Measuring and Improving the Safety and Quality of Care in Older Medical Inpatients

A thesis presented for the degree of Doctor of Philosophy (PhD)

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Abstract.

Older people, often frail with multiple co-morbidities, constitute the largest proportion of hospital inpatient populations. Yet existing ways of measuring the quality and safety of care that they receive are not usually designed with the unique problems encountered by this vulnerable population in mind. The aims of the work presented in this thesis were to investigate what is known about the types, incidence and causes of safety and quality issues in older medical inpatients, to develop and test novel tools to measure the safety and quality of care that they receive and finally to design and test interventions to improve care.

In Section 1 of the thesis (Chapters 1 and 2), an introduction of patient safety and quality in older people is presented, with an overview of current strategies for measurement and improvement, and the rationale for undertaking this research.

Section 2 (Chapters 3 - 5) contains three exploratory studies in which different approaches (a systematic review of the literature and re-analysis of the major adverse event studies, a qualitative study involving staff who are involved in the care of older people, and an exploratory retrospective case record review) were used to produce an overall picture of safety and quality issues in older medical inpatients.

This information was used to develop two novel case record review tools (the "Long tool" and "COMPACT") to measure the quality and safety of care in older medical inpatients, using a combination of outcome and process measures. Section 3 (Chapters 6 and 7) describes the development and testing of these tools.

Next, Section 4 (Chapters 8 and 9) of the thesis consists of two studies which were designed to provide the basis for further safety and quality improvement work in older medical inpatients. In Chapter 8, an investigation of the importance and trainability of safety skills (attributes of the safe practitioner) that may form the basis of a template for future patient safety curricula is described. In Chapter 9, a different improvement approach is described - the development and use of a multidisciplinary goal sheet on a medicine for the elderly ward, its effect on quality of care as measured by COMPACT, on staff perceptions of the incidence of adverse events, teamwork and communication, and on goal understanding.

Finally, the discussion (Section 5, Chapter 10) reflects on the overall findings, strengths and weaknesses of the studies, and implications for clinical practice and future research.

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Section 1. Introduction.

I would like to start by setting out the background and context for the work contained in this thesis. In Chapter 1 I describe the history and evolution of the concepts of patient safety and quality of care, and how these apply to geriatric medicine in terms of the types and causes of hospital-associated harm experienced by older people. In Chapter 2 I will describe some of the current ways of measuring and improving care in this population. Then, at the end of the section, I will set out the aims and structure of the thesis.

Chapter 1. An introduction to patient safety and quality in the care of older people in hospital.

1.1. Introduction and context for this work.

1.1.1. History and evolution of the concept of patient safety.

The practice of medicine, aptly described by Samuel Johnson as “the greatest benefit to mankind”, has and always will be associated with inherent risks (Vincent, 2010). This has been acknowledged for as long as medicine itself has existed; the Ancient Greeks’ words for “kill” and “cure” were similar, and the Hippocratic Oath contains the promise "to abstain from doing harm", later adapted by Thomas Sydenham into the famous phrase “Primum non Nocere” or “First do no Harm”.

Perhaps surprisingly, it has only been relatively recently that these healthcare-associated risks, their causes and ways to ameliorate them have been subject to rigorous academic study. One of the earliest specific observations of patient harm was made in the nineteenth century by Florence Nightingale regarding infection in hospitals, a new and devastating problem at the time. In the 1960’s, more systematic studies of hospital-associated harm began to be carried out, initially driven by the development of litigation. In more recent times, through high profile events such as the Bristol Heart Inquiry and landmark international reports such as “An Organisation with a Memory” in the UK (Donaldson, 2002) and “To Err is Human” (Institute of Medicine, 1999) in the USA, patient safety has become the focus of much attention. It is now recognised globally as one of the top priorities in healthcare and as our understanding of healthcare related harm deepens, so our ability to reduce it grows.

1.1.2. Safety and its relationship with quality

Patient safety is just one aspect of high quality care. In the recent UK report "High Quality Care for all: NHS Next Stage Review" (Department of Health, 2008) the three main dimensions of quality are deemed to relate to safety, patient experience and effectiveness. In the USA, "Crossing the Quality Chasm" (Institute of Medicine, 2001) similarly described the elements of quality as safety, effectiveness, patient-centredness, timeliness, efficiency and equitableness. Patient safety has been described as "the dark side of quality" because of its historical association with litigation and blame, but it is increasingly acknowledged that efforts to learn more about and improve safety are themselves a feature of high quality healthcare organisations (Vincent, 1997).

1.1.3. The development of an understanding of safety and quality in Geriatric Medicine.

Like patient safety, our practice and understanding of geriatric medicine has expanded greatly over the last 50-60 years. The cornerstones of the speciality are strong multidisciplinary team working and the use of a holistic approach towards patients. One of the early pioneers of the speciality was Marjorie Warren (1897-1960), who was Deputy Medical Superintendent at the West Middlesex Hospital in 1935 when the Poor Law Infirmary next door was annexed into it. In 1943 and 1946 she blamed the high number of elderly, bedridden and chronically sick patients she and her team found in this infirmary on poor diagnosis, insufficient treatment, and the absence of proper medical supervision, multidisciplinary working or rehabilitation. By creating the first Geriatric Specialist Unit in the United Kingdom, she helped to found the British speciality of Geriatric Medicine (Matthews, 1984). This was probably the first time that it was understood that preventing iatrogenic harm was crucial to maximising the health and independence of older patients.

A greater appreciation of the vulnerability of older people to healthcare associated harm developed further in the 1960's. One of the first studies to examine this was conducted at St. Pancras Hospital, London (Rosin & Boyd, 1966); this was a prospective study following three groups of patients which found that the rate of complications in the older group was about twice that of younger medical patients. At around the same time, our understanding of the specific clinical problems that occur in older patients developed further, with Bernard Isaacs in 1965 being the first to coin the phrase "geriatric giants"; immobility and instability, incontinence and impaired intellect (Isaacs, 1965), now understood to include delirium, falls, incontinence, pressure sores, depression, under-nutrition, constipation and functional decline. Our ability to recognise, prevent and manage these problems or "geriatric syndromes" has vastly improved over the years and as discussed throughout this thesis, they are inextricably linked to safety and quality of care in older people.

1.1.4. Drivers for improving the care of older people.

In modern times, across the world, the demographics of hospital inpatient populations reflect our increasingly ageing societies. The Wanless Social Care report of 2006 (King's Fund, 2006) estimated that by 2026 the number of people in England aged over 85 will have increased by two thirds, compared with a 10% increase in the overall population. This report also predicted an expansion of the proportion of older people with impairment and dependency over the same time frame, with about a 54% increase in the number of people with a "high level" of need. This will inevitably impact on hospital services; as it is currently people over 65 account for 60% of acute hospital admissions and 70% of bed days in NHS hospitals (Oliver, 2008).

Not only has the ageing population been associated with the expansion and development of the speciality of Geriatric Medicine over recent decades, but it has also caused major shifts in strategic priorities for those responsible for health service provision

and organisation, so that increasing attention is now being paid to the needs of older people. In the UK, the National Service Framework for Older People (NSFOP) (Department of Health, 2001), published ten years ago, set out eight standards of care for older people designed to be incorporated across the healthcare system. In 2004, "Better Health in Old Age" (Philp, 2004) reviewed progress made since publication of the NSFOP, and reported improvements in social and intermediate care for older people and in overall attitudes towards older people. Subsequently the document "A New Ambition for Old Age" (Philp, 2006) proposed programmes to improve dignity in care, "joined-up" care and healthy ageing. This was followed by "A Recipe for Care - Not a Single Ingredient" (Philp, 2007) which acknowledged the ongoing challenges in providing excellent care for older people in hospital and in the community, describing one of these challenges thus: "Our existing services were not designed with older people's needs in mind" (p.1), and highlighting the need to "ensure that the right care is delivered in the right place by teams with the skills to meet the health and care needs of people with age-related problems." (p.8).

Over recent decades there have been huge advances in the provision of certain clinical services heavily used by older people, such as falls, orthogeriatrics and stroke services. This thesis is concerned with measuring and improving the quality and safety of care of the general medical, frail, older patient in hospital - for these patients welcome attention has recently been paid to general issues such as dignity (British Geriatrics Society, 2006) and the care of patients with dementia in the acute general hospital (Department of Health, 2009) particularly in the light of reports such as "Counting the Cost: Caring for people with dementia on hospital wards" (Alzheimer's Society, 2009). Maximising safety and quality for these patients may be seen as a battle against the inevitable consequences of illness and age, combined with the negative outcomes of preventable geriatric syndromes and adverse effects of treatments and interventions.

1.2. Types of adverse events experienced by older people in hospital.

Much of our knowledge of the scale of healthcare-related harm derives from a series of large international studies of adverse events, described in greater detail in Chapter 3. At this stage, I would like to consider the definition of an adverse event, and how this applies to older people.

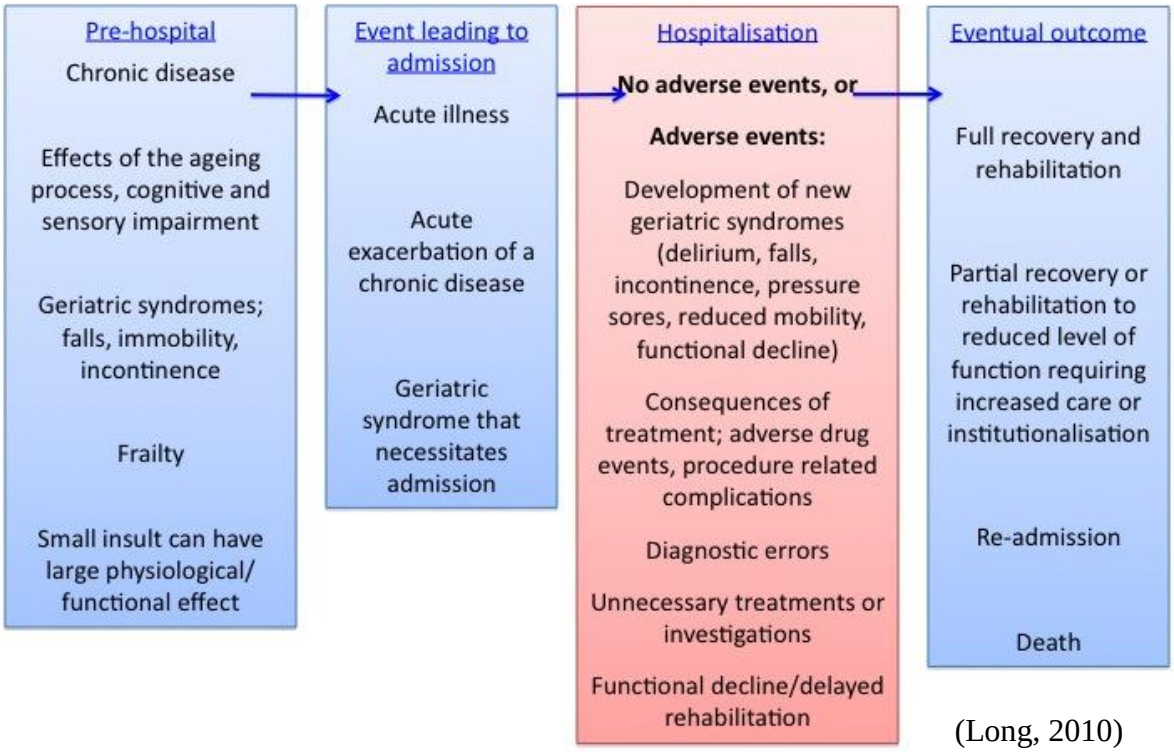
1.2.1. What are adverse events?

The traditional definition of an adverse event is "an unintended injury caused by medical management rather than by the disease process and which is sufficiently serious to lead to prolongation of hospitalisation or to temporary or permanent impairment or disability to the patient at the time of discharge or death" (Brennan, 1991). In this section I would like to consider the specific types of adverse events that affect older people in hospital.

1.2.2. The geriatric syndromes as adverse events.

During an admission to hospital, older people are of course vulnerable to the same types of adverse events as their younger counterparts, such as hospital acquired infection, adverse drug events, deep vein thrombosis, and procedure related complications (Rothschild et al., 2000). As will be described in Chapter 3, there is evidence that the incidence of these types of adverse events is greater in older patients and their consequences more severe. However, the process and effects of hospitalisation in older people, particularly those who are frail with multiple comorbidities, are different from those in younger people: it therefore follows that any analysis of patient safety and adverse events in this vulnerable population should be undertaken in this context. Figure 1.1. illustrates this in a proposed scheme for the effects of hospitalisation in frail older people.

Figure 1.1. A proposed scheme for the effects of hospitalisation in frail older people.



(Long, 2010)

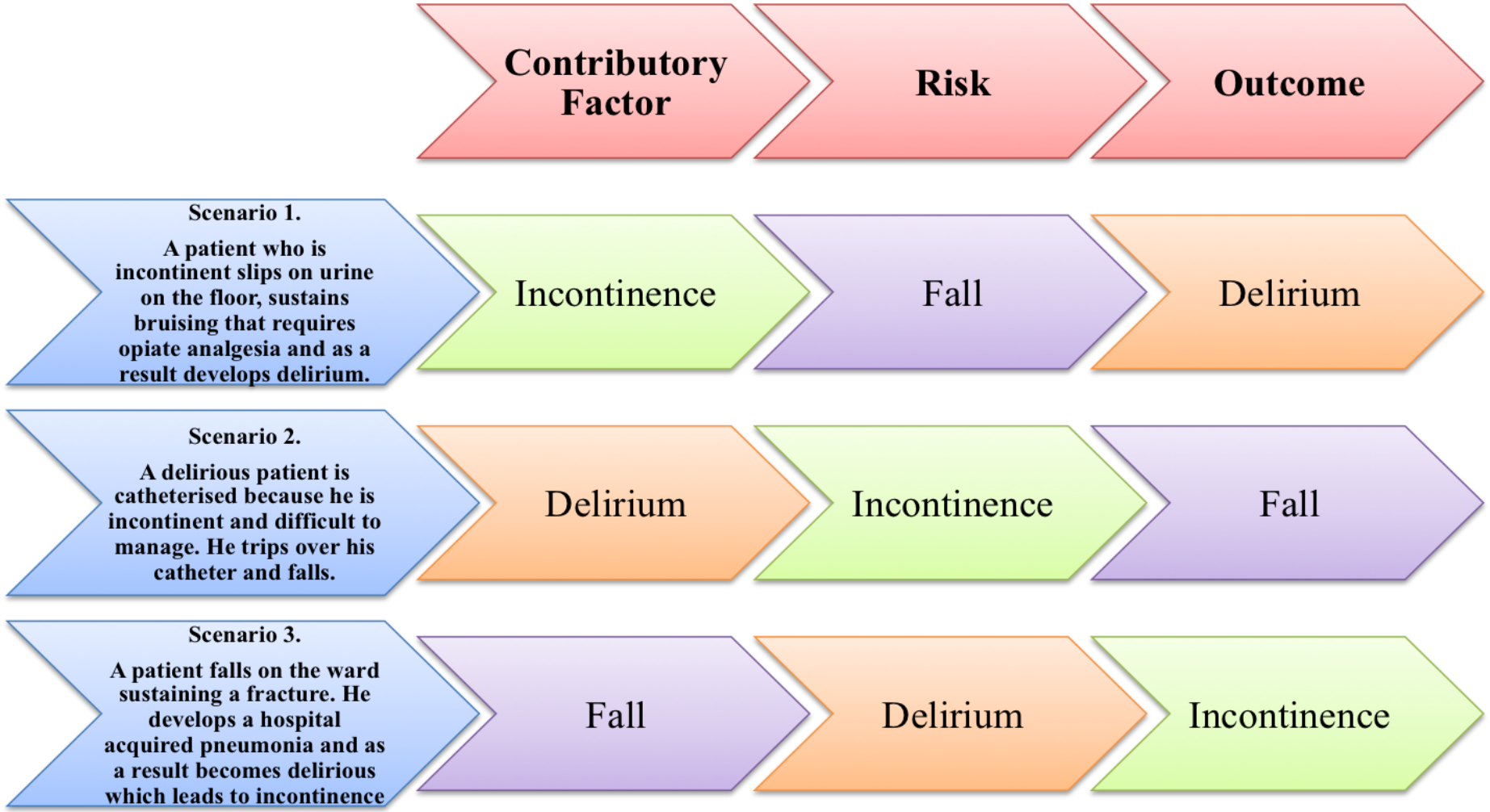
Older people may come in to hospital because of an acute illness, acute exacerbation of a chronic disease process, because of side effects of treatment for these conditions, or because of the development of a new "geriatric syndrome" such as delirium, falls, incontinence, pressure sores, depression, under-nutrition, constipation and functional decline.

Of course older patients very commonly have one or more of the geriatric syndromes at the time they are admitted to hospital. If any of them truly occur *de novo* during the inpatient stay (and are not caused by the progression of disease alone), then it is reasonable to consider this an adverse event. New geriatric syndromes fulfil the criteria for the definition of an adverse event (Brennan, 1991) because they are associated with adverse outcomes in terms of mortality and morbidity, and they are largely preventable (Tsilimingras et al., 2003).

One example of a geriatric syndrome that is increasingly being recognised as an adverse event if it occurs *de novo* during the hospital admission is delirium. It has been argued that the occurrence of delirium in hospitals can be used as a barometer of the quality of care provided to older people, because in an ideal world high quality hospital care would mean the avoidance of all of the causes of hospital-associated delirium such as dehydration, hospital acquired infection, constipation and adverse effects of medication (Inouye, 1999).

The geriatric syndromes rarely occur singly or in isolation - during the complex, lengthy hospital admissions often experienced by older people, they are often interlinked and may contribute to downward spirals in progress and outcome. They can each contribute or be outcomes of each other: this is illustrated in Figure 1.2., which shows three common clinical scenarios where delirium, incontinence and falls occur in different sequences. This illustrates the complexity of the relationships between different clinical syndromes; in addition to being risks in their own right they can also contribute to or result from each other. A consequence of this complexity is that interventions targeted at any one of these syndromes will have knock on effects on the others. A summary of common adverse events in older people is shown in Figure 1.3..

Figure 1.2. Three common clinical scenarios where delirium, incontinence and falls occur in different sequences.



(Long, 2010)

Figure 1.3. Common adverse events in older people.

The geriatric syndromes, which could be considered to be preventable adverse events if they arise *de novo* in older people in hospital and are not related solely to progression of disease:

- Functional decline
- Loss of mobility
- Urinary or faecal incontinence
- Delirium
- Severe constipation
- Pressure sores
- Falls
- Malnutrition and/or dehydration
- Depression

Other common adverse events in older people:

- Hospital acquired infection (in older patients notably aspiration pneumonia and catheter-associated infections)
- Adverse drug events
- Venous thromboembolism
- Procedure related complications

(Long, 2010)

1.2.3. Preventable functional decline as an adverse event.

Functional decline, defined as a decrement in physical and/or cognitive functioning which leads to a reduced ability to perform the Activities of Daily Living (ADLs) which are necessary to live independently, is a common outcome for older people in hospital, regardless of whether or not any adverse events or geriatric syndromes occur during their stay in hospital.

The dangers of believing the misconception that bed rest is good for hospitalised patients was succinctly put by Richard Asher in 1947:

"*It is always assumed that the first thing in any illness is to put the patient to bed. Hospital accommodation is always numbered in beds. Illness is measured by the length of time in bed. Doctors are assessed by their bedside manner. Bed is not ordered like a pill or a purge, but is assumed as the basis of all treatment. Yet we should think twice before ordering*

our patients to bed and realise that beneath the comfort of the blankets there lurks a host of formidable dangers... Teach us to live that we may dread unnecessary time in bed. Get people up and we may save our patients from an early grave" (Asher, 1947).

"Hazards of Hospitalisation" (Creditor, 1993), provides a review of the clinical effects of being confined to bed for older people in hospital, namely reduced muscle strength and aerobic capacity, vasomotor instability, reduced respiratory function, bone demineralisation, urinary incontinence, loss of skin integrity, loss of "sensory continence", and reduced nutritional status.

Unfortunately, older patients are still often confined to bed more than is necessary in hospital, and functional decline remains an extremely common problem in more modern times; in one study a third of elderly patients had lost at least one ADL at discharge from hospital (Boyd et al., 2008). Much of this may be inevitable and unavoidable, as acute illness often necessitates a period of limited mobility and dependence on others. However, it may occur more than is necessary if, perhaps due to low staffing levels or a lack of training, understanding or awareness, staff are not pro-active in getting patients out of bed. As described in Chapter 4, there can be a perception amongst staff that it is easier and safer to leave patients in bed in hospital and to carry out all ADLs for them. An incorrect balance may therefore be struck between the avoidance of some adverse consequences, such as falls, and institutionalisation and a loss of independence. Hence, like the other "geriatric syndromes", many cases of functional decline are avoidable during a hospital admission if proper measures are taken to prevent it.

Functional decline that occurs during hospitalisation can impact on the older person (and the healthcare system) in several other ways: the "cascade of interactions" between the factors described by Creditor can lead to loss of independence necessitating increased care requirements, often institutionalisation, and what Creditor describes as " a loss of home, and

ultimately a loss of place". Depression and reduced overall quality of life are of course often associated with this. One consequence of the diminished reserves associated with frailty and age is that when functional decline occurs, it may be irreversible, or require a prolonged period of rehabilitation to achieve partial or complete reversal, which whilst often unavoidable, bring further risks associated with a prolonged length of stay.

1.2.4. Adverse drug events in older people.

Medication related problems in older people in hospital are common and, like the geriatric syndromes, are often inextricably linked to safety and quality of care in these patients. The term "adverse drug event" covers a wide range of medication related problems, encompassing the following: errors in prescription, preparation or administration, adverse drug reactions (Spinewine et al., 2007), or problems with concordance. These may occur as a result of appropriate or "inappropriate" (under-, over-, or mis-) prescribing.

As with other adverse events in hospital, at first glance the incidence of adverse drug events seems to increase with age, but there is some evidence that they are actually directly related to complexity and comorbidity rather than age alone, in particular being related to changing pharmacodynamics associated with ageing and polypharmacy (Milton, 2008).

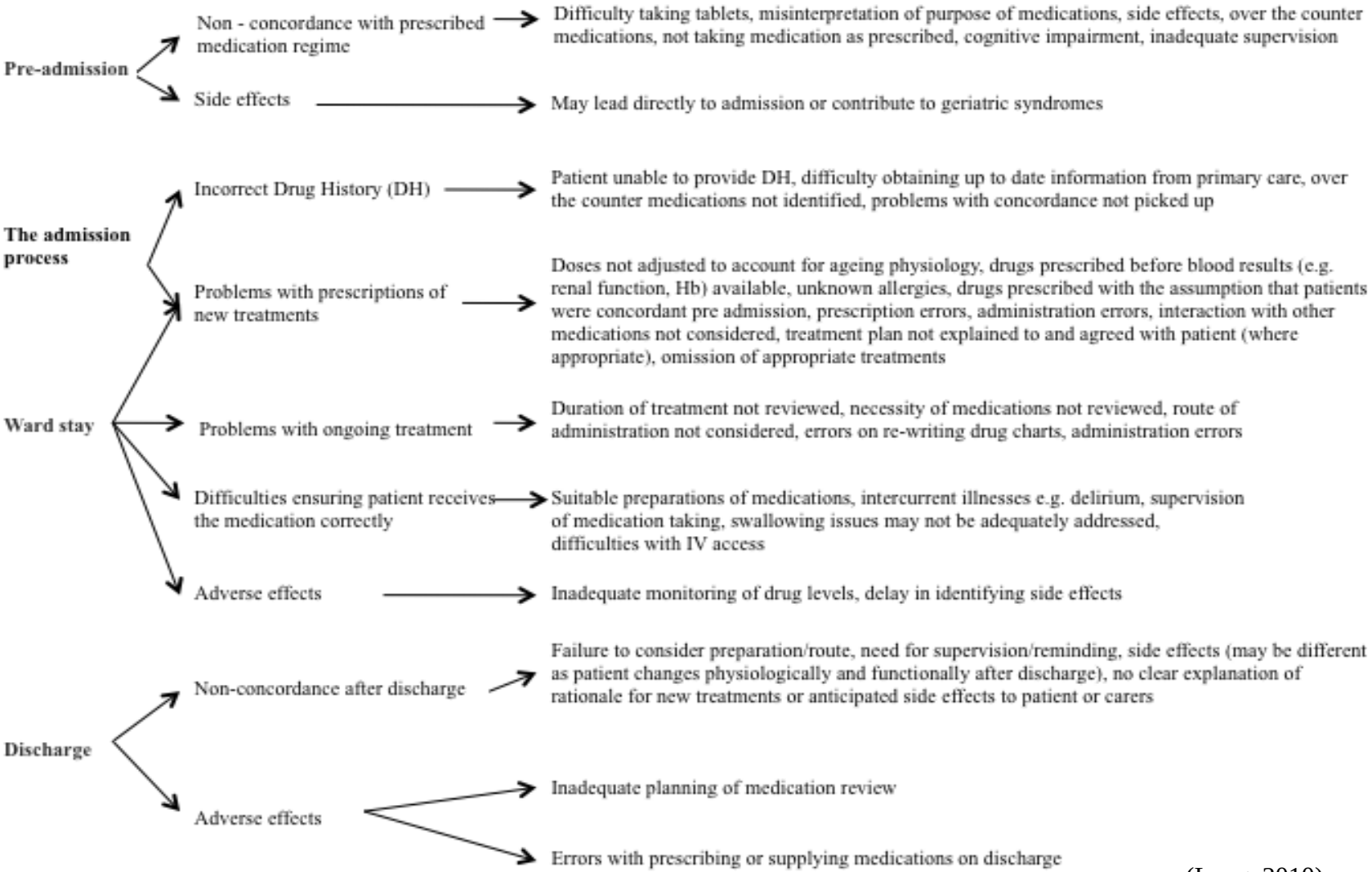
Recent studies have estimated the incidence of adverse drug events in older people in hospital to be between 31.9% and 37% (Page & Mark Ruscin, 2006). As with all estimations of hospital-associated risks, this figure very much depends on the definitions and methodologies used. Nevertheless, even when relatively strict definitions are used, adverse drug events are the most common adverse events to affect hospitalised patients of all ages (Leape et al., 1991).

The over 60's are the highest users of medications, receiving 59% of dispensed prescriptions in the UK (Department of Health, 2004). Polypharmacy is an important issue. A

fifth of people aged over 70 take five or more medications (Rollason & Vogt, 2003). Virtually all older patients who are admitted to hospital are given drug treatment of some description. It would be unusual for an older patient not to have been taking any medications prior to admission, or for these not to have changed in some way by the time of discharge. These changes need to be communicated effectively to primary care providers to avoid potentially disastrous consequences due to continuation of pre-admission medication regimes.

Adverse drug events are also a significant cause of admission to hospital in older people (estimated at 6.5% of admissions, with a median length of stay of 8 days (Pirmohamed, 2004)). Furthermore, patients who were admitted because of an adverse drug event go on to have a significant chance (17.7% (Zhang, 2009)) of subsequent readmission due to further adverse drug events. Figure 1.4. shows some of the common types of medication related problems that may occur at different stages of the hospital admission process in an older person.

Figure 1.4. Common types of medication-related problems in older people in hospital.



(Long, 2010)

Outside hospital, the highest users of medications are care home residents. A recent study in the UK showed that the incidence of medication errors in nursing home residents was as high as 69.5% (Barber et al., 2009). The categories of error found were similar to those in Figure 1.4. - they included prescribing errors, monitoring errors, dispensing and administration errors. The underlying causes of the errors both in hospital and in care homes relate to common underlying patient safety themes: system failures in addition to individual errors, communication problems within and between healthcare teams and with the patient, and assessment or diagnostic skills and procedures not tailored to the individual.

Certain categories of drugs are more problematic than others for older people, notably anticoagulants, opiates and other centrally acting medications. Several efforts have been made to try to identify groups of medications which pose particular risk, so that they can be more easily avoided in this population, such as those categories of drugs included in the Beer's Criteria (Fick, 2003). The fact that common treatments such as oxygen and intravenous fluids should be treated in the same way as other drugs is sometimes forgotten; but these are potentially dangerous treatments (particularly for older patients) and should be treated with due caution. The physiological changes associated with normal ageing and the pathological changes associated with the disease processes which are common among older people in hospital all impact on the risks associated with giving medications to this population. These changes have effects on the pharmacokinetics and pharmacodynamics of virtually all medications.

Frail elderly people are rarely included in large pharmaceutical trials, which in turn may result in harm because findings from clinical trials involving younger patients may be incorrectly extrapolated to older patients. This occurs even with very commonly prescribed drugs such as aspirin or non-steroidal anti-inflammatory drugs (NSAIDS) (Rehman, 2005). The pathophysiological changes that occur with age also have practical implications, in terms

of drug regimens, administration and concordance; for example swallowing difficulties, arthritis or cognitive or visual impairment need to be taken into consideration when prescribing and administering drugs to these complex patients.

As with all patient safety issues in older people, adverse drug events do not occur in isolation and they are closely linked to the geriatric syndromes both in cause and effect. Because of the often non-specific ways in which adverse drug events present in these patients, a potential problem is that they may go unrecognised, and rather than stopping causative agents, more medications are added, causing further adverse effects. The resultant vicious circle is known as the "prescribing cascade" (Rochon, 1997).

1.3. Causes of hospital associated harm in older people.

The causes of harm to patients of any age are complex and may lie in individual error, process factors, organisational or cultural issues, or wider system problems. In this section I address a number of issues which are particularly critical in the care of older people.

1.3.1. The effects of comorbidity and frailty.

As the major international studies (discussed in Chapter 3) show, adverse events are not associated with age alone, but rather with co-morbidity, complexity and frailty. Co-morbidity is commonplace amongst older people: 98% of people over the age of 65 in one primary care population had multiple chronic medical conditions (Fortin et al., 2007). This leads to complex care needs, interacting medical conditions, and polypharmacy, all of which make them more vulnerable to poorer outcomes in general such as increased mortality and length of hospital stay. In this group, acute illness is often associated with exacerbations of multiple coexistent chronic diseases, which interplay to produce complex physiological, cognitive and functional consequences. There is a great deal of inter-individual heterogeneity in the way in which these complexities manifest themselves. It follows that acute illness

leading to hospitalisation in such individuals is rarely as straightforward as it might be in a younger, fitter patient, thus more healthcare associated harm can occur.

Frailty can be, but is not always, associated with the latter stages of chronic illnesses. Definitions vary, but frailty is understood to be a clinical syndrome in its own right, which is associated with loss of reserve in multiple organs, associated with a clinical phenotype of generalised weakness, weight loss, exhaustion and immobility (Fried, 2001). This loss of reserve leads to the frail individual being less able to withstand illness and hospitalisation than those without the condition.

The interaction between older people with multiple comorbidities, complexity and frailty with the healthcare system is often complicated by the fact that illness presents in different, often more non-specific, ways in this population, and may manifest as one of the "geriatric syndromes" described above.

In addition, cognitive impairment and sensory impairment may make it difficult for these patients to communicate with healthcare staff, which means that they are less able to be involved in their own care than younger people, thus increasing their vulnerability to errors.

1.3.2. Decision-making in the care of older people.

Safe and high quality of care for older people requires staff to make complex decisions about medical and non-medical matters, with the involvement of the whole multidisciplinary team, and with the aim of meeting the patients best interests. This applies across the entire healthcare system, from decisions relating to the prevention and management of long term conditions in primary care, deciding when and whether to refer or admit patients to secondary care, to making decisions relating to inpatient care and the complex planning required to maximise their safety on discharge from hospital. The challenge is to make these decisions in the safest possible way, by anticipating and pre-empting potential error or harm, and whilst always acting in the patients best interests.

Very old people, particularly those who are frail and complex, have in the past often been excluded from large clinical and pharmaceutical trials (Masoudi, 2003), which have formed the basis of our pharmaceutical approach to treating many common conditions. This is to a certain degree understandable: the different physiological characteristics, coexistent medical conditions and therapies associated with old age can lead to a variety of responses to drug therapy, both beneficial and adverse: these responses can be difficult to predict, detect and adjust for accurately in terms of measured outcomes. The consequence of this is that optimal therapeutic decision making for the individual, for instance in terms of drug dosing or combinations, may be difficult to achieve because of the lack of an appropriate evidence base. Hence a degree of clinical judgement based on the risks and benefits of treatment in the context of elderly, frail physiology needs to be used to make such decisions. Over recent years it has become more apparent that older people are the target group for many treatments, and increasingly trials have been designed with these patients in mind (Milton et al., 2008).

Commonly used therapeutic guidelines can also be difficult to generalise to older people, and, particularly when used by those who are not *au fait* with geriatric medicine (such as relatively inexperienced prescribers or prescribers in settings which are more used to dealing with younger or fitter people), this can result in inappropriate treatments being given to frail older people, with adverse consequences which may include over- or under-treatment, for example with opiate analgesia, or intravenous fluids. Even in conditions where strong consensus and clear guidelines for management exist, there is evidence that treatment remains inadequate. This is particularly true of conditions such as delirium, where appropriate management comprises a concerted team effort and a multi-facetted approach. There is evidence that such guidelines are not always followed: this demonstrates the fact that if they are to be implemented universally and successfully, concomitant educational and organisational change are needed (Young & George, 2003).

As the needs of each individual within this population are so heterogeneous, care must be taken to tailor decision making to the individual. Training to develop these difficult decision making skills is also often lacking and is usually expected to develop with experience. There is an extensive literature about the complexities of medical decision making (Croskerry, 2002a). In our daily clinical practice, we use heuristics, which are simple but approximate rules to aid decision making by simplifying the situation and decision to be made. Particularly at times of fatigue, stress or time pressure, these heuristics can become "biases", leading to faulty clinical decision making leading to undesirable consequences (Redelmeier, 2005). It follows that cognitive biases and failed heuristics are more likely to occur when the information presented to the decision maker is as complex and of varying quality as is often the case in the care of older patients. Another problem is that whereas younger people might expect and be able to take part in the clinical decision making process, older people often prefer not to be involved to the same extent (Levinson, 2005) or are not able to do so. When making complex decisions such as care planning near the end of life, multiple factors need to be taken into consideration, such as the health status of the patient, their values and individual goals, so that the best interests of the individual are met. All of these factors make decision making in the frail elderly difficult, and any failure in this process can lead to undesirable consequences.

1.3.3. Multidisciplinary team working and communication.

The complex needs of elderly patients often require equally complex treatments or interventions, usually involving the combined efforts of a highly skilled multidisciplinary team. Of course this is in general a highly beneficial way of working because decisions and clinical management are enhanced by the expertise contributed by a variety of professionals: however team working can be associated with its own problems.

If optimal patient outcomes are to occur, the multidisciplinary team needs to communicate effectively. Some of the barriers to effective communication in healthcare teams described in the literature include conflict or ambiguity about individual roles within the team, perceived hierarchical difficulties and interpersonal conflict (Sutcliffe et al., 2004). There is some evidence that this is compounded by the fact that different professions differ in their ratings of collaboration, perceived barriers to teamwork, and beliefs of what the best outcomes for patients might be (O'Leary et al., 2010). In addition, there can be difficulty in ensuring that team members do not work in "silos" and have a common understanding of goals of care. If multidisciplinary teamwork is ineffective, this can adversely effect communication with patients and carers, in turn causing decisions to be made without adequately involving patients.

The wider team caring for an older person usually extends across health and social care sectors, where coordination and continuity of care can be a problem. In particular, poor communication at times of transition of care can cause problems. It has been shown that inadequate communication at discharge from hospital, particularly in relation to medication management and monitoring arrangements, can lead to preventable re-admissions in older people (Witherington et al., 2008). It is also crucial that decisions that have been made with patients about preferred levels of future intervention are adequately communicated at the time of discharge, otherwise they may be subjected to unwanted or unnecessary intervention after discharge.

1.3.4. Systems and processes of care for frail older people.

Frailty and comorbidity bring many challenges for healthcare systems - the largest of which is to ensure integrated care, with seamless communication and transition between services, allowing congruent treatment plans and optimal outcomes. Transitions of care,

particularly the interface between primary and secondary care in acute hospitalisation (both at admission and discharge) can be particularly problematic.

The goal of care in hospital for a frail person is not just to treat their acute illness, but also to promote maximal functional recovery and independence- in other words to prevent functional decline. This requires systems in hospital to be set up so that those patients who are frail and at risk of functional decline can be recognised and treated early to prevent adverse outcomes. However, this does not always occur, particularly when older people are admitted (justly) to areas or departments where systems are geared more towards the care of younger, fitter people (such as surgery).

There are of course several other systems factors that may contribute to adverse events in the care of patients of all ages in hospital. These can give rise to poor communication, for example inadequate procedures for handover for medical and nursing staff, either between themselves when shifts change or between disciplines when decisions are made.

The provision of systems for good communication is particularly important in the care of complex older patients - for example, time constraints and pressures of volume of work may not allow healthcare professionals to take the time required to assess an older person thoroughly, decide upon a good management plan, initiate it and communicate all of this effectively to the patient, their relatives and other staff caring for them. This means that even if an individual has the good communication and clinical reasoning skills, the system does not always allow these to be realised to their maximum potential in optimising patient care.

1.3.5. Attitudes and ageism

Unfortunately, despite standard one of the UK's National Service Framework for Older People in 2001 being "Rooting out age discrimination", there is still evidence that

negative attitudes towards older people, including ageism, can result in poor quality care and problems with patient safety (Joint Committee on Human Rights, 2007). Ageism describes the act of discrimination against people on the grounds of age alone. Commonly cited consequences of this are that older people may be denied treatment or investigations which may be of benefit to them, or that they may be subject to mislabelling or misdiagnosis (Oliver, 2008). For example, there are several studies showing that older people with ischaemic heart disease are less thoroughly investigated and receive less interventional treatment than younger patients, even when it is clinically indicated (Harries et al., 2007). This is despite growing evidence that older people are likely to experience substantial benefit in terms of quality and length of life from appropriate cardiac interventions. This may not occur as a result of overt ageism, but rather may be related to uncertainty about the best and safest clinical practice in this age group, particularly in those who are not specialists in caring for older patients. Of course one of the unique skills of geriatricians is to be able to strike the correct balance for the individual patient between therapeutic nihilism (the avoidance of treatment entirely) and therapeutic heroism (where all interventions and treatments are given, even when there is unlikely to be any therapeutic benefit).

The care of older people in general can be regarded by some within the healthcare profession as a speciality with very little reward (in terms of clinical outcomes or prestige) for sometimes very "heavy" physical work. This can lead to staff feeling undervalued and lacking in motivation to implement change. There can also be a negative attitude towards the patients themselves, leading to reduced dignity, loss of patient empowerment and a sense of infantilisation. One of the observable manifestations of this is "elderspeak" (Williams et al., 2003), where patients, particularly those with cognitive or sensory impairment, are talked down to as if they are children: this lack of meaningful interaction can contribute to depression and cognitive and functional decline.

Chapter 2. Measuring and improving the quality and safety of care in older hospital inpatients.

2.1. Measurement of safety and quality.

2.1.1. Introduction - why measure safety and quality?

"We can only be sure to improve what we can actually measure"

> (Lord Darzi, High Quality Care for All: NHS next stage review final report, June 2008).

With increasing public expectations and financial pressures, there is a growing emphasis on measuring safety and quality in healthcare, to ensure that limited resources are used in the best possible way for everyone. This is reflected in current British government policy, which is shifting away from a focus on targets and waiting times towards an emphasis on patient outcomes and experience (Raleigh & Foot, 2010).

Current policy aims to include the development and use of quality indicators at all levels of the healthcare system. This includes the use of "patient reported outcome measures" (PROMS) and measures provided by regional Quality Observatories at the local clinical team level, "quality accounts" and "clinical dashboards" (King's Fund, 2010) at the Board Executive level, information used as part of the "Commissioning for Quality and Innovation" (CQUIN) scheme at commissioner level, and finally national quality outcome goals, such as those in the proposed NHS Outcomes Framework (Department of Health, 2010) and the National Quality Board, which assesses national priorities and compares performance with other countries. The Department of Health has launched a Measuring for Quality Improvement (MQI) programme to implement, support and promote the quality measurement agenda across all of these levels of the healthcare system. Common standards of safety and

quality are being sought for use by the Care Quality Commission, the role of which is to regulate for safety and ensure minimum standards.

Measuring quality at the local clinical level – the target of the work presented in this thesis.

Although it is important for commissioners and the government to have broad measures of quality for benchmarking and to drive national strategies, it is equally important for useful quality measures to be available at a more local level for clinical teams who wish to improve the care they deliver. Clinical teams need to have data that is meaningful to them and can allow them to monitor and reflect on practice, innovate and improve their services and see the effects of such improvement. It is important that we try to ensure that quality and safety measures are as accurate as possible and as true a reflection as possible of the actual care that patients receive. It is equally crucial (and a central tenet of this thesis) that they involve measures that are important to the patient group being studied, thus ensuring equity and avoiding health inequalities.

Measuring quality and safety in a clinically useful way is a complex challenge and if improvements in care are to follow it is vital that these complexities are understood and dealt with. In subsequent paragraphs I describe several existing ways to measure or estimate safety and quality in healthcare, including analysis of administrative and reporting data, national audits, quality indicators and case record review. Each of these methods has its advantages and disadvantages, in terms of availability of data, cost, reliability, observer bias and clinical relevance.

2.1.2. Important definitions for this thesis.

The ultimate aim of the thesis is to develop safety and quality measures and improvements for older patients. Firstly I would like to consider definitions, end points and measurement in safety and quality. A clear understanding of these is crucial before we can even begin to contemplate improvement.

Quality.

Finding an adequate definition of quality of care is difficult and has been an ongoing struggle over many years. In 1980, Donabedian defined care of high quality as "that kind of care which is expected to maximise an inclusive measure of patient welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all its parts" (Donabedian, 1980). Over recent years, there has been much debate about whether quality should be defined from the point of view of healthcare organisations, clinicians, or patients. There are perceived barriers to quality measurement and improvement with each approach (Casalino, 1999). Different organisations focus on different aspects of quality, depending on their aims and perspectives. This is illustrated in Table 2.1., taken from the Kings Fund report "Getting the Measure of Quality" (Raleigh & Foot, 2010).

Table 2.1. Domains of quality, taken from "Getting the Measure of Quality" (Raleigh & Foot, 2010).

Domain	Institute of Medicine	Organisation for Economic Co-operation and Development	Quest for Quality	Performance Assessment Framework	NHS Next Stage Review	Care Quality Commission
Safety	✓	✓	✓		✓	✓
Effectiveness	✓	✓	✓	✓	✓	
Outcomes of care				✓		✓
Patient experience	✓	✓	✓	✓	✓	✓
Timeliness	✓		✓			
Access			✓	✓		✓
Efficiency	✓			✓		✓
Value for money						✓
Capacity			✓			
Equity	✓		✓			
Healthy, independent living						✓
Health improvement				✓		

Current thinking tends to place the patients perspective as the most important as patients are increasingly involved in their care and as healthcare organisations are increasingly accountable to the public. As described in Chapter 1, the current trend is to define quality of care as in Lord Darzis report "High Quality for All" (Department of Health, 2008) where quality, from the patients point of view, encompasses the three dimensions of safety, patient experience and effectiveness.

Safety.

Safety is undoubtedly a vital domain of quality. Patient safety itself may be defined as "the prevention and amelioration of adverse outcomes or injuries stemming from the process of healthcare" (Vincent, 2010). This definition encompasses not only the avoidance of individual error or harm and the high reliability of healthcare systems, but also the appropriate management of healthcare-associated harm: not just in terms of appropriate immediate medical management, but also in supporting staff, patients and their families. There is a distinction to be made between error and harm. The aim of patient safety is to prevent harm, in other words to make the process of healthcare more reliable and able to cope with error, which may in itself not be avoidable.

An adverse event is defined as an unintended injury caused by medical management rather than the disease process, which is sufficiently serious to lead to prolongation of hospitalisation or to temporary or permanent disability or death (Brennan et al., 1991a). This definition is important because it has been traditionally used in studies of the nature and scale of harm, described below.

A critical incident or "near miss" may be considered to be the next step down from this - incidents which may have caused harm but didn't actually do so.

Older People.

Again, definitions of "older people" vary depending on the purpose and aims of those seeking the definition. There is no true chronological age limit that defines a person as "old", although arbitrary thresholds are used both in the clinical and research worlds for necessity. It is generally more useful to think in terms of "biological age", taking into account the phenotypical characteristics of frailty, co-morbidity and complexity described in Chapter 1. This thesis focuses on medical inpatients with these characteristics, as the unique problems

associated with this vulnerable group means that a different approach is required for assessment of the quality and safety of care they receive.

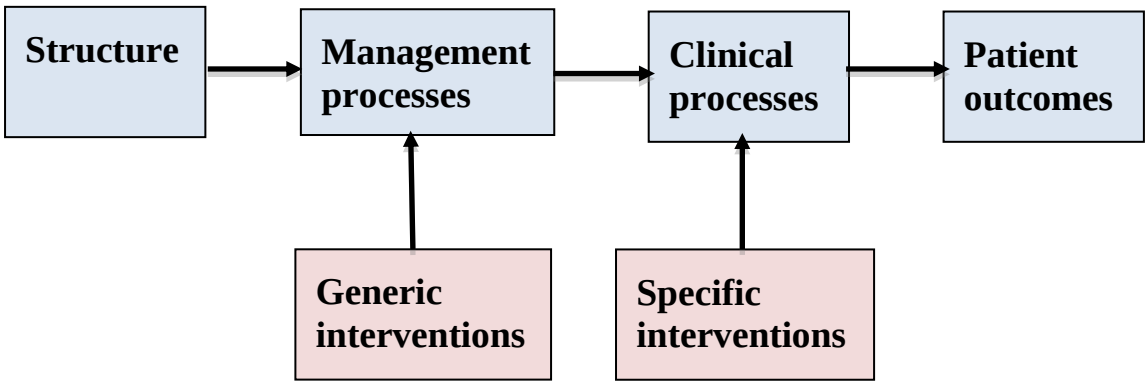
2.1.3. End points and measurement in safety and quality.

Types of measures.

One universally accepted approach when deciding how best to measure quality and safety is the classic Donabedian model (Brown et al., 2008; Lilford et al., 2010; Raleigh & Foot, 2010). This is a linear concept that follows a patients path through the healthcare system, the three key measurable elements of which can be thought of in terms of structure, process and outcome, as illustrated in Figure 2.1. This also indicates that healthcare structures and processes, together with other factors, are the determinants of patient outcomes.

Figure 2.1. The Donabedian model of quality assessment in healthcare, adapted from Brown et al. 2008.

(Blue boxes contain items that can be measured, and red boxes show where interventions might be effective)



Measures relating to the structure of healthcare processes, such as staffing levels, facilities and skill mix available are relatively easy to measure (Potter et al., 2000), and are likely to have some association with quality but do not give the whole picture.

Process measures examine the way in which care is carried out, and form the basis of many commonly used quality indicators and items in national audits described in the next section. However, problems with process measures include: difficulties in defining these measures, the potential for services to focus solely on the processes being measured, therefore neglecting others, problems of reliability and judgement of reviewers and cost.

Outcome measures are perhaps simpler to define and tend to be preferred at an organisational level. They include readily available data such as mortality or infection rates, but also have inherent difficulties such as problems with case-mix adjustment (particularly important in older people with multiple co-morbidities), and concerns about the degree to which surrogate end points (which occur prior to final patient outcomes) truly reflect patient outcomes (Brown, et al., 2008).

Because of the difficulties inherent to each of the different types of measures available, it is generally accepted that the best way of measuring quality in order to obtain a complete picture of care is to use a combination of such measures (Donabedian, 1980; Pronovost et al., 2004), and to develop suitable indicators for use in different clinical contexts (Wright & Shojania, 2009). I will discuss this further in Chapters 6 and 7.

Measurement for improvement.

Quality measurement is increasingly being thought of in the context of improvement, rather than purely as an exercise in judgement (Pronovost, et al., 2004). This shift in thinking derives from the principles of "Total quality management" and "Continuous quality improvement" taken from other industries. Here, data is continuously fed back to clinicians, often using time series or run charts, to which the principals of statistical process control have been applied (this produces measures which take into account "common or attributable cause" variation and exclude "natural" variation (Kolesar, 1993)). These approaches are increasingly informing models of modern medical practice (Hockey &

Marshall, 2009) and are even being incorporated into some medical school curricula (Humphrey et al., 2007), with the aim that doctors of the future will all routinely contribute to quality measurement and improvement throughout their working lives.

There are both barriers and incentives to quality improvement in this way. Barriers include disinterest amongst clinicians in quality improvement, and difficulties in making sustainable changes to the way in which we practice (Scott & Phelps, 2009).

Specific challenges in measurement of quality and safety in older people

The characteristics of older people and their complex interactions with the healthcare system described in Chapter 1, which make their clinical care both challenging and rewarding, also have implications for the measurement of quality and safety of their care. Difficulties with measuring quality using "one size fits all" approaches in patients with multiple conditions can lead to their exclusion from quality assessments, despite efforts to apply weights to measures or stratify according to co-morbidities (Werner et al., 2007). Older people in hospital usually require complex, multi-facetted treatments, which not only means that they there is more potential for problems to arise with their care, but also makes quality and safety measurement even more difficult.

Another area relevant to this thesis which raises controversy in the literature is how best to measure quality at the end of life, where measures tend to focus on patient experience, necessitating the use of qualitative approaches with their own methodological problems (Fowler et al., 1999).

2.1.4. Current ways of measuring safety and quality in older people.

As briefly described above, the field of quality and safety measurement and improvement is evolving and controversies about methodological problems abound. In this

section I summarise the means currently used to provide us with measures that currently provide us with information relevant to the care of older people in hospital.

Retrospective Case Record Review.

Numerous international studies have been carried out to investigate the incidence and types of adverse events experienced in hospitals. These were mostly conducted using retrospective case record review. I will go on to discuss these studies, their findings in relation to older people and their methodological strengths and limitations in Chapter 3.

Hospital administrative data.

These measures, such as the Hospital Standardised Mortality Rate (HSMR) are calculated from widely available hospital episode statistics. Despite efforts to adjust for confounders such as case-mix variability, there has been much controversy relating to their use to judge the performance of hospitals (Black, 2010). Organisations such as the Dr. Foster Unit in the UK monitor such measures and use them as triggers to alert Trusts when an aberrance is detected. Such measures are usually more useful for judgement and benchmarking than direct improvement, and their findings require particularly careful interpretation and explanation (Vincent et al., 2008).

Trigger tools and safety indicators.

Trusts in the UK are now encouraged to perform their own monthly retrospective case record reviews to assess the scale of organisational harm, using adapted versions of the Global Trigger Tool, initially developed by the Institute of Medicine in the United States. There are tools adapted for use in primary care, paediatrics and acute adult care (NHS Institiute for Innovation and Improvement, 2010). The acute adult care tool consists of a list of items or "triggers" in the following modules: general care, surgical care, intensive care,

medication, and laboratory tests. Regular use of the Global Trigger Tool is designed to provide Trusts with an estimate of the scale of healthcare associated harm in their organisation, to identify areas for improvement and to track improvement over time. It was not designed for benchmarking or comparing the performance of Trusts. Other patient safety indicators are used elsewhere, such as those developed by the Agency for Healthcare Research and Quality in the United States, which again employ screening methods to alert healthcare organisations of potential safety concerns and areas for improvement work.

Data from reporting systems.

Another way of estimating the incidence of hospital-related harm in older people is to analyse data from local and national reporting systems. The most commonly reported incidents to the National Reporting and Learning System (NRLS) in the UK, part of the National Patient Safety Agency, in acute hospitals are patient related accidents, which in older people are most likely to be falls. These are followed closely by problems related to medication. Data sources such as this can be very useful in terms of allowing us to prioritise areas for intervention. However, it is important to bear in mind that many problems go unreported, particularly those which may not be as obvious as falls or drug errors, so the scale and nature of adverse events may not be truly reflected in this way. Reporting systems are strongly dependent on the willingness of staff to report and are a very imperfect reflection of the underlying rate of errors or adverse events (Sari, 2007).

Local and national audits of process measures.

In the UK, there are several regularly conducted national audits of clinical issues that are of great relevance to the care of older people, including stroke, falls and bone health and continence. These consist of retrospective assessment of valid process measures and allow Trusts to benchmark their performance against each other and highlight priorities for

local improvement. Data from national audits has also been used to examine the relationship between different models of service organisation and quality, which could be used to inform future service development (Wagg et al., 2009). At a very local level, Trusts and departments carry out a huge amount of local audit work, comparing their performance in chosen care processes against widely recognised standards. Many such audits are carried out by junior doctors, and there are often difficulties in coordinating these into something meaningful leading to improvement and true completion of the audit cycle.

Other quality indicators for older people.

Several other organisations across the world have developed quality indicators for clinical areas of relevance to older people. The RAND Corporation in The United States of America have undertaken a large amount of work on this, in the ACOVE (Assessing Care of Vulnerable Elders) project. Here, several key clinical areas with different clinical standards were identified, and valid quality indicators were produced for each using expert consensus methods. These quality indicators cover a range of clinical conditions, some of which are relevant to acute care, but the majority of which were relevant to the primary care setting. "Vulnerable elders" were identified using a screening tool which highlighted those with common geriatric syndromes, and the care of those patients in respect to a wide range of clinical domains was assessed using a quality score. In the first major study which employed the ACOVE system, overall only 41% of quality indicators for acute geriatric care and 29% of quality indicators for chronic geriatric care were met (Wenger et al., 2003). These quality indicators have since been developed further and used to investigate the quality of care received by a variety of patient groups such as those with chronic pain (Chodosh et al., 2004), dementia (Feil et al., 2007), urinary incontinence (Gnanadesigan et al., 2004) and those at the end of life (Roth et al., 2010).

In Europe, the ACME*plus* (Admission Case-Mix System for Elderly Patients) project (Espallargues et al., 2008) sought to identify case-mix variables, measurable shortly after admission to hospital that are important in predicting key outcomes for older people in hospital. The overall goal of the project was to create an instrument that could lead to improvement of the quality of care received by older people, by allowing clinicians to compare their own performance in relation to the identified variables with other units. Analysis of data from multiple sites across Europe found that factors not related to the admitting diagnosis, such as socio-economic characteristics, cognitive and physical status and the presence of one or more of the "geriatric giants" were important in predicting outcome. The authors concluded that further work in refining and developing the ACME*plus* instrument for routine use in quality improvement for older people would be worthwhile.

Implications for measuring the quality of care in older people.

In summary, the range of quality measurement strategies described above that are currently used to assess the quality of care in older people in hospital are beset by problems relating to generalisability, clinical context, and the degree to which they are valuable in such complex patients. There is a clear need for measures which can be used routinely at the clinical team level and which have been designed specifically with this vulnerable group in mind.

2.2. Improving the care of older people in hospital.

2.2.1. Introduction.

In the remainder of this chapter I would like to turn away from measurement of quality and safety to its ultimate goal - improvement - and look at ways in which the care of older people in hospital has been improved over recent years and where future efforts could be employed. Improving the safety and quality of a clinical system requires action at many different levels, combining a focus on generic issues with attention to specific clinical problems. In this section I first briefly address three issues which are relevant to all healthcare sectors, but particularly critical in the care of older people because of their complex nature. These are the education and training of practitioners, improving systems of care and the potential of design and technology to enhance safety. I will then consider how specific clinical issues can be tackled, addressing interventions for the geriatric syndromes, hospital acquired infections and medication safety.

2.2.2. Education and skills for individual practitioners.

Healthcare professionals caring for older people need to be trained in the clinical reasoning and communication skills necessary to ensure safe and high quality care in this challenging group of patients. These skills are essential for accurate and thorough initial assessment and if lacking may lead to diagnostic errors and subsequent mismanagement, as well as poor overall quality. Explicit training to develop these difficult skills can be lacking and is often expected to develop with experience. Figure 2.2. shows some of the individual skills or behaviours that geriatricians use to maximise patient safety in older people.

Figure 2.2. Some of the individual skills and behaviours that geriatricians routinely use to maximise patient safety in older people.

1. Early detection and prevention where possible of frailty and geriatric syndromes.
2. Ensuring a full collateral history is taken at every available opportunity.
3. Carrying out medication review and reconciliation at every opportunity.
4. Involving patients in their care as much as possible.
5. Ensuring that basic compassionate care is carried out.
6. Maximising communication at times of transition of care.
7. Support effective MDT working, sharing goals and information as much as possible.
8. Inspiring interest in the care of older people amongst juniors and other colleagues.
9. Working with management to try to improve organisational culture towards older people.
10. Being aware of cognitive biases in decision making and the use of strategies to overcome these.

(Long, 2010)

The same communication and clinical reasoning skills required for geriatric assessment are also required to detect and manage adverse events in older people once they have occurred during the hospital admission. Successful care of older people requires staff to make complex decisions about medical and non-medical matters, with the involvement of the whole multidisciplinary team, and with the aim of meeting the patients best interests. In hospital this applies to decisions regarding both the inpatient care that elderly patients receive and also the complex planning that is often required to maximise their safety on discharge from hospital. Several educational strategies have been suggested to improve clinical reasoning (Croskerry, 2002a) , such as the introduction of formal critical thinking training,

teaching with the use of clinical examples of cognitive biases, encouraging consideration of diagnostic alternatives, developing mental rehearsal for practical skills using simulation, or using cognitive aids such as guidelines, checklists, algorithms or handheld computer devices. These approaches have also been used to improve communication within clinical teams, for example in the use of a daily goals sheet in Intensive Care (Pronovost et al., 2003), which provided the inspiration for the study presented in Chapter 9.

Keeping patients safe, particularly those with complex and fluctuating conditions, also requires individual clinicians to possess skills such as anticipation, awareness of hazards, preparedness, resilience and flexibility. To try and instil these qualities into the next generation of clinicians patient safety is being incorporated explicitly into both undergraduate and postgraduate training. To aid this endeavour there has been some work to identify the desirable knowledge, skills, behaviours and attitudes of a safe healthcare practitioner. In surgery and anaesthesia, much work has been done to identify and enhance "non- technical skills" including communication, stress management, teamwork, decision making and leadership (Flin et al., 2008) which promote patient safety - similar skills are of course crucial across all specialities, particularly in the care of older people. This is the basis of the study presented in Chapter 8.

2.2.3. Design (human factors and ergonomics) and technology.

Increasingly, design and technology are being used to great effect to improve patient safety, as healthcare learns from the principles of human factors and ergonomics which are so well engrained in other safety-critical industries. These disciplines are concerned with the interaction between humans and the systems in which they work, including perception, cognition, human performance, interaction with technology, teamwork and organisational behaviour. Design of hospital equipment used to be carried out by people at relative distance from end-users, with feedback only occurring at a late stage, or when

accidents occurred. Now there tends to be a much more integrated approach, with a substantial and growing literature around evidence based design. This has led to numerous practical benefits, for example in the re-design of labelling and packaging of medications, anaesthetic and emergency equipment and in designing hospital environments to reduce the incidence of hospital acquired infection (Vincent, 2010).

The same principles and ideas can be effective in reducing the incidence of geriatric syndromes in older people in hospital. For example, there is a growing amount of work on the role that design of the hospital environment can play in falls and delirium prevention, in terms of ensuring adequate lighting, noise reduction, orientation boards, suitable hospital beds, appropriate flooring and signage.

Advances in technology can reduce error by improving communication, providing reminders, making knowledge more readily accessible, prompting for key information, assisting with calculations, monitoring and checking in real time, and providing decision support (Bates & Gawande, 2003). There are many examples of how technology has helped to counteract the cognitive errors that humans can be prone to making, such as the use of barcodes in blood transfusions. It can also enhance the human qualities of judgement and decision making, such as with computerised decision support with systems for diagnosis, reminder systems for prevention, systems for disease management and systems for supporting prescribing and drug dosing (Garg et al., 2005).

2.2.4. Improving systems of care for older people.

In hospital, much effort has been made in recent years to implement new ways of caring for acutely ill elderly patients in order to try to minimise functional decline during hospitalisation and subsequent prolonged rehabilitation. For example, it is now common practice for most hospitals in the UK to have an orthogeriatric service to ensure optimal medical care from admission to discharge of elderly patients who have sustained fractured

neck of femurs. Stroke units are another example of how specialist care with focussed, immediate rehabilitation, and anticipation and swift recognition of complications can improve outcomes and reduce hospital acquired complications such as functional decline.

In general acute geriatric medicine it has been shown that providing specialist care environments with staff who are interested in caring for older people and who have had relevant specialist training, can also prevent the development of the geriatric syndromes in hospital. An example of this are Acute Care of the Elders (ACE) units, in which a prepared environment, interdisciplinary collaborative care, multidimensional assessment, non-pharmacological prescription, medical review, home planning and transitional care all combine to improve a range of outcomes, including improved functional status, lower risk of nursing home placement and higher levels of patient and professional satisfaction with care (Palmer et al., 2003). This system of care, tailored towards the older person, also leads to a reduction in other errors such as inappropriate prescribing.

Technological advances are also making it possible to redesign systems of care for older people, with the aim of providing more targeted and integrated health and social care. For example, the rapidly growing field of telecare, has made it possible for older people with sub-acute problems to be cared for in their own homes, in “virtual wards”, thereby avoiding unnecessary hospital admissions.

2.2.5. Interventions for the geriatric syndromes.

There are many well-founded interventions for the prevention and management of geriatric syndromes in hospital (Brice et al., 2009). These generally fall into the following categories: risk identification and assessment tools, single or multi-component practical interventions, changes to systems of care and educational programmes. Many of these are complemented by, or have been incorporated into, national or international campaigns and

guidelines for widespread use. All are most effective if underpinned by strong leadership and robust measurement and reporting systems.

Some examples of commonly used risk assessment tools in the UK are the multitude of available falls risk assessment tools, the Waterlow score for assessing pressure sore risk, or the Malnutrition Universal Screening tool (MUST). There are challenges to the effective use of screening tools such of these: they should be completed by staff who have a sound understanding of the conditions they are assessing, and identification of risk must be followed by justifiable actions to prevent the development of the geriatric syndrome.

The most well-known and widely used general assessment tool for older people is Comprehensive Geriatric Assessment (CGA). This contains six key elements: assessment of functional ability, cognitive function, physical health, socio-economic status, nutritional status, mobility and falls risk. Its purpose is to provide a holistic assessment all issues relevant to a frail patient: it has been shown that if CGA is combined with strong and sustained interventions, better long-term outcomes can be achieved (Stuck et al., 1993). However, it is unclear whether it has any benefits impact on hospital-acquired complications, although it undoubtedly identifies those who are frailest and at highest risk of adverse outcomes.

A good example of a practical intervention designed to prevent the development of a geriatric syndrome in hospital is the multicomponent intervention for delirium tested as part of the Elder Life Program (Inouye et al., 1999). In this study, six well known risk factors for delirium (cognitive impairment, visual and hearing impairment, sleep deprivation, immobility and dehydration) were addressed in a comprehensive manner, by a trained interdisciplinary team, and tested in a controlled clinical trial. The incidence of delirium was reduced from 15% in the “usual care” group to 9.9% in the intervention group (giving a matched odds ratio of 0.60, with $p = 0.02$). The actual practical methods used in each protocol were simple,

common sense measures that it could be argued should form part of "best practice" and good, empathetic care for all elderly patients. Other multi- factorial interventions, when supported by strong leadership and robust measurement and reporting, have been shown to be key to reducing other geriatric syndromes, such as falls (Oliver, 2007).

2.2.6. Reducing hospital acquired infection

Significant progress has been made in recent years in reducing hospital-acquired infection across all age groups, not just in older people. This has partly been driven by regulatory and public pressure in response to a shift in societal attitudes about acceptable levels of risk, which have made hospital acquired infections (HAIs) a major organisational priority and a matter for statutory regulation. HAIs are relatively easy to measure and identify, so the impact of interventions for them can be easily assessed, unlike some of the other hospital-acquired complications common in older people. There are now standard definitions for HAIs, an increasing trend towards mandatory reporting of infections and in most hospitals there are infection control departments who independently monitor and act to reduce HAIs.

The underlying causes of HAIs are complex - ranging from individual actions or inactions, such as failures to follow rules and procedures, through to systemic failures or problems with design and technology. Consequently, many of the interventions which have been successful in tackling HAIs are equally as complex, and are increasingly being seen as part of more general quality improvement programmes rather than solutions in isolation. For example HAIs are one of the major outcome measures of the Safer Patients Initiative (The Health Foundation, 2010), a long term collaborative programme developed by the Health Foundation in partnership with the US Institute for Healthcare Improvement and 24 participating UK NHS Trust sites. This ongoing initiative has a focus upon reliability and

safety of care through application of continuous quality improvement techniques adapted from process industries and manufacturing.

Some of the other multifaceted interventions which have been shown to reduce the rates of HAIs include the use of care bundles to tackle central line infections and ventilator associated pneumonias in intensive care units (Pronovost et al., 2010), or using combined approaches to improve hand hygiene on general wards (Pittet et al., 2000). Other effective infection control measures have included advances in treatment, regularly updated antibiotic prescribing guidelines, and the use of other precautions such as minimising ward transfers, hand washing and "bare below the elbows" campaigns. Design of the hospital environment has an important part to play, in terms of providing adequate isolation and cleaning facilities, and allowing sterile practices to be carried out with minimal contamination (Ulrich et al., 2008). Other innovations include the use of decision support systems and in antibiotic prescription, or allowing patients to participate in infection control initiatives (although older people may be less willing or able to do this).

2.2.7. Medication Safety

Reducing medication error requires a multi-faceted approach involving education and training, computerised systems, simplification and standardisation of clinical processes, and wider cultural and organisational change (Bates, 2007).

Much work has been carried out to reduce medication error in general. The principles underlying this are common to all successful safety and quality improvement processes: systems must be designed to prevent errors occurring in the first place, then to make errors more visible when they do occur, and finally to limit the effects of errors so they do not lead to harm. Standardisation of processes, paying particular attention to high-risk medications, and involvement and collaboration with patients as well as clinicians have all been shown to be successful strategies (Bates, 2007).

There are several categories of interventions that have been shown to maximise medication safety for older people in particular. Much as for falls or delirium, the first step is to identify and prevent inappropriate prescribing. Assessment instruments such as the Beers criteria, STOPP and START (Gallagher & O'Mahony, 2008), give lists of drugs to avoid in older patients. These tools are useful both for the prevention and measurement of inappropriate prescribing. The potential drawbacks of such tools are that they require appropriate education and skills training, they may not be internationally useable, they rely on correct usage by prescribers, and they may not include all classes of relevant drugs.

A crucial intervention to improve medication safety in older people is medication review and medicines reconciliation, both of which should ideally occur routinely at transitions of care, and form a crucial part of specialist geriatric assessment. In primary care, various measures have been shown to improve overall medication safety in older patients, including clinical pharmacist intervention, educational measures, and computerised support (Spinewine, et al., 2007). As described earlier, one of the problems in assuring appropriate prescribing for older people is that they have been often excluded from large relevant clinical trials, leading to uncertainty about the safest way to prescribe for them. However, this trend seems to be being reversed of late, with older people being specifically targeted for recruitment into such trials (Milton, et al., 2008).

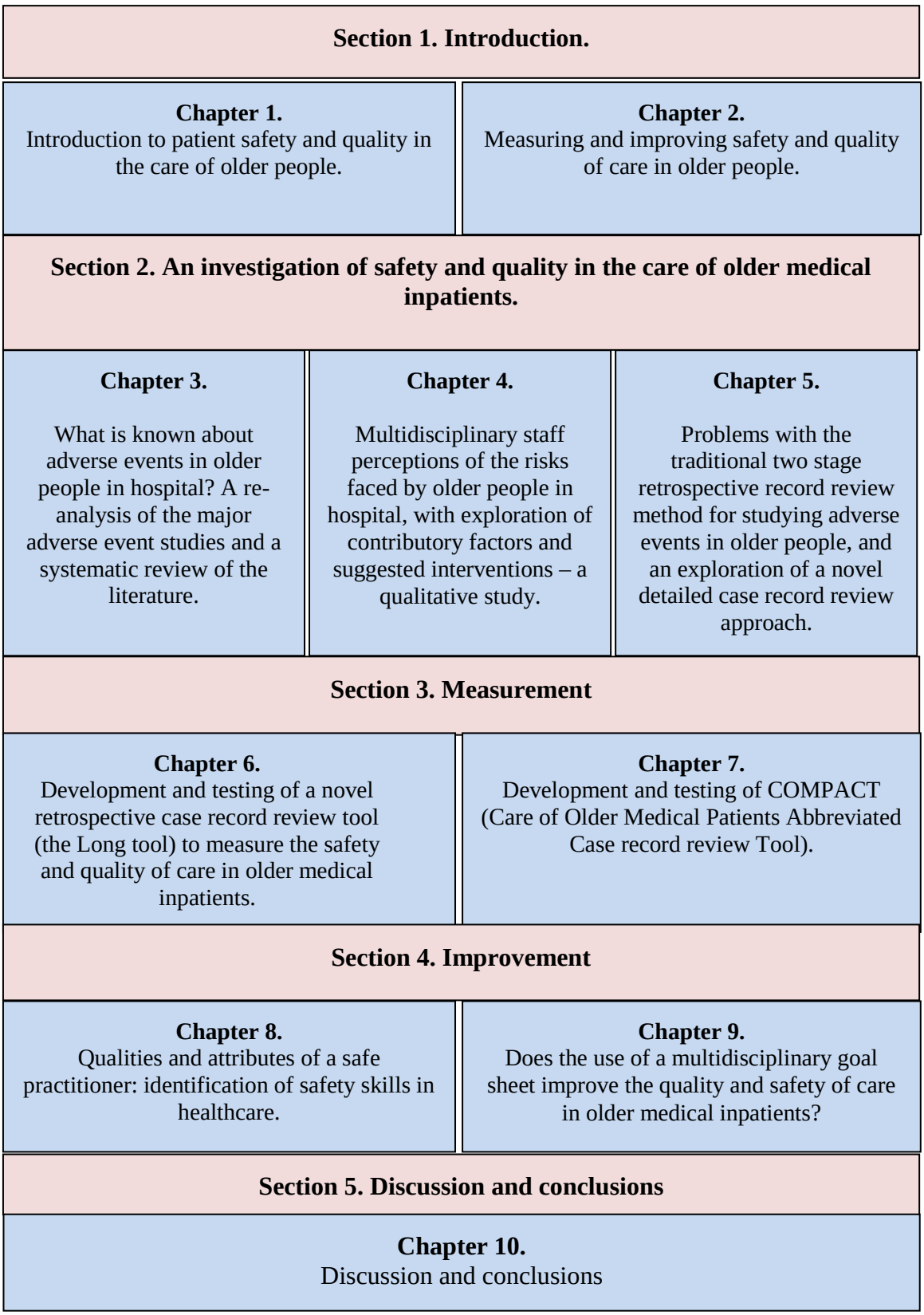
Overview of introductory chapters 1 and 2.

Our general understanding of patient safety and of the unique needs of older people in hospital have increased significantly in recent decades. However, despite often excellent care, there is always room for further improvement, particularly in view of the changing demographics of our ageing society.

The focus of this thesis is the care of frail, general medical, older inpatients, who have complex medical and social needs. Older people are vulnerable to the development of preventable "geriatric syndromes" during their hospital stay in addition to the other adverse events experienced by patients of all ages, due to a combination of staff, patient and system related factors. These can all lead to adverse outcomes, including increased length of stay, the development of other geriatric syndromes, or functional decline necessitating rehabilitation or institutionalisation, or death. Older medical patients are vulnerable to negative attitudes and ageism, and can be neglected in terms of research and service improvement efforts, partly because their complexity means that "one size fits all" models used in modern healthcare improvement are not as effective for them. My own clinical experience has led me to believe that they are the most challenging and rewarding patients to work with and this has sparked my interest in this topic.

The ultimate aim of the work presented in the rest of the thesis is to help find ways to further improve the care of older people in hospital. Improvement requires good measurement and there is a dearth of quality measures designed particularly for use in older medical inpatients. The next two sections of the thesis are devoted to an investigation of safety and quality issues in this population followed by a description of how I have used this information to develop and test new measurement tools designed specifically with older people in mind. Figure 2.3. shows an outline of the structure of the thesis.

Figure 2.3. An overview of the structure of the thesis.



Aims of the thesis.

1. **To explore what is known about the types, incidences and causes of safety and quality issues in older medical inpatients**

2. **To develop and test novel, valid and reliable measurement tools for use in the assessment of safety and quality of care in older medical inpatients.**

3. **To develop and test interventions designed to improve overall quality and safety of care in older medical inpatients**

Section 2. An investigation of safety and quality in the care of older medical inpatients.

Before going on to address measurement and improvement of safety and quality in older medical inpatients, I carried out studies to investigate further the types, incidence, contributory factors and outcomes of safety and quality issues in this population. To this end three approaches were taken: firstly a review of the literature, secondly a qualitative study of the perceptions of staff involved in the care of older people, and thirdly a detailed case record review. The use of this combination of methods was designed to produce a more complete picture of the issues than any single approach.

Chapter 3. What is known about adverse events in older people in hospital? A re-analysis of the major adverse event studies and a systematic review of the literature.

3.1. Introduction

For the purpose of this literature review, I chose to focus on safety rather than overall quality of care for older people. Two major types of studies are available in the published literature which inform us about adverse events in older people: firstly the major international studies designed to investigate adverse events in hospital populations of all ages and secondly studies with a specific focus on adverse events in older people. In section 3.2 the evidence from the major international adverse event studies is summarised. In section 3.3 a systematic review of studies that focus on adverse events in older medical patients is described.

3.2. A re-analysis of the international adverse event studies which employed case record review.

3.2.1. Introduction.

The landmark international studies of adverse events investigated the incidence and types of adverse events in hospital inpatients of all ages. This was achieved by two-stage retrospective case record review in the majority of studies, the methodology of which is discussed in more detail in Chapter 5. The aim of these studies was to estimate the extent of hospital associated harm on large population-based scales, not to investigate in great depth adverse events at the individual patient or even institutional level. In all of these studies, some degree of analysis was carried out to examine adverse events in different patient groups; age was a commonly used variable.

3.2.2. Method.

The major international adverse event studies were identified using a broad search of Pubmed and from reference lists of other texts. Studies without full versions available in English were excluded. Where possible data was extracted to allow comparisons to be made between the younger and older patient subsets of the populations studied. This data was either obtained directly from the published articles, or from supplementary data provided on journal websites. All of the resultant data was synthesised to produce a summary of what can be learnt from these large studies about adverse events in older people.

3.2.3. Results and discussion of findings relevant to older people.

15 studies were identified in total, from the USA, Europe, Australia and New Zealand. Patient numbers varied, as did the exact methods used in each study. Only 13 of the studies published data that allows interpretation of the incidence or types of adverse events specifically in older people. The two studies that do not provide this information are the observational study carried out in the USA by Andrews et al in 1997, and the more recent Spanish adverse event study (ENEAS) (Aranaz-Andrés et al., 2009). In this paper, although there is a statement that "age over 65 was associated with a higher incidence of preventable AE's", no further information or supporting data is given to elucidate this further.

1. The main features of each study, and the reported incidence of adverse events in older people.

The main features of each study, in chronological order of publication, are shown in Table 3.1.. Table 3.2. demonstrates that in virtually all studies, significantly higher adverse event incidences were found in older patients than younger patients.

Table 3.1. Overview of the major international adverse event studies, in chronological order of publication.

Title	Country	Method	Subject numbers and selection	Overall adverse event rate	Data for older people?
"The Californian Medical Insurance Study" (Mills, 1978)	USA (California)	Two stage retrospective case record review	n=20864, random sample of inpatient charts which closely matched population demographics	4.65%	**Yes**
"Iatrogenic Illness on a general medical service at a university hospital" (Steel et al., 1981)	USA	Prospective case record review and staff questioning	n=815, prospective admissions to the general medical service of a university hospital, including ITU and CCU, excluding cancer unit.	36%	**Yes**
"The Harvard Medical Practice Study" (Brennan et al., 1991b)	USA (New York)	Two stage retrospective case record review	n=30121, randomly selected from acute care, non-psychiatric hospitals	3.7%	**Yes**
"The Quality in Australian Healthcare study" (Wilson et al., 1995)	Australia	Two stage retrospective case record review	n=14210, admissions from randomly selected hospitals, excluding day cases and psychiatry	16.6%	**Yes**
"An alternative strategy for studying adverse events in medical care" (Andrews et al., 1997)	USA	Observational	n=1047, 2 ITU's and 1 surgical care floor	17.7%	No
"Incidence and types of adverse events and negligent events and negligent care in Utah and Colorado" (Thomas et al., 2000)	USA	Two stage retrospective case record review	n=15000, representative sample of non-psychiatric discharges	2.9 ± 0.2%	**Yes (Thomas & Brennan, 2000)**
"Adverse events in British hospitals: preliminary retrospective record review." (Vincent et al., 2001)	UK	Two stage retrospective case record review	n=1014, randomly selected from general medicine (including geriatrics), surgery and obstetrics	10.8%	**Yes**
"Adverse events in New Zealand public Hospitals I: occurrence and impact", and "Adverse events in New Zealand public Hospitals II: preventability and clinical context." (Davis et al., 2002, 2003)	New Zealand	Two stage retrospective case record review	n= 6579, selected by systematic list sample of admissions to 13 acute hospitals	11.2%	**Yes**

Title	Country	Method	Subject numbers and selection	Overall adverse event rate	Data for older people?
The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada (Baker et al., 2004)	Canada	Two stage retrospective case record review	n= 3745, random selection of non-psychiatric and non-obstetric adults from four hospitals	7.5%	**Yes**
Ottawa Hospital Patient Safety Study: incidence and timing of adverse events in patients admitted to a Canadian teaching hospital (Forster et al., 2004)	Canada (Ottawa)	Two stage retrospective case record review	n= 502, random admissions to the Ottawa Hospital, non-psychiatric	12.7%	**Yes**
French National Survey of inpatient adverse events prospectively assessed with staff (Michel et al., 2007)	France	Prospective assessment of adverse events by external senior nursing and doctor investigators with ward staff	n = 8754, over 35 234 hospitalisation days	6.6 AEs per 1000 days hospitalisation	**Yes**
Extent, nature and consequences and consequences of adverse events: results of a retrospective case note review in a large NHS hospital (Sari, 2007)	United Kingdom	Two stage retrospective case record review	n=1006, random sample of hospital admissions.	8.7%	**Yes (Sari et al., 2008)**
Adverse events and potentially preventable deaths in Dutch hospitals: results of a retrospective patient record review study (Zegers et al., 2009)	The Netherlands	Three stage retrospective case record review	n=7926, random, stratified sample. 3983 deaths and 3943 discharges from 21 hospitals	5.7%	**Yes**
The Incidence of adverse events in Swedish Hospitals: a retrospective medical record review study (Soop et al., 2009)	Sweden	Three stage retrospective case record review	n=1967, random, stratified sample, from 28 hospitals	12.3%	**Yes**
Impact and preventability of adverse events in Spanish public Hospitals: results of the Spanish National Study of Adverse Events (ENEAS) (Aranaz-Andrés, et al., 2009)	Spain	Two-stage retrospective case record review	n=5908, random, stratified sample, from 24 hospitals	9.3%	No

Table 3.2. Details of landmark studies from which it is possible to extract data regarding adverse events in older people.

Title	No of subjects	No (proportion) of elderly subjects	Definition of "elderly"	Overall adverse event (AE) incidence	AE incidence in older group	AE incidence in younger group	Significance, if stated in study
"The Californian Medical Insurance Study" (Mills, 1978)	20864	3826 (18.34%)	≥65 years	4.65%	7.22 ± 0.82%	4.07 ± 0.30%	**p<0.05**
"Iatrogenic Illness on a general medical service at a university hospital" (Steel, et al., 1981)	815	Not stated	≥65 years	36%	Mean age of those with no complications 57.8, those with minor complications 62.7, and those with major complications 64 years.		**p<0.001**
"The Harvard Medical Practice Study" (Brennan, et al., 1991b)	30 121	4980 (16.53%)	≥65 years	3.7 %	Crude 5.9% ± 0.5 Standardised for DRG 5.7% ± 0.6	2.6% ± 0.2 (16-44 yrs)	**p<0.0001**
"The Quality in Australian Healthcare study" (Wilson, et al., 1995)	14210	3945 (27.76%)	≥65 years	16.6%	23.3%	Mean=13.75% (increased in each age group)	**Not given**
"Incidence and types of adverse events and negligent events and negligent care in Utah and Colorado" (Thomas, et al., 2000)	15 000	Not stated	≥65 years	2.9% ± 0.2	All AE's 5.29% ± 0.37	All AE's 2.80% ± 0.18	**p=0.001**
"Adverse events in British hospitals: preliminary retrospective record review." (Vincent, et al., 2001)	1014	342 (33.73%)	≥65 years	10.8% or 11.7% (inc. multiple events)	Total: 62/342 (18.13%) Gen Med 15/112 (13.40%), Gen surg 19/103 (18.44%), Ortho 28/127 (22.05%), Obstetrics 0/0	Total: 48/662 (7.25%) Gen med 9/157 (5.73%), Gen surg 22/187 (11.76%), Ortho 10/151 (6.62%), Obstetrics 7/167 (4.19%)	**p<0.001**

"Adverse events in New Zealand public Hospitals I: occurrence and impact", and "Adverse events in New Zealand public Hospitals II: preventability and clinical context." (Davis, et al., 2002, 2003)	6579	1967 (29.9%)	≥65 years	11.2%	17.6% (346/1967) (table 6 of study)	10.93% (504/4612)	**Not given**
The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada (Baker, et al., 2004)	3745	Not stated	Not stated	7.5%	Not stated, but mean age of patient with AE 64.9 (SD 16.7) vs 62.0 (SD 18.4),		**p= 0.016**
Ottawa Hospital Patient Safety Study: incidence and timing of adverse events in patients admitted to a Canadian teaching hospital (Forster, et al., 2004)	502	126 (25.1%)	> 72 years (4^{th} quartile)	12.7%	28/126 = 22.22%	36/376 = 9.57%	**p<0.001**
French National Survey of inpatient adverse events prospectively assessed with staff (Michel, et al., 2007)	8754	Not stated	Not stated	6.6 per 1000 days of hospitalisation	Mean age of those experiencing AE = 63 years, 61.7 years for those who did not.		**p=0.5**
Extent, nature and consequences and consequences of adverse events: results of a retrospective casenote review in a large NHS hospital (Sari, et al., 2007)	1006	332 (33.0%)	≥ 75 years	8.7%	13.5% (95% CI 9.8-17.2)	6.2% (95% CI 4.4-8.0)	**p<0.001**
Adverse events and potentially preventable deaths in Dutch hospitals: results of a retrospective patient record review study (Zegers, et al., 2009)	7926	2582(66-79 yrs) 2013 (>80 yrs). Total = 4515 (57.97%)	≥66 years	5.7%	Mean = 7.15% 6.1% (66-79 yrs) and 8.2% (>80 yrs),	Mean = 4.07% 1.7% (1-18yrs), 5.0% (19-40 yrs), 5.5 (41-65 yrs),	**Not given**
The Incidence of adverse events in Swedish Hospitals: a retrospective medical record review study (Soop, et al., 2009)	1967	946 (48.1%)	≥65 years	12.3%	13.6%	5.0 (0-14 yrs), 11.7 (15-29 yrs) 12.5% (30-44 yrs) 12.0% (45-64 yrs)	**OR 1.3; (95%CI 1.0-1.9)**

The Californian Medical Insurance Feasibility Study (Mills, 1978) was the first major study to use retrospective case record review to analyse the frequencies of "potentially compensatable events" in order to gain insights into problems associated with healthcare to aid the insurance industry. It was also the first to report that patients over the age of 65 years were at significantly higher risk of experiencing a "potentially compensatable event" than those who were younger. The authors do not offer any explanation of why this should be the case, (but this was not part of their remit). It is interesting that the relationship between age and the incidence of adverse events was first observed over thirty years ago, yet as is described in the remainder of this chapter, relatively little work has been carried out since to investigate this further.

The subsequent study carried out in New York by Steel et al (1981) was the next major adverse event study, in which the focus shifted slightly away from the world of litigation and insurance to one of improved understanding of the scope of the problem, with the ultimate aim of healthcare improvement. The overall rate of "iatrogenic illnesses" in Steel et al was 36%. This high rate compared to other studies is probably due to differences in the interpretation and definition of these events. A strong association was demonstrated between age and healthcare associated complications, when different age groups were compared using a Chi-squared test ($p<0.001$).

The Harvard Medical Practice Study (HMPS) (1991) is known as the first modern landmark adverse event study. It used methods derived from the Californian Medical Insurance Study, but aimed to look at adverse events from a scientific, rather than financial, point of view. It went on to strongly influence the scientific and medical communities' drive to improve patient safety. This was the first time that we were given definitions of adverse events (as described in Chapter 1) and that their outcomes and preventability were assessed. In this study, 30 121 randomly selected case records from acute, non-psychiatric hospitals were retrospectively reviewed using a two stage process: firstly case records were subjected

to screening criteria to identify those in which adverse events may have occurred, and then these cases were analysed in greater depth to provide more detail about the adverse events. This method is highly significant because its "classic" two-stage retrospective method of adverse event detection was also used in the majority of subsequent retrospective case record review studies of adverse events described in this section.

The Harvard Medical Practice Study showed that the rate of adverse events was significantly higher in the over 65 age group than in the under 65s (5.9% vs. 2.6%, $p < 0.0001$). When compared with those aged between 16 and 44 years, those aged over 65 years had more than double the risk of an adverse event. There is a comment in the Harvard Medical Practice II study that although the elderly hospitalised population in New York was only 27% at the time of the review, 43% of all the adverse events were experienced by older people. This was still the case after adjustment for speciality, which was done because, as acknowledged by the authors, some specialities by their very nature posed a higher risk of adverse events than others. The authors comment that there was no evidence of an increased risk of negligent adverse events in older people, however; a result that perhaps is reassuring from the point of view of preventing age discrimination.

The figures describing the proportion of elderly patients within the sample group in this study raises two interesting points. Firstly, the reported number of elderly patients in the study was 4980, which is 16.53% of the total number of cases (30 121). In the accompanying paper, the Harvard Medical Practice Study II, in which the authors analyse the adverse events and classify them according to type, they comment that in 1984 27% of the hospitalised population of New York was over 64. Presumably the discrepancy between the 16.54% and 27% is due to the fact that the authors in their own words "oversampled several high risk, low volume specialities", such as cardiothoracic surgery, to make sure that there were enough adverse events in each category. It is unlikely that many of the patients in these high risk specialities were elderly. This may mean that actually the proportion of elderly people

experiencing an adverse event was even higher than that stated in this study. Secondly, it is interesting to note the difference between the reported proportion of elderly inpatients in New York in 1984 (27%) and the reported proportion in the United Kingdom in 2006/7 (65%) (Oliver, 2008). Clearly, if these figures are accurate, there has either been a large change in the demographics of the hospital population over the last twenty or so years, or there is a large difference between the USA and the UK in this respect. In either case, this illustrates that caution should be applied when interpreting these results or extrapolating them to our own current practice.

The next major adverse event study was carried out to investigate adverse events in a non-USA setting – Australia. In the Quality in Australian Healthcare Study (1995), a large study using very similar methods to the HMPS, the incidence of adverse events also rose with age.

Next, in 2000, a further study was carried out in the USA – the Utah and Colorado study - in which the authors attempted to answer some questions raised about the generalisability of the HMPS. Although in the original paper the authors state that they divided the study population into age groups, including the over 65's, they did not present their results by age group at the time, nor did they analyse their data to determine if there was a relationship between the incidences or types of adverse events and age. However, Thomas addressed this in 2000, when he reanalysed the data from the original study to specifically focus on adverse events in older people (Thomas, 2000). He found that the incidence of adverse events amongst younger patients (aged 16-64 years) was 2.8% ± 0.18% compared to 5.29% ± 0.37 among older patients (aged over 65 years). This difference was highly significant, with $p=0.001$. However, in this study, when a patient experienced more than one adverse event, the event that was considered to produce the most harm to the patient was considered in this study and any "lesser" adverse events were disregarded. This may have

given a falsely lower estimation of adverse events, particularly in the complex elderly population, who are most likely to experience multiple adverse events.

Adverse Events in British Hospitals (Vincent, 2001) followed: this was the first large retrospective record review of adverse events in the United Kingdom. On the whole, the methods used were the same as in the American and Australian studies described above. In each speciality studied, older people experienced a significantly higher incidence of adverse events than younger patients. The data for this was obtained from the extra content from this study available on www.bmj.com.

Similarly, a considerable difference between the incidences of adverse events in older people compared to younger patients was found in the New Zealand Adverse events study: 17.6% vs. 10.93% (p was not given). The authors state that the disproportionate vulnerability of older people to adverse events is the only demographic pattern that did not mirror the profile of the admissions closely.

In the Canadian Adverse event study, unfortunately the authors do not provide data regarding the proportion of elderly patients in their sample, or the incidence of adverse events by age group. However, they do say that the mean age of patients experiencing an adverse event is significantly higher than those not experiencing an adverse event (64.9 years (SD 16.7) vs. 62.0 years (SD 18.4), p=0.016). One unique feature of this study was that the authors clearly identified the point at which the adverse event occurred; before, during or after the index admission; however, they did not provide data for this for each age group.

The French National Survey of Inpatient Adverse Events (Michel, 2007) was a major departure from what had preceded it in terms of methodology. In this study, the authors used a prospective method, whereby they observed care on different wards and calculated the incidence density of adverse events in terms of numbers of events observed over 1000 days of hospitalisation. The great advantage of this method is that it allows the investigators to talk directly to those involved with the patients care, with the aim of achieving a much clearer

sense of the issues underlying the adverse event than would be possible from retrospective case record review alone. The overall incidence density of adverse events in the French National Survey of inpatient adverse events (2007) was 6.6 per 1000 days. Unlike all the retrospective adverse event studies, there was no significant difference in age between patients who experienced an adverse event and those who did not (63 years vs. 61.7 years, p = 0.5). This may reflect the proportions of different age groups within the sample population. However, the authors were struck by the fact that the highest incidence density of adverse events was on geriatric units (10.8%, 95% CI 4.4% to 17.3%).

Once again, Sari et al (2007) used the two-stage record review process to analyse adverse events in 1006 patients in the UK. In this study, 75 years was used as the cut off for "elderly", because this was the age limit used for service organisation in the hospital in which the study took place. The only disadvantage of this was that this meant that only 33% of the study population were "elderly", whereas in general in the UK patients over the age of 65 years account for around half of all hospital inpatients (Oliver, 2008). However, in acknowledgement of this point, the authors reanalysed the data looking at the over 65's and found similar differences between this group and younger patients.

In a similar fashion to Thomas et al with the Utah & Colorado study, Sari et al re-analysed the data from their initial adverse event study, giving particular focus to older people and published these results separately (Sari 2008, Age and Ageing). This gives us a more detailed picture of events in older people and also allows the authors to share their views of the issues affecting the findings. Overall the authors found an increase in the risk of adverse events of 3% (OR 1.03%) with each year of age. It would be interesting to know if this was a linear association, or whether there was any difference, for example, in the very old (over 90 years), whom one might expect would have the highest degree of frailty and co-morbidity.

This was, however, addressed in the Dutch adverse events study (Zegers et al), which was the first time that the data for the elderly was further subdivided into "young elderly" (66-79 years) and "old elderly" (80 years or above). Interestingly, those who were more elderly experienced the highest rates of adverse events (see Table 3.2. for details). Zegers et al used a slightly different sampling technique than had been used in other studies, because of the desire to investigate adverse events and death in more detail. Perhaps because around half of the sample population in this study were deceased, a larger overall proportion of subjects were elderly than in previous studies.

Zegers et al again used retrospective case record review to analyse adverse events in Dutch hospitals (2009). The major difference in this study compared to others is that one of its major aims is to try to estimate the number of deaths associated with adverse events. This is a difficult area, as will be discussed later, because of the problems that arise when trying to estimate causation of death in unwell patients with multiple medical problems. Both Zegers and Soop (Swedish Adverse Events Study, 2010) adapted the traditional two-stage approach to retrospective adverse event detection by adding a third stage to the review process, which involved the use of a second independent review in cases in which decisions about the nature and preventability of could not be made by the first reviewers.

In addition to telling us about the increased incidence of adverse events in older people described above, the studies included in this study give us different amounts of information about the types, outcomes and preventability of adverse events in older people. The degree to which each study helps us in these respects is described in Table 3.3.

Table 3.3. A summary of the types of information given about adverse events (AE's) in older people in the major adverse event studies.

Study (year)	Incidence			Types of AE's	Preventability	Consequences	Death and AE's
	With age	On geriatric wards	In "Young and old" elderly				
Californian Medical Insurance Feasibility Study (1977)	✓	×	×	×	×	×	×
Harvard Medical Practice Study (1991)	✓	×	×	✓	×	×	×
Quality in Australian Healthcare Study (1995)	✓	×	×	×	✓	✓	✓
Utah and Colorado Study (2000)	✓	×	×	✓	✓	✓	×
Adverse Events in British Hospitals (2001)	✓	✓	×	×	✓	×	×
Adverse events in New Zealand public hospitals (2002)	✓	×	×	×	✓	✓	×
Canadian Adverse Events Study (2004)	✓	×	×	×	×	×	×
Ottawa Hospital Patient Safety study (2004)	✓	×	×	×	✓	✓	×
French National Survey of inpatient adverse events (2007)	✓	✓	×	✓	×	×	×
Adverse events in a large NHS hospital (2008)	✓	×	×	✓	✓	✓	×
Adverse events and deaths in Dutch Hospitals (2009)	✓	×	✓	×	✓	✓	✓
The Incidence of adverse events in Swedish Hospitals (2010)	✓	×	×	×	×	×	×

2. Types of adverse events in older people.

In Steel et al, no details are given about the types of adverse events that older patients experienced, although the authors state that aspiration pneumonias, nosocomial infections and complications related to invasive procedures were the most common major adverse events identified in the study overall.

The Harvard Medical Practice Study II (Leape, et al., 1991) analysed all the adverse events and categorised them into two broad categories – operative and non-operative. These categories were then further sub-divided and tabulated according to age group. Not surprisingly, most types of adverse events were more common in older people. The following categories of adverse events occurred at least twice as frequently in older people than younger patients:

1. Non-technical postoperative complications
2. Non-invasive treatment mishaps
3. Fractures
4. Falls

The authors acknowledge that the increased incidences in certain categories probably reflect the usage of those treatments amongst older people – for example older people had a relatively low rate of surgical failure, because the majority of high-risk operations in which these failures occurred are unlikely to have been carried out on elderly patients.

Sari et al noted that older people were more likely to experience certain types of adverse events, such as hospital acquired infections and falls, than younger patients, who experienced more adverse events related to invasive procedures. This reflects findings in other studies and also reflects the demographics of patients able to undergo invasive procedures.

3. Underlying causes of adverse events in older people.

In Steel et al, when a "logit model" was used to investigate the combined effects of age, sex and condition at admission, it became apparent that the condition of the patient on admission (as judged by the admitting house officer as either "critical to poor" or "stable to good") was actually the key risk factor for subsequent adverse events, not simply chronological age. In other words, the initially apparent linear association between age and adverse events was actually due to the fact that elderly people were more likely to be admitted to hospital in a poorer clinical state than were younger patients, and it was this that predisposed them to healthcare associated complications.

The Quality in Australian Healthcare Study (1995) was the first to really attempt to address the causes of increased adverse event incidence in older people. The following is a quote from authors of this study:

"The increase in preventable AEs causing death for patients over the age of 65 years may well represent the complex balance of risk and benefit, or it could indicate that clinical assessment is more difficult in the elderly, and more susceptible to error. Qualitative methods and a detailed review of the clinical situation are needed to clarify this issue".

This quote alludes to the complex causes of safety and quality issues in older people discussed in the introductory chapters of this thesis.

The Utah and Colorado study was the next to conclude that age alone does not appear to be a risk factor for preventable adverse events, when co-morbidity, complexity of care and other patient and hospital characteristics are adjusted for. This is extremely important, as it highlights the importance that we should place on improving safety and quality inpatients who are most complex, not simply those who are above a certain age.

The authors of the French National Survey of inpatient adverse events (2007) stated that patients with complex general health and co-morbidity status accounted for the majority

(64.8%) of those who experienced an adverse event. Indeed, they say that poor general health status was considered to be a factor in 79.2% of patients experiencing adverse events.

The authors' comment about the high rate of adverse events in geriatric units is as follows:

"… there was a trend toward high rates…in geriatrics. The high rate of adverse events in geriatrics has been rarely outlined in the literature, and may be considered even more surprising here as we found that the age of patients with and without adverse events did not differ significantly. These two findings are, however, not necessarily contradictory, but we do not have a simple explanation for the high rate in geriatrics. It may be a French peculiarity, since most of these events were related to drugs, and the consumption of drugs by elderly people in France is believed to be amongst the highest in the world."

The notion that the explanation for the lack of difference in age between those who experienced an adverse event and those who did not may be related to the types of adverse event experienced may be supported by the fact that most adverse events in the study involved invasive procedures. This perhaps points towards a larger proportion of the sample population being fit, non-elderly, patients undergoing surgical procedures than in other studies. Interestingly this study, unlike most of the others, included day cases and short stay wards.

The explanation given by the authors that the high incidence of adverse events may be related to the number of drugs older French people consume may well be correct. However, another explanation would be that patients on the geriatric wards may have been the most complex patients with multiple co-morbidities, which the authors themselves have stated was a major predictor of adverse events.

4. Outcomes of adverse events in older people.

In the Quality in Australian Healthcare Study (1995), older people were more likely to experience adverse events resulting in more serious disability and death than younger people, but not in those adverse events resulting in minimal disability (less than 1 month). This reflects the vulnerability of older people to more serious harm when an adverse event occurs. The authors also comment on the apparent association between adverse events and death that was found in the study. They have pointed out that 80% of those who died as a result of an adverse event were over 65, and therefore were likely to have serious comorbidity, which would have increased their risk of dying independently of the adverse event. They also state that it may have been the case that elderly patients may have requested and received limited care, although this was not documented. This is quite a surprising assumption, as it is difficult to imagine that those caring for older people would not document such important decisions. This perhaps is reflected in the statement in the paper "adverse events associated with "decision-making" were generally associated with increased preventability, permanent disability and death".

In contrast to other studies, the study by Sari et al found no association between age and poor outcome of adverse events, i.e. serious disability or death. The authors state that this may be partly due to the relatively small number of patients (23) in this study who experienced death or disability as a result of an adverse event, which may have meant that the study did not have enough power to detect a significant difference between age groups in this respect.

The Dutch adverse event study reported that 10.7% of deceased patients had experienced an adverse event, and that in 4.1% a preventable adverse event had contributed towards death. Looking at the figures for this by age group, it seems that patients who died or were disabled as a result of an adverse event were more likely to be older.

5. Preventability of adverse events in older people.

In view of the statistically significant association found between disability caused by an adverse event and preventability in the Quality in Australian Healthcare Study (with high preventability being associated with greater disability, $p<0.0001$), and the fact that older people experienced more disability as a result of adverse events, it is somewhat surprising that on further analysis preventability was not strongly associated with age. This may reflect the difficulties in older people in terms making accurate judgements about preventability and underling causation of any disability that may have been associated with a hospital admission.

In contrast, older people did have a significantly higher incidence of certain types of preventable adverse events than younger patients in the Utah and Colorado study. These are summarised in Table 3.4.

Table 3.4. Statistically significant differences in preventable adverse events in older people in the Utah and Colorado Study (from Thomas, 2000).

Type of preventable adverse event	Incidence in older people	Incidence in younger patients	Difference
Related to medical procedure e.g. cardiac catheterisation, thoracocentesis	0.69 ± 0.14	0.13 ± 0.04	$p < 0.05$
Drug related	0.17 ± 0.05	0.63 ± 0.14	$p < 0.05$
Falls	0.01 ± 0.02	0.10 ± 0.06	$p < 0.05$

"Adverse Events in British Hospitals" (Vincent, 2001) also found that older people experienced a much higher incidence of preventable adverse events than younger patients: 10.24% (35/342) vs 3.32% (22/662) respectively.

Not only did the incidence of adverse events increase with patient age in the New Zealand study, along with the impact on the patients and the hospitals, but also the proportion of adverse events judged to be highly preventable increased in each age group, reaching 40.5% of adverse events in the over 65 age group. In the subsequent paper (Davis 2003,

Preventable in-hospital medical injury under the "no fault system" in New Zealand), a multivariate odds ratio was calculated as 2.43 in the over 65 age group for association with a preventable adverse event. This odds ratio was calculated using multiple logistic regression, adjusted to account for the stratified cluster sample deign and adjusted for other patient factors such as ethnicity and deprivation score.

In contrast with other major adverse event studies, in the study by Sari et al there was no evidence of a relationship between preventability of adverse events and age, despite adjustment for potential confounders. The authors say that there is the possibility that there may have been some bias in estimating preventability of adverse events in older people, because of the assumption that poorer outcomes were more likely to occur in older people anyway.

3.2.4. Conclusions

In all the major adverse event studies for which it was possible to extract evidence regarding older people, there is incontrovertible evidence that older people experience more adverse events than younger people. This seems not to be related to age *per se*, but rather to co-morbidity and complexity. The more serious consequences of adverse events that older people experienced in the majority of studies also seems to be related to their physical vulnerability, in terms of frailty and diminished physiological reserve.

Most of the studies excluded psychiatric patients, palliative care patients and patients in rehabilitation beds, preferring instead to concentrate on patients receiving acute active treatment. This obviously has implications when considering the care of older people, who frequently use these services. For example, patients cared for in a cancer unit were excluded from Steel et als study, to quote "because of the recognised high risk of iatrogenic complications in these patients". No references are given to back up this statement, but it is notable that several studies that particularly focus on adverse events in older people (included in the systematic review in Chapter 3.3) also exclude patients who are nearing the end of life.

As would be expected, older people tend to experience more of certain types of adverse events than their younger counterparts in hospital, such as falls, hospital acquired infections and drug errors rather than complications related to invasive procedures. In general, it seems that it is controversial as to whether adverse events are more preventable in older people than younger patients.

This analysis suggests that more work is needed to:

1. Examine the underlying causes of the increased incidence of adverse events in elderly people and institute methods to improve safety for this large but vulnerable population.
2. Determine whether there are any differences between the “young elderly” and “old elderly” in terms of burdens of co-morbidity and vulnerability to adverse events
3. Assess the link between adverse events and death further.

3.3. A systematic literature review of the incidence, types, causes and outcomes of adverse events in older medical inpatients.

3.3.1. Introduction.

As described in the first half of this chapter, it is apparent from the major adverse event studies that more adverse events and errors occur in the hospitalised elderly than in younger patients. However, as far as I know, there are no existing systematic reviews that give a picture of the incidence, types, associated factors and outcomes of adverse events in older people medical inpatient population. The purpose of this systematic review was to examine the published evidence and attempt to synthesise it to produce such a picture. In contrast to the previous section, this study aimed to focus on studies that were specifically designed for to investigate adverse events in older people, rather than entire hospital populations.

3.3.2. Method.

Search strategy.

1) Formulating the research question.

Guidelines from the Centre for Research and Dissemination (NHS Centre for Reviews and Dissemination (CRD), 2001) suggest that the main features to be considered within the research question are as follows;

a) the population(s) to be studied,

b) the intervention(s) to be applied (not relevant to this systematic review),

c) the outcome(s) relevant to the purpose of the review.

Population – older medical hospital inpatients.

Older patients on both geriatric wards and internal medicine wards are included in this review, because not all hospitals internationally have wards specifically devoted to geriatrics, and even in those that do, a significant proportion of older patients are often cared for on general medical wards. In addition, the usual process of admission for any elderly patient, at least in the United Kingdom, would be through an Accident & Emergency department or a Medical Admissions Unit, so adverse events relating to these environments are also included in this review.

Outcome(s) relating to the aims of the review– adverse events.

As described in Chapter 2, an adverse event is classically defined as an unintended injury caused by medical management rather than the disease process, which is sufficiently serious to lead to prolongation of hospitalisation or to temporary or permanent disability or death (Brennan, et al., 1991a). For the purposes of this review, terms for this were selected to be as broad as possible, including, as shown in Table 3.5., adverse events, errors and iatrogenic complications.

2) **Selecting databases to search.**

The OVID SP interface was used to search the following databases in April 2008.

- Medline 1980 – April Week 3 2008
- Medline in process and other non-indexed citations April 29th, 2008
- Embase 1980-2008 Week 17
- PsycINFO 1985-Week 4 2008

3) Identifying and modifying search terms.

The facets of the research question were:

- Adverse events
- Older people
- Hospital inpatients

These were each expanded into a list of search terms, initially by brainstorming for synonyms and using key words from previously identified relevant articles. The search terms were mapped to their MeSH headings wherever possible. A full list of the search terms used, their development and the numbers of articles generated by each term is given in Appendix 1. Search terms were truncated and combined using Boolean operators, and the search was limited to article titles. At each stage, sensitivity checking was carried out by cross checking with five reference papers which had previously been identified as examples of papers which it was hoped the search strategy would produce. At all stages, this sensitivity check was passed.

4) Running the final search strategy

Table 3.5. shows a summary of final search strategy which was run on 28th April, 2008, producing 3617 references. Further detail is shown in Appendix 2. These were reduced by the removal of duplicates and limiting the results to papers written in the English language, and which studied humans, and contained abstracts. This returned 1829 references, which were then subjected to inclusion/exclusion criteria.

Table 3.5. Final search strategy used in systematic literature review.

#	Search term	Number of articles
1	(adverse$ or error$ or (MEDICAL ERROR or DIAGNOSTIC ERROR or MEDICATION ERROR or THERAPEUTIC ERROR or SYSTEMATIC ERROR) or clinical incident$ or undesirable outcome$ or critical incident$ or Patient Safety or iatrogenic$ or IATROGENIC DISEASE or injuri$ or hospital acquired complication).ti.ab.	777016
2	(elder$ or (Aging or Elderly Care) or geriatric$ or geriatrics or frail$ or (Elderly Care or Falling or FRAIL ELDERLY or Health Program or Geriatric Disorder or Geriatric Care) or older$)ti.	258964
3	(inpatient$ or patient$ or hospital$ or ward$ or (hospital patient or aged hospital patient) or Hospitalization or (PATIENT or GERIATRIC PATIENT or HIGH RISK PATIENT)).ti.	1649961
4	1 and 2 and 3	3617
5	Limit 4 to abstracts	3522
6	Limit 5 to English language	3156
7	Limit 6 to humans (not valid in Psych Info so records retained)	3117
8	Remove duplicates	1829
9-18	Sensitivity check with Thomas, Lefevre, Rothschild, Gillick, Kapp	PASSED

Selection of papers for review

1) Creating study selection criteria

The 1829 references identified by the search were next subjected to a process of study selection using six specific criteria. These were created according to the purposes of the review and ordered into a hierarchy of importance. Table 3.6. shows these criteria, their definitions and the rationales behind each of them.

Table 3.6. Inclusion Criteria, with definitions and rationales.

Criterion		Definition	Rationale
1.	Participants must be "older"	Study gives data for patients considered to be "older". It may also contain data for younger patients (e.g. in a comparison study), but the data for older people must be easily identifiable and extractable.	Older patients are the target population for this study.
2.	Adverse events must occur as an inpatient	The study should include adverse events occurring during hospital admission, and not solely focus on those that lead to hospital admission or occur after discharge from hospital.	This study aims to specifically address adverse events and errors that occur within the hospital. Problems with the transition between primary and secondary care at admission and discharge will be discussed elsewhere.
3.	Setting - medical or geriatric wards in a hospital.	Not surgery, psychiatry, ITU or anywhere outside a hospital. Rehabilitation hospitals are allowed. A&E is allowed because many older medical patients are admitted through A&E.	Patterns of adverse events are likely to be different in different settings, and the aim of this study is to specifically concentrate on older patients on internal medicine or geriatric wards.
4.	Study describes empirical data.	The paper describes a study to determine the incidence and/or types of adverse events. It is not a discussion, review or comment.	Empirical studies are free of the biases that may occur with other types of studies.
5.	Paper describes adverse events or errors	Study looks at the incidence and/or causes of adverse events (events which may cause permanent disability, death, or a prolonged length of stay) - not expected side effects or consequences of treatment or disease, and not describing an intervention or clinical outcome.	We wish to look at significant adverse events, and do not wish to include adverse outcomes of hospital admission which may arise as a result of the inevitable effects of illness.
6.	Paper describes adverse events that are broadly relevant to UK practice.	Problems with medications, environments or systems of care not commonly found in UK practice are excluded.	We wish to extract information that will be relevant to the majority of elderly patients in the UK.

2) Abstract selection.

The titles of the 1829 references were read in an initial screening phase and those which very obviously did not meet the study selection criteria were discarded. This left 198 abstracts for more rigorous review using the selection criteria.

A "criterion-led method" was used to apply the selection criteria to the final abstracts, in which the selection criteria were ordered into a hierarchy of importance, and applied one at a time to all abstracts. A screenshot illustrating this process is shown in Appendix 3.

Next, all abstracts were examined using criterion 1 and given a score based on their fulfilment of the definition of the criterion. The possible scores were as follows:

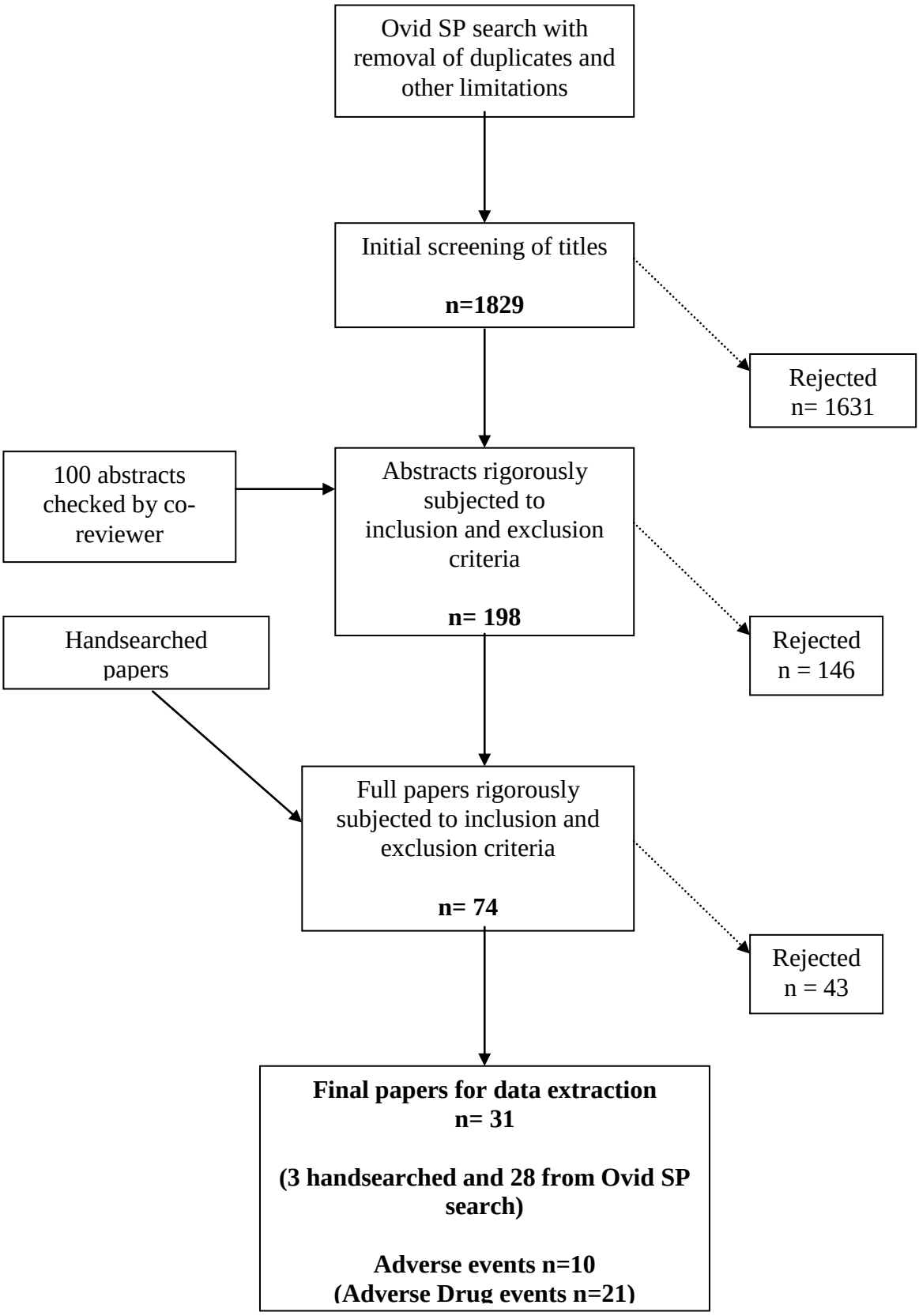
Criterion definitely not met = 0

Unclear whether criterion met = 1

Criterion definitely met = 2

At each of the six stages, papers that scored 0 were rejected. The reasons for each given score were noted. A co-reviewer (KB) reviewed a random sample of 100 of the 198 abstracts, and applied the same inclusion and exclusion to them as the principal reviewer. Good agreement was achieved between the two reviewers (Kappa 0.71, calculated using SPSS). Reassuringly, there were no abstracts selected by the principal reviewer but not by the second reviewer. On discussion and further examination of the reasons given by each reviewer for accepting/rejecting the abstracts, it emerged that the majority of the discrepancies were due to the fact that the second reviewer, a non-clinician, had not been as able to reject abstracts based on knowledge of care settings, or whether the adverse event occurred as an inpatient or not, as the principal reviewer. Eventually 52 abstracts remained for further review. At this stage, 22 further abstracts were included from hand-searching and the "grey literature", so that in total 74 papers were put forward for further assessment. The numbers of articles accepted and rejected at each stage are shown in Figure 3.1.

Figure 3.1. Selection process for the final articles included in the study.



3) Final paper selection.

The full text of the final 74 papers were read and were again subjected to the same inclusion and exclusion criteria as the abstracts had been, using the same criterion led process as described earlier. This left 31 papers for the final analysis. It was decided to divide the final papers into two main groups for further analysis, according to their subject:

1. Incidence, causes, types and reporting of adverse events in elderly medical inpatients (10 papers).
2. Incidence, causes, types and reporting of adverse drug events in elderly medical inpatients (21 papers).

It was subsequently decided that the present study would deal only with studies that investigate adverse events in general, so the second group was discarded. Although there is likely to be overlap in terms of causes and outcomes of adverse drug events and adverse events in older people, as described in the introductory chapters, it was felt that adverse drug events were to some degree separate, and we preferred to focus on studies of adverse events in general.

Data extraction, quality assessment and data synthesis.

1) Data extraction.

Data extraction was carried out using two Excel documents: one to extract details of the methodologies of the studies, and one to extract data from their results. In addition, the authors' main conclusions, acknowledged limitations of the studies and comparison with other studies, and suggestions for future research and practice were documented.

2) Quality assessment.

Quality assessment is a recommended part of a systematic literature review, to ensure that a balanced view of the results of the studies is presented, in the context of their methodological flaws or strengths. A basic literature search was carried out to find a well-validated scoring system to assess the quality of the final studies. The results of this were rather limited, as there seems to be very little guidance on assessing the quality of non-intervention studies. After consideration, the MINORS scale (Slim et al., 2003) was modified for the purpose of this review, to produce the quality assessment scale shown in Figure 3.2. Each study was given an individual quality assessment score for each point using the following system for items 1-11 (max 2 points each):

0 = Not reported, or reported but not fulfilled at all

1 = Reported and fulfilled to partial satisfaction

2 = Reported and fulfilled to full satisfaction

For items 12-14 (max 1 point each) the scoring system was as follows:

0 = Not reported, reported but not fulfilled at all, or fulfilled partially

1 = Reported and fulfilled to full satisfaction

The total scores for each paper were then calculated.

Figure 3.2. Modified MINORS score used for quality assessment of final papers.

The ideal study in this review would have the following characteristics:

Study design

1. **A clearly stated aim**: the question addressed should be precise and relevant in the light of available literature (max 2 points).
2. **Endpoints appropriate to the aim of the study**: clearly explained and appropriate definition of adverse event (max 2 points).
3. **Follow up period appropriate to the aims of the study** to allow adequate assessment of the outcome (max 2 points).
4. **Adequate study size** in view of the expected incidence of the outcome (max 2 points).

Case selection

5. **Selected patients are representative of the target population** (max 2 points).
6. **Clearly defined selection and exclusion criteria** and inclusion of all consecutive patients who fit inclusion criteria (max 2 points).
7. **Reliable method of dealing with patient movement**, to other wards or readmission, during study period (max 2 points).

Data collection methods

8. **Robust way of detecting adverse events**, using well validated methods (max 2 points).
9. **Unbiased assessment of adverse event occurrence;** adequate mechanisms in place to reduce bias (max 2 points).

For studies which look at causative factors or outcomes of adverse events

10. **Well validated ways of measuring or recording the causative factors or outcomes of adverse events** (max 2 points).
11. **Sound statistical methods** of determining any association (max 2 points).

For studies that compare adverse events in different groups

12. **Adjustment for potentially confounding factors** such as sample size, speciality or comorbidity. (max 1 point).
13. **Contemporary groups:** both groups should be managed during the same time period to avoid historical comparison which may lead to bias (max 1 point).
14. **Adequate statistical analysis:** the statistics are in accordance with the type of study, with calculation of confidence intervals or relative risk (max 1 point).

4) Data synthesis.

Data were then complied and summarised into the following categories:

- Incidence and types of adverse events.
- The relationship between age and adverse events and the effects of other factors.
- Preventability of adverse events.
- Factors other than age affecting the incidence of adverse events.
- Effects and outcomes of adverse events.
- Effect of specialities
- Multiple adverse events

1.3.3. Results.

Characteristics and quality assessment of the studies included in the review.

The authors, titles and aims of the 10 studies that were included in the review are shown in Table 3.7, followed by a summary of their relevant characteristics in Table 3.8. The papers published by Thomas and Sari described in Chapter 3.2. (secondary analyses of their large adverse event studies) are also included in this systematic review.

Quality assessment.

Table 3.9 demonstrates a wide variation in study quality, ranging from 0.44 to 0.80, with a mean score of 0.659.

Table 3.7. Authors, titles and aims of the studies selected for inclusion in the systematic review.

Author	Title	Stated aims
Becker, 1987	"Hospital-acquired complications in a randomized controlled clinical trial of a geriatric consultation team."	"to answer these specific questions: 1. What is the incidence of hospital-acquired complications in elderly veterans? 2. What factors are associated with the occurrence of hospital-acquired complications? 3. Can a Geriatric consultation team (GCT) reduce the occurrence of hospital acquired complications?"
Davis, 1984	"Level of care and complications among geriatric patients discharged from the medical service of a teaching hospital."	"to assess…the effects of complications of…. hospitalisation on the subsequent placement and supportive care of older people"…..
Foreman, 1993	"Adverse events in the hospitalized elderly."	"to examine elderly hospitalised patients and describe the incidence, onset and correlates of adverse events that occur during the course of hospitalisation and which lead to less than desirable consequences of that hospitalisation"
Gillick, 1982	"Adverse consequences of hospitalization in the elderly."	"to study the effect of the process of hospitalisation on the patient - "social iatrogeny" (vs. clinical iatrogeny)". In other words to look at the consequences of hospitalisation itself, unrelated to diagnostic or therapeutic interventions
Jahnigen, 1982	"Iatrogenic disease in hospitalized elderly veterans."	"to identify and measure complication rates in elderly hospitalised veterans"
Lefevre, 1992	"Iatrogenic complications in high-risk, elderly patients."	"to develop a strategy aimed at preventing iatrogenesis, the extent of the problem, as well as the predictors and determinants of iatrogenic events, needs to be more fully understood" "This hypothesis-generating, retrospective study was seen as the first step towards a confirmatory prospective study, and ultimately a controlled trial of targeted preventative techniques"

Middleton, 1989	"An autopsy-based study of diagnostic errors in geriatric and non geriatric adult patients."	"to explore the utility of and possible differences in the roles of the autopsy in the assessment of patient care in the general adult and geriatric populations….to answer the following questions 1) Did the autopsy rate decrease with age? 2) Did the incidence of diagnostic/therapeutic errors, as identified with autopsy, increase with age? 3) Were these errors of clinical significance? 4) What were the underlying causes and did any appear to be age related?"
Sari, 2008	"Incidence, preventability and consequences of adverse events in older people: results of a retrospective case-note review."	" (to) compare the incidence, preventability, types and consequences of adverse events between elderly patients (of ≥ 75 years) and those <75 years old in a large NHS hospital."
Thomas, 2000	"Incidence and types of preventable adverse events in elderly patients: population based review of medical records."	"to determine the incidence and types of preventable adverse events in elderly patients"
Witham, 2006	"Using a sentinel adverse incident audit on a Medicine for the Elderly ward."	" introduced a sentinel adverse incident reporting system to ascertain whether a) additional events would be detected by this system and b) to provide a driver for ward based quality improvement programmes"

Table 3.8. Characteristics of the papers selected for inclusion in the systematic review.

	Becker 1987	Davis 1984	Foreman 1993	Gillick 1982	Jahnigen 1982	Lefevre 1992	Middleton 1989	Sari 2008	Thomas 2000	Witham 2006
Country	USA	USA	USA	USA	USA	USA	USA	UK	USA	UK
Study design	Prospective randomised controlled clinical trial.	Retrospective case record review.	Prospective observational study	Prospective observational study.	Prospective observational study	Retrospective case record review.	Retrospective analysis of autopsies and corresponding case records	Two stage retrospective case record review.	Two stage retrospective case record review	Prospective audit.
Setting	A Veterans Administration Medical Center	A university teaching hospital	An acute care hospital	A city hospital	A Veterans Administration hospital	Large university teaching hospital	University teaching hospital	Large NHS hospital	Various hospital types	A Scottish hospital
Specialities	Medical, surgical & psychiatric services	General medical	Medicine, ITU, cardiology and surgery	Not stated	Medicine, surgery, psychiatry, neurology	Not stated	Not stated	Elderly medicine (54.2%), GIM, surgery	Not stated	Geriatric medicine
Definition of older patients	Over 75	Over 75	Over 65	Over 70	Over 65	Over 65	Over 65	Over 75	Over 65	Not stated
Intervention study?	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗
Comparison of older patients with younger?	✓	✗	✗	✓	✓	✗	✓	✓	✓	✗
Factors affecting AE incidence?	✓	✗	✓	✓	✓	✓	✗	✗	✓	✗
Types of AE's?	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Preventability of AE's?	✗	✗	✗	✗	✗	✓	✗	✓	✓	✗
Outcomes of AE's?	✗	✓	✗	✗	✗	✗	✗	✓	✓	✗

Table 3.9. Summary of quality scores for papers included in systematic review.

		Quality assessment item	Becker 1987	Davis 1984	Foreman 1993	Gillick 1982	Jahnigen 1982	Lefevre 1992	Middleton 1989	Sari 2008	Thomas 2000	Witham 2006
Study design	1	Clear aims	2	2	2	2	2	2	2	2	2	2
	2	Clear definition of AE	2	1	1	2	1	2	2	2	2	0
	3	Study duration	1	1	1	1	1	1	1	1	1	1
	4	Study size	1	1	1	2	1	1	1	2	1	1
Case selection and data collection	5	Representativeness of sample	0	0	1	0	0	1	1	0	1	0
	6	Selection of subjects	2	2	2	2	1	2	2	2	2	2
	7	Dealing with patient movement	0	0	0	2	0	0	0	0	0	0
	8	Method of detection of AEs	2	1	2	2	1	1	2	2	2	1
	9	Minimisation of bias when detecting AEs	2	2	0	1	1	2	2	2	2	1
Measurement of factors affecting AE incidence and outcomes	10	Measuring factors affecting AEs other than age.	2	2	1	2	1	2	0/0†	0/0†	2	0/0†
	11	Bias/Statistical methods in estimating relationship.	2	0	2	1	1	2	0/0†	0/0†	2	0/0†
Group comparison. ‡	12	Adjustment for confounders	1	0/0†	0/0†	0	1	0/0†	0	0	1	0/0†
	13	Contemporary groups?	1	0/0†	0/0†	1	1	0/0†	1	1	1	0/0†
	14	Adequate statistical analysis?	1	0/0†	0/0†	1	1	0/0†	1	1	1	0/0†
		Total Score	**19/25**	**12/22**	**13/22**	**19/25**	**13/25**	**16/22**	**13/18**	**13/18**	**20/25**	**8/18**
			0.76	**0.55**	**0.59**	**0.76**	**0.52**	**0.73**	**0.72**	**0.72**	**0.80**	**0.44**

† Criterion not applicable in this study so reduced possible total score given.

‡ Criteria 12 to 14 only score a maximum of one point each (criteria 1-11 score a maximum of two)

Aims of the studies and definitions used.

Definitions of adverse events varied hugely between the studies, often with no explanation. Some studies such as Sari and Thomas used generic definitions used widely in the large adverse event studies, whilst others used definitions specifically tailored to older people, such as the phrase "symptoms of depressed psychophysiologic functioning" in Gillick. This obviously affects the type of data generated by the studies. Middleton took a very different approach to the other studies, looking at the proportion of diagnostic errors as detected by autopsy in older people and non-elderly populations. This study used fictional death certificates created from review of the notes and compared them with death certificates produced after autopsy to identify diagnostic errors that had been made by the teams caring for the patient. In this way, the study written by Middleton is very different from the other studies, as it does not seek to provide information about types of adverse events other than diagnostic errors.

The studies each had different aims and therefore provide data on a wide range of aspects of adverse events in older people. Some compared groups of elderly patients with younger groups, and others solely investigated elderly patients. In one study (Becker) two groups of elderly patients were compared in order to test the effect of an intervention (a Geriatric Consultation Team) on the incidence of adverse events.

Some of the studies (Sari, Thomas) were publications of secondary data analysis of large studies of adverse events in all age groups; the large studies from which they were generated have already been discussed in Chapter 3.2. (p.61). Although these studies were not designed with older people specifically in mind, they were the largest studies in the review in terms of sample size and therefore most likely to have been the most representative of the population as a whole. In fact, the Utah and Colorado adverse event study, from which Thomas was derived, was a "population based study", meaning that the large sample

reviewed was deemed to be representative of the population as a whole, so the authors were able to extrapolate results for the whole population of patients discharged in Utah and Colorado in that year. This allowed strong statistical conclusion to be drawn about the incidence, types, causes and consequences of adverse events. In contrast, Witham's paper (Witham et al., 2006) was an evaluation of a novel way of reporting adverse events in older people, so by its very nature did not seek to investigate the actual adverse events in any depth. Davis's study was also unique, in that it was the only study which aimed to look at the effect of patient factors on outcomes of adverse events, rather than their effect on adverse events alone: the implied hypothesis being that complications in hospital would lead to a reduction in function, death or placement in care homes.

All studies used arbitrary definitions of "elderly", with only one study (Gillick) stating that the age limit used was based on pilot work for those at most risk.

Sample selection.

All studies used similar subject recruitment and selection processes, usually using consecutive admissions to the hospitals in question. As in Chapter 3.2., an interesting feature of several of the studies is the exclusion criteria they employed. Many of the studies excluded very unwell, or even dying patients from their sample. Several excluded patients with acute neurological conditions or reduced levels of consciousness. Usually, no explanation for this was given, but some studies explained that the reason for this was that patients presenting with stroke, intensive care, oncology or palliative care needs would be cared for in specialist environments, which could not easily be compared to general wards. This may well be the case but causes one to wonder whether the incidence of adverse events in older patients in these other specialist environments has been studied; certainly this literature review did not reveal any such studies. Also concerning is the fact that it is not clear whether these patients were included if they were in fact cared for on the geriatric or general medical wards. There

is a strong possibility that very unwell patients are even more susceptible to adverse events and errors than more straightforward cases, perhaps because of the intensity of their treatment, the different approaches used in palliative care, or the patients lack of ability to participate in their own health care.

Detection of adverse events.

All studies (except Witham) used some form of case record review to detect adverse events, which brings with it its own problems (see Chapter 5 for further discussion of this). Some supplemented this with patient or staff interviews, or other data collected on a hospital or state level. It is interesting to note that Witham and Becker were the only studies in which official adverse event reporting systems were used to detect adverse events; perhaps this says something about the other authors' perception of the reliability of existing reporting systems in identifying adverse events.

Incidence and types of adverse events.

A wide variation in the incidence of adverse events in older people was reported in these studies. The two studies that had been part of large international adverse events studies, in which data was simply re-analysed to look at the differences between the old and the young, showed the lowest adverse event rates – 5.29% (Thomas & Brennan, 2000) and 6.2% (Sari, et al., 2008). In contrast, studies that had been carried out specifically to look at adverse events in older people found a much higher incidence – the highest of which was in the study conducted by Lefevre (Lefevre et al., 1992), in which there were more adverse events than patients overall, with 1.8 adverse events per patient. This huge variation reflects the different methodologies employed, particularly the different definitions of adverse events used and the fact that investigators who were particularly focussing on older people tended to seek out information about conditions such as delirium or incontinence which may not have been

detected in the large adverse event studies which were not designed with older people in mind.

Similarly, a wide range of types of adverse events was reported in these studies, which varied according to the study's definition of adverse events. These ranged from geriatric syndromes such as falls, delirium, pressure sores and incontinence in Davis (Davis et al., 1984), Foreman (Foreman et al., 1993), and Gillick (Gillick et al., 1982), to diagnostic errors in Middleton (Middleton et al., 1989) and more "conventional" adverse events such as adverse drug events, hospital acquired infections and procedure related complications in the other studies.

Table 3.10. gives a summary of information obtained about the incidence, types and preventability of adverse events.

Table 3.10. Incidence, types and preventability of adverse events.

	Overall adverse event rate	Incidence of AE's in older group	Incidence of AE's in younger group	Difference (p)	Types of adverse eventa	Preventability of adverse events
Becker, 1987	38%	38%	NA	NA	Medication related 22%, Trauma 20%, Procedure related 19%, Infections 24%, Delirium 10%, Other 5%	Not studied
Davis, 1984	30%	30%	NA	NA	Medication related 52%, Delirium 29%, Incontinence 22%, Falls 12%, Fever 4%, Pneumonia 3%, Other 12%, Procedure related 7%	Not studied
Foreman, 1993	60%	60%	NA	NA	54% delirium, 24% pressure sores, 33% urinary incontinence or nutritional problems, 2% adverse drug reactions.	Not studied
Gillick, 1982	14.9%	40.50%	8.80%	p<0.0001	Functional confusion - 3.6% of young, 29.5% of elderly, (p<0.0001). Not eating - 1.8% of young, 15.6% old (p<0.0001), Incontinence - 5.5% young, 26.6% old (p<0.0001). Falls - 0.9% young, 5.2% old (p=0.003).	Not studied
Jahnigen, 1982	33.3%	45.00%	29.00%	p<0.05	16.8% hospital procedures, 15.4% trauma, 14.8% misc, 10.7 psychiatric, 13.4% infections, 12.8% drugs.	Not studied
Lefevre, 1992	58.3%	58.3%	NA	NA	44% due to therapeutic interventions, (40% inappropriate), 10.1% due to procedural intervention, (45% inappropriate). 24% errors of omission/inadequate attention, 6% falls. 15.9% other	52.1% of the iatrogenic complications were deemed preventable
Middleton, 1989	32%	35% overall, 34% minor discrepancies	30% overall, 15% minor discrepancies	p=0.6 overall, p<0.04, minor discrepancies	All diagnostic errors. In general, more common to have errors of judgement than errors of omission	Not studied

Sari, 2008	8.7%	6.2% (95% CI 4.4-8.0)	13.5% (95% CI 9.8-17.2)	p<0.001, still p<0.001 for <65's, and after adjusting for LOS	HAI and falls more common, operative complications less common in over 75's than in under 75's	AE's preventable in 15.5% pts over 75 and 47.6% under 75 (p=0.15 after adjustment for confounders.)
Thomas, 2000	2.9% +/- 0.2	All AE's: 5.29% +/- 0.37, preventable AE's 2.95 +/-0.28%	All AE's 2.8% +/- 0.18%, preventable AE's 1.58% +/- 0.14	p<0.001	Elderly pts have a higher incidence of preventable AE's related to medical procedures (0.69% vs. 0.13%), preventable ADE's (0.63% vs. 0.17%), preventable falls (0.1% vs. 0.01%)	Preventable AE's in older people: 2.95 +/- 0.28%, in younger patients: 1.58% +/- 0.14, p<0.001
Witham, 2006	27%, reported by sentinel audit, 55%, reported by incident forms	27%, reported by sentinel audit, 55%, reported by incident forms	NA	NA	Sentinel audit form – 33% delay in Rx/Ix/Dx, 19% prescribing errors, 7% no DC summary, 5% inappropriate Rx, 5% unplanned readmission, 5% cancelled or inadequate discharge, 8% ADE, 4% unprescribed drugs/warfarin, 3% obs not recorded, 8% other. Incident reporting - none of the above, 87% slips/trips/falls, 4% drug admin error, 9% violence and aggression	Not studied

The relationship between age and adverse events.

Jahnigen (Jahnigen et al., 1982) found that age seemed to be related to the incidence of adverse events independently of disease severity or length of stay and Sari found that each year of life increased the risk of an adverse event by 28%, after adjustment for length of stay. Becker (Becker, 1987) and Lefevre showed that loss of functional ability was independently associated with adverse events, whilst Thomas reported that clinical complexity probably accounted for the observed association with age, rather than simply age discrimination or age alone. Complexity also seems to be a confounder for preventability of adverse events, with Sari initially finding an apparently significant relationship between age and preventability which was no longer statistically significant when the definition of elderly was reduced from 75 to 65 years, and also when adjusted for confounders.

Factors other than age affecting the incidence of adverse events.

The factors other than age which were associated with a statistically significant increased risk of adverse events in these studies were:

1. Functional loss: the inability to perform at least one activity of daily living on admission (Becker and Lefevre), living in a nursing home (Gillick).

2. Comorbidity and severity of illness: severity of illness on admission (Jahnigen), reduced level of consciousness on admission (Lefevre), diagnosis related group (DRG) complexity (Thomas), having the admitting diagnosis “infection” (Gillick)

3. Demographic factors; being of Afro-American ethnicity (Foreman), being male (Gillick)

4. Receiving less than adequate quality of care as judged using the RAND scale (Lefevre)

The only factor in all the studies which was found to be negatively associated with the incidence of adverse events in a statistically significant way was good documentation of functional status during the admission (Lefevre); this halved the risk of adverse event occurrence in this study.

Effects and outcomes of adverse events.

Jahnigen's study was the only one to describe the effect of adverse events on the patient experience, stating that all adverse events were likely to have an effect, ranging from discomfort to death. Jahnigen was also the only author to investigate the effect of adverse events on length of stay, stating that for all ages, patients with adverse events were likely to be in hospital twice as long as those without. The reason why the effect on length of stay has not been more widely studied is probably that it is very difficult to separate additional days in hospital caused by adverse events from additional days that these frail complex patients may require to recover from functional loss due to illness rather than adverse events. The relationship is further complicated by the fact that any additional length of stay will inevitable result in exposure to further risk of adverse events, a fact acknowledged by Sari who adjusted for length of stay when estimating adverse events.

Only Jahnigen and Gillick investigated the incidence and deleterious effects of interventions employed when adverse events occurred. Jahnigen found that restraint and/or tranquilisation were "often necessary" in the patients who developed delirium, with subsequent risks of pressure sores, aspiration, and self-injury. Gillick found that psychotropic drugs and restraints used for delirium, nasogastric tubes inserted for feeding in undernourished patients and catheters inserted for incontinence were more likely to be used in older people than younger patients. This in turn led to complications such as urinary tract infections, septic shock, and fractures in older people, with none occurring in the younger patients who received these interventions. The authors acknowledge that this was a very

small sample, but based on evidence in the literature at the time, gave a suggested risk of complications from treatment given as a result of adverse events of 1.0% for young patients, and 5.7% for elderly patients ($p<0.0001$).

Several of the studies described the proportions of patients who died during the study period, but only Thomas related this to adverse event occurrence; however there was no significant difference between the rates of death considered to be attributable to adverse events in younger compared to older patients. There is considerable difficulty in making this estimation, which probably explains why more studies did not attempt to do so (Hayward & Hofer, 2001).

Only Davis investigated whether there was a link between adverse event occurrence and the need for nursing home placement on discharge from hospital; in this study most adverse events were minor and transient and their occurrence did not correlate with either nursing home placement or change in level of care on discharge.

Multiple adverse events

The studies varied in terms of their estimation of the proportion of patients who experienced more than one adverse event, from 11% in Foreman to 58.3% in Lefevre. In Middleton's study, 73% of patients in whom a diagnostic error was found fell into more than one error category.

3.3.4. Discussion and conclusions.

Main findings.

This review shows that, surprisingly, there have only been a small number of studies specifically designed to look at adverse events in older medical inpatients. Of the 10 identified in this systematic review, 2 were simply re-analyses of data collected in larger populations (from studies designed without adverse event types in older people in mind,

which would therefore have excluded the geriatric syndromes for example). However, the remaining 8 studies were deigned to look for problems of particularly relevance to older people.

A wide variety of incidences of adverse events was reported in these studies, depending on the definitions used and the aims of the studies. All of the studies that compared age groups found statistically significantly more adverse events in older patients than younger ones. This, together with the evidence from data extracted from the large international adverse event studies (Chapter 3.2.) provides very strong evidence of an association between age and adverse events. Again, this relationship seems to be related to complexity, frailty and co-morbidity rather than age alone.

Limitations of this review.

The main limitation of this review is the heterogeneity of the studies that it identified, as described above. Older patients receiving care in settings other than general medical or wards were often not included, although it is likely that the adverse events they encountered would have been similar. Also, this literature search was not designed to look for the incidences and causal factors of specific conditions such as delirium, falls or incontinence, instead relying on the broad term "adverse event" to include these. The wide variation in study quality as judged by the quality assessment scores given above reflects the variation amongst the studies in terms of their aims and design.

Many of the studies included here are rather old. Obviously the ways in which healthcare is delivered in general, but particularly in geriatric medicine, has changed significantly over the last few decades, which may make the relevance of the results of the earlier studies in this review to practice today questionable. The vast majority of the studies were published in the USA, with only two originating from the UK; clearly the healthcare systems are different in the two countries and therefore caution should be used when drawing

parallels between the two. Having said that, it might be argued that the problems encountered by elderly people in hospital are the same in many respects across continents (and similarly across decades).

3.3.5. Conclusions and implications for further work..

All studies in this review found a positive association between age and the incidence of adverse events. Attempts were made by many to investigate the underlying causes of this relationship, and the effect of age on outcomes of adverse events. The review is limited by the variety of methodologies used in the included studies, and the variation in study quality found in this review. It is apparent that further studies to investigate the complex nature of adverse events in older people are required.

Chapter 4. Multidisciplinary staff perceptions of the risks faced by older people in hospital, with exploration of contributory factors and suggested interventions – a qualitative study.

4.1. Introduction and aims.

I have shown in Chapter 3 that there are relatively few quantitative studies published in the literature that provide a general overview of safety and quality issues in older medical inpatients in modern British hospitals. The qualitative study presented in this chapter was carried out in order to supplement the scant information provided by the literature review, with the aim of providing a much more complete picture with which to inform the safety and quality measurement tools and improvement work described later in the thesis.

The aims of this study were:

1) To gain an understanding of the types of quality and safety issues (risks) as perceived by staff working "on the shop floor" with older people in hospital.
2) To determine from staff what they perceive to be important causes of these problems.
3) To identify what interventions staff think might alleviate these problems.

4.2. Methods.

4.2.1. Design, participant selection and recruitment.

In depth semi-structured interviews were carried out with multidisciplinary staff involved in the care of older people. A purposive sample of interviewees was selected, in order to obtain a range of individuals with different professional backgrounds and levels of experience, working with older patients across a variety of clinical settings within one London teaching hospital. Prospective interviewees were given an information sheet describing the purpose of the study at the time of invitation to participate. Sample size was

not fixed in advance; recruitment continued until thematic saturation was reached (Pope & Mays, 2006).

4.2.2. Interview procedure.

In order to stimulate thought, prior to the interview participants were sent a pre-interview sheet (Appendix 4) asking them to imagine two fictional patients and to then think about the safety and quality issues that may arise during their stay in hospital. These were: a) an 85 year old lady who lives at home alone is admitted to hospital after a fall; and b) an 85 year old gentleman with advanced Parkinson's disease, who is immobile and lives in a nursing home, is admitted to hospital because he is more confused than usual. These examples were chosen because they represent common clinical presentations of older people to hospital, similar to that which all the participants would have come in to contact with regularly in their day-to-day work.

The interview procedure was guided by a semi-structured schedule (shown in Figure 4.1. below). The interviewers made every effort not to ask leading or suggestive questions, asking open questions only. We started by asking "What do you think are the risks are to older people in hospital?" If necessary we prompted ideas by asking the interviewees to imagine the fictional patients described above. We encouraged interviewees to tell us as much as possible about the issues they mentioned, which meant that we were able to obtain a great deal of information about each risk. Each interview lasted around an hour.

Two interviewers were present at each interview, one of whom carried out the interview itself (both Specialist Registrars in geriatric Medicine), whilst the other took field notes during the interview using a table with the broad headings "Type of risk, contributory factors, outcomes, interventions". Towards the end of the interview, the completed table was shown to the interviewee, so they could check that the information that was recorded was

correct ("member checking") (Pope & Mays, 2006) and so that they could fill in any gaps, particularly interventions for risks they mentioned.

In order to provide triangulation for our data (Richards, 2005), at the end of the interviews participants were asked to name the three risks they have mentioned which they felt were most important, and the three "magic wands", or interventions that could be implemented in an ideal world, that they would like to see.

Figure 4.1. Semi-structured interview schedule.

1. What is your job title and role?

2. What do you think the risks are to older people in hospital?
(Keep this question very open initially; give participant space to bring up topics before prompting).

Prompts: Think about the fictional patients we sent you before the interview – what might happen during their stay in hospital?
What risks/problems/hazards/complications might occur?

3. Why do you think this happens?

Prompts: What are the contributory factors to these risks?
Types of contributory factors: patient-related, staff-related, system related, environment related

4. What do you think could be done about these risks?

Prompts: Are there any interventions were already in place for these risks?
Have they been they successful or not very successful?
What changes would you like to see?

5. Could you check our notes and fill in any gaps?

6. What are your top three (most important) risks?

7. If we could wave a magic wand, what would your top three interventions be?

4.2.3. Data extraction and synthesis.

The interviews were digitally recorded and professionally transcribed verbatim, and transcripts were checked against recordings for accuracy. The transcripts were then coded using content analysis, in a systematic manual process as follows:

1. A list of risks given by each interviewee was created by systematically working through the transcripts. Actual segments of the transcripts were pasted into this coding system with every effort being made not to paraphrase the interviewees.
2. Each contributory factor (patient, staff or environment or system), outcome and intervention (suggested or in place) that the interviewee mentioned was then coded to the relevant risk, using a simple colour coding system.
3. The information from each interview regarding top three risks and interventions was extracted separately from the transcript.
4. Each interview transcript was analysed separately by the two interviewers and discrepancies in coding were resolved after detailed discussion.

Extracted data from each interview were then merged so that we were able to produce a list of risks. We made every effort not to paraphrase the interviewees, however we found that when merging the risks, different individuals had different ways of naming the same problem, for example delirium was variously described as “delirium” or “acute confusion”. This was the only time that we changed the text of phrases based on our own interpretation of underlying meanings, otherwise throughout the process of data synthesis we simply categorised and merged the raw data.

Common themes were identified in terms of contributory factors, outcomes and interventions.

4.2.4. Ethical considerations

Ethical approval for this study was obtained from the local Research Ethics Committee (REC number: 07/H0715/90). Full written consent was obtained at the time of each interview (the consent form is shown in Appendix 5).

4.3. Results.

4.3.1. Interviewee characteristics.

16 members of staff were interviewed. Table 4.1. illustrates the range of professions, levels of experience, and clinical settings in which participants work.

Table 4.1. Interview participants.

Nursing	Medical	Allied Health Professionals
• Ward Manager, Medicine for the elderly ward A • A&E Nurse Consultant Discharge Nurse Specialist • Palliative Care Clinical Nurse Specialist • Nurse who works for OASIS (Older Adults Specialist Inpatient Service) team • Ward Sister, Medicine for the elderly ward B • Ward Sister, Orthopaedic ward	• Consultant, Geriatric Medicine • Foundation Year 1 doctor, Geriatric Medicine • Specialist Registrar, Geriatric medicine	• Occupational Therapist, Band 6 • Physiotherapist, Band 6 • Ward Administrator • Physiotherapist, Band 7 • Lead Pharmacist for older people • Speech and Language Therapist, Band 7

4.3.2. Quality and safety themes identified by staff.

A complete list of the safety and quality issues (or "risks") that our interviewees described are presented in Table 4.2., with the number of participants that mentioned each (a table showing source details is shown in Appendix 6). Problems identified in the literature

review (geriatric syndromes, procedural complications and medication related problems) were also described by our interviewees. The most commonly cited problems were falls, functional decline and hospital acquired infection. However, a significant number of additional, perhaps less obvious but yet important problems were also identified in this study. Many of these overlap to some degree, but subtle differences have been preserved. These tend to be related to issues that are perhaps less measurable or quantifiable, such as processes of care, systems, attitudes and cultures within the hospital and the wider healthcare system.

Table 4.2. All safety and quality issues described by interviewees.

Broad group	Specific problem	No. of interviewees
Mobility and functional decline	Decline in mobility, being left in bed	4
	Loss of independence or the ability to perform ADL's	9
Delirium	Inappropriate management of delirium	2
	Not risk stratifying patients or recognising those at risk of delirium	2
	Acute confusion being misdiagnosed as dementia	1
	Incorrectly assuming confusion is acute in patients with chronic cognitive impairment	1
	Failure to recognise delirium	2
Pressure sores	Developing new or worse pressure sores	7
Continence and bowel care	Not being encouraged to be continent, becoming newly incontinent, or if already incontinent not being assessed or treated	5
	Inadequate bowel care	3
Falls	Falling in hospital	15
Hospital acquired infection	Developing hospital acquired infection	10
Nutrition	Swallowing managed poorly	2
	Poor nutrition in general	5
	Being fed in inappropriate positions in bed, or not being sat out for meals	2
	Poor nutrition at the end of life	1
The admission process/A&E	Unnecessary hospital admissions	6
	Inadequate initial assessment	5
	Inadequate care for patients with minor injuries	1
	Missing social problems in A&E	2
	Being admitted through a system not designed with the complex elderly in mind	1
	Receiving inappropriate/unnecessary treatment/interventions in A&E	2
	Not having direct access to outpatient services such as falls clinic from A&E	1
	Being overlooked in A&E	1
	Feeling that the emergency department is unwelcoming/forbidding/difficult to find	1
	Recurrent admissions	1
Investigation, diagnosis, treatment	Inadequate assessment on the ward	2
	Delay in carrying out investigations	2

	Over investigating and treating	2
	Under investigating and treating	1
	Incomplete and inaccurate assessments leading to incorrect diagnoses e.g. "UTI"	1
	Delay in performing interventions/procedures in palliative patients	1
	Interventions unnecessarily painful or distressing	1
Risks if cared for in non-geriatric settings such as surgical wards:	Operative risks	2
	Drugs not reviewed	1
	Being treated inappropriately the same way as younger patients	1
	Not receiving early specialist geriatric input	1
	Poor functional status immediately post-operatively	1
	Prolonged wait for surgery	1
	Post-operative infections	1
	Poor discharge planning/prolonged length of stay	1
	Poor future care planning (contingency planning for patient after discharge)	1
	Not receiving appropriate investigations (e.g. for falls if admitted with fracture)	1
	Side effects of drugs not anticipated (e.g. constipation due to opiates)	1
	Delay in investigating causes of delirium	1
	Slow progress mobilising post-operation	1
	Prolonged fasting pre-operatively in acute trauma	1
	Surgical or peri-operative death	1
	Never getting back to pre-operative functional level	1
	Poor mental capacity assessments	1
	Poor communication with families	1
Medication management	Inappropriate or inaccurate prescribing	2
	Prescription or administration errors	6
	Medications not reviewed and adjusted according to clinical need	3
	Receiving incorrect formulations of drugs	1
	Side effects of medications	2
	Not receiving prescribed medication	1
	Being overmedicated	3
	Lack of individualised prescribing	1
	Receiving inadequate analgesia	3

Decision making	Inconsistencies in end of life decision making, or lack of end of life decision making	1
	Delays in making decisions	1
	Incorrect decisions made around mental capacity	1
Basic and holistic care	Not being given enough time for proper assistance	2
	Inadequate management of underlying social problems	1
	Hearing not optimised	1
	Poor communication with patients and relatives	3
	Not addressing sub-acute or subtle problems e.g. with swallowing or communication	1
	Being cared for by staff with no knowledge of the patient, who make assumptions	2
	Not looking at the patient as a whole, focusing on single problems	3
	Poor or inappropriate general care if patient is not for resuscitation	1
	Being perceived as less important than younger patients	1
	Poor hand hygiene (patients)	1
	Poor management of oral/ dental hygiene	3
	Not receiving adequate attention from staff on the ward	1
Multidisciplinary team working	Decisions made without consulting other members of the team	1
	SALT recommendations not followed	1
	Unclear roles/responsibilities within the MDT	1
	Staff don't read each others entries in the notes	1
	Poor nursing handover	1
	Poor handover between medical teams	1
	Poor communication between doctors and nurses	1
	Poor handover in general	2
	Inadequate handover to out of hours team	1
	Not being referred to members of MDT	1
	Lack of communication between MDT on wards without MDM's	1
	Not receiving timely SALT assessments	1
Psychological or emotional wellbeing	Being cared for by staff without a professional, courteous or compassionate manner	1
	Dehumanisation/depersonalisation	2
	Institutionalisation	4
	Loss of dignity	4
	Facing prejudice	1
	Sensory deprivation	1

	Sleep deprivation	1
	Boredom, isolation or understimulation on the ward	4
	Not receiving individualised care	2
	Depression	2
	Stopping people from taking managed risks	1
	Becoming muddled or disorientated (NB different from delirium)	7
	Misinterpreting behaviours in patients with dementia or delirium	4
	Not being empowered to take part in decisions relating to care	3
	Loneliness due to difficulties for relatives coming to visit patients in hospital	1
	Wishes or needs not being advocated or respected	3
	Infantilisation or being spoken to like a child (elderspeak)	2
	Being made to feel insecure or frightened	3
	Inadequate communication between staff and patients in A&E	3
	Inadequate or delayed assessment of psychiatric issues	1
	Becoming distressed or agitated	2
Abuse	Financial	1
	Psychological	1
	Physical	1
	Neglect	1
Problems associated with care settings	Being cared for in Care of the Elderly Wards with remote locations	2
	Inappropriate ward transfers	3
	Not having access to appropriate care when acute deterioration occurs	2
Practical problems	Getting lost	1
	Wandering within the ward	2
	Losing personal possessions	1
	Injuries e.g. burning from tea	1
	Being transferred to wards without notes	1
	Wandering off ward	4
Discharge and post-hospital	Lack of access to services after discharge	1
	Readmission to hospital	1
	Unnecessary prolonged stays in hospital	5
	Unsafe/unprepared/incoherent discharges	7
	Medication errors after discharge from hospital	1

4.3.3. Contributory factors, outcomes and suggested interventions.

This study also yielded a great deal of data about interviewees' perceptions of the contributory factors, outcomes and suggested interventions for each of the problems shown in Table 4.2.. In this section I have chosen to focus on the issues relevant to older people on medical wards, rather than in A&E or on surgical wards, because these are the main focus of the measurement and improvement efforts described later in the thesis. Common themes are described below, and illustrative quotes are given in Tables 4.3. to 4.6..

1. Contributory factors.

Three main types of contributory factors to problems with safety and quality in older people in hospital were identified: staff-related, system or environment-related, and patient-related.

a. Staff-related contributory factors.

Interviewees cited many different problems arising from lack of knowledge and skills amongst staff, as shown in Table 4.3.. They felt that risks to safety and quality of care arise when staff make assumptions about patients, do not recognise problems or consequences of problems, fail to communicate effectively with patients and families, and fail to conduct thorough assessments. They also felt that problems arise when staff display poor attitudes or a lack of understanding.

b. System/environment-related contributory factors

Commonly cited system-related contributory factors (Table 4.4.) included busy wards, low staffing levels and time pressures, together with restrictive ward routines. They felt that the ways in which the multidisciplinary team works can also contribute to a failure of adequate care of older people, when team working is not effective and when information is

not shared between team members. Problems with ward design and layout, together with equipment problems were also described. On an organisational level, interviewees felt that a lack of links with the primary care sector caused problems, and a perceived lack of importance of older people within the organisation itself was a concern.

c. Patient-related contributory factors.

Interviewees reported that some of the characteristics of frail elderly people themselves can lead to challenges and specific problems (Table 4.5.). Comorbidity, frailty, difficulty expressing needs and wishes, cognitive impairment and a difficulty in coping with the change in environment associated with hospitalisation were described as particular problems.

2. Outcomes

Descriptions were given of how interviewees had observed adverse outcomes of the risks identified in this study (Table 4.6.), such as inappropriate institutionalization, prolonged length of stay and social isolation. They were also aware of the cascade of geriatric syndromes that can occur (as depicted in Figure 1.2., p.24). They felt that patients may experience a lack of individualised decision making and inappropriate restraint as a result of some of the problems described, and also described communication breakdowns with families and financial costs to the organisation.

3. Interventions

a. Already in place

When asked what they felt could be done to stop the problems that they had described, interviewees told us of several successful interventions or changes to practice that were already in place or being tested in the hospital in which the study was carried out (Table

4.7.). These included the "OASIS" (Older Adults Specialist Inpatient Service) team, designed to identify older people early in their admission and provide geriatric specialist assessment and intervention to prevent unnecessary lengths of stay and adverse consequences of hospitalisation. Other recently introduced schemes which participants felt were useful included the Red Tray scheme to identify patients at risk of nutritional decline, the recent introduction of a "dementia-friendly cubicle" in A&E, the recent employment of a "dementia specialist nurse", nurse led discharges, OT and SALT presence on wards at mealtimes, and the presence of the "Early Supportive Discharge rehabilitation team in the community.

b. Suggested further interventions

Most of the changes to practice (the details of which are shown in Table 4.8.) that participants told us that they would like to see relate to the behaviour and skills of individual staff members, and therefore to staff training and education. These include improving general understanding of the needs of older people and empathy, communication skills with the patients and their families, improving prescribing habits, and encouraging staff to behave in ways which encourage independence amongst older people. They suggested several improvements to hospital systems, such as the mechanisms of patient assessment and documentation, enhancing shared decision making with patients and their families and finding ways to make better use and improving sharing of information collected by the multidisciplinary team. In addition, they felt that increased staffing levels and improvements to the ward environments and equipment would help. On national level, they felt that improving public awareness and patient expectations of hospitalization would also help. Finally, an over-arching theme was that interviewees felt that general attitudes towards older people amongst staff, the organisation and society as a whole should be improved.

Table 4.3. Staff-related contributory factors.

Factor	Illustrative quotes (problem that this causes)
Making assumptions.	• "We do not consider all the factors that make the patient the way they are, for example, we do not find out who gets washed in the morning and who does not. We make patients fit into hospital routines" (Functional decline) • "We often underestimate what patients are capable of and do everything for them" (Institutionalisation) • "We often assume older patients are incontinent" (Incontinence)
Failure to recognise problems.	• "Worrying are the hypoactive delirium patients who sit there being quiet and who are left in bed – we often don't recognize that this is a significant change in their cognitive function" (Delirium)
Failure to recognise consequences of problems.	• "Nurses don't recognise patients that are becoming malnourished - those who are not eating, if their diet has gone off, the concept that this might cause pressure sores is lost on them" (Pressure sores)
Failure to address basic care needs	• "The mouth and I think sometimes feet as well, these extremities really don't get enough attention. There's so much going on and so much paperwork and things that nurses have to do that…I'm actually surprised if someone gets their teeth brushed" (Poor management of oral or dental hygiene)
Lack of appropriate knowledge and skills	• "Junior doctors do not know what to do with delirious patients" (Delirium) • "There is a lack of knowledge and confidence around swallowing. Staff are scared of making decisions without SALT input" (Swallowing mismanagement) • "Peoples perceptions about what is an appropriate feeding position vastly differ" (HAI) • "Doctors often don't know how to communicate with elderly patients" (Poor communication with patients) • "We stop people from taking managed risks. If we do ask them what they want and we don't agree with it, sometimes we use their lack of mental capacity as a tool to make us feel better, to make sure we take fewer risks" (Stopping patients taking managed risks) • "I went onto the ward and found an agitated patient with dementia and the staff were complaining 'Oh she never sits down, she's really difficult'. I walked that patient to the toilets, and afterwards the nurse on the ward was really surprised 'How come when you came she settled down?' I said 'Because she only needed to go to the toilet'." (Being mislabeled or misjudged) • "It is easier to do something than nothing" (Over-investigating and treating) • "Junior doctors blindly follow protocols without thinking whether this appropriate for this patient" (Inappropriate treatments) • "I don't think they take the patient as a whole, and they don't think about kidney function or how these drugs are broken down and they can become toxic" (Being overmedicated)

	• "They give treatment without consideration of the physiological vulnerabilities of the elderly" (Adverse drug events)
Poor attitudes or lack of understanding	• "People do not question why patients are confused" (Delirium) • "They are regarded as being troublesome or "difficult" (Delirium) • "Patients can seem demanding and unsettled because they cannot express what they want" (Being mislabeled or misjudged, Delirium) • "Staff make judgments about patients in a split second" (Delirium) • "I think one of the things you always hear on wards in every hospital is when a patient is calling out for the loo and the nurse is saying 'Well you've got a pad on, just use your pad' when the patient is continent enough to call for help." (Continence) • "Not everyone working on elderly care wards wants to be on elderly care wards – people don't take an interest in elderly patients" (Continence) • "By strapping pads on indiscriminately you are saying that it is acceptable to wet yourself". (Continence) • "Some of the common sense issues have been lost to computers and machines" (Continence) • "We do not think of it is as a continuous process" (Falls) • "Sometimes there is a lack of thinking- assessments are done but not always acted upon" (Falls) • "There is often a lack of awareness of best interests at the end of life" (Inappropriate treatments) • "You have to be pragmatic in geriatrics and not always follow 'rules'." (Inappropriate treatments) • "Staff poke and pull at patients belongings not realising how important they are to them" (Lack of courtesy) • "We patronise patients" (Infantilisation) • "They are labeled as being confused but no one explains to relatives that they have dementia and what that means" (Poor communication with patients and relatives) • "There are problems with the medical model – people feel that we have to do x,y,z to reverse things, which is not always appropriate." (Inappropriate treatments) • "Some staff are uncomfortable and hostile when asked about these decisions and they try to avoid the topic by saying talk to the family first" (Lack of end of life care decision making) • "Some people argue that if you make someone "not for resuscitation" then care standards fall, as nursing staff sometimes think that means do not panic too much if things change" (Lack of end of life care decision making)
Failure to perform thorough assessments.	• "It takes too long to take good collateral histories" (Functional decline) • "People don't ask about alcohol so withdrawal goes unnoticed" (Delirium) • "When they lose their independence or their health - lots of elderly people get depressed as a result and nobody even really goes there or asks them about it. They are just routinely shoved on any old antibiotics without their mood being reviewed at any point by anybody who knows anything about it." (Depression)

Failure to communicate with patients and their families.	• "Maybe we're not using patients enough in preventing pressure sores, we are not giving them enough information to let them help us to prevent pressure sores, like moving every couple of hours and things like that, we don't ask them to do things like that. So we're not involving them, but essentially not giving them ownership of their bodies" (Pressure sores) • "Nurses don't take the time to communicate what doctors say back to patients or relatives" (Poor communication with patients and their families) • "They are just put in bed and no one provides an explanation of why or for how long" "We all expect families to understand dementia when invariably they don't" "Families receive a lot of information that may be duplicated or conflicting" (Poor communication with patients and their families)

Table 4.4. System or environment related contributory factors.

Factor	Illustrative quote (problem that this causes)
Transforming documentation of risk into real action	• "Documentation isn't great - it's about ticking boxes, rather than actually assessing the state of people's skin" (Pressure sores)
Lack of clear responsibilities	• "It's often not clear where responsibilities lie" (Pressure sores) • "Knowing how to do a swallowing screen is more than just SALTs responsibility - it is a whole MDT thing" (Aspiration pneumonia)
Busy wards, low staffing levels and time pressures	• "We are inadequately staffed so patients who need assistance to mobilise cannot get assistance" "Staff do not have the flexibility to stagger out breakfasts for example", "It takes too long to wait for patients to do things" "It can be difficult to care for the individual needs of multiple patients" (Functional decline) • "When you are looking after lots of people things don't come to light immediately" "You are lucky to have staff to cover what is necessary let alone staff to sit with patients" (Delirium) • "Patients receive less attention at night, "There are not enough staff to hoist patients onto something to urinate" "Geriatric staffing at night is an issue" (Continence) • "Not having enough nurses is a problem. Personally I think the nurses' role is extended all the time. I think every discipline that comes on the ward, they feel their discipline is the most important and they all have expectations for the nurses, so the nurses have a thousand things to do and that's been growing in the time that I've been qualified, its grown in the time that I've been here. What we're expecting the nurses to do is huge but the establishment hasn't gone up to match what our role is now meant to be. So if it was just the basic nursing care we'd probably have enough nurses, but there are so many other things now involved in nursing that you don't. So I think it comes down to a lack of nurses." (Falls) • "Staff often say they are too busy to help or that they are not looking after that patient" (Being cared for by staff who don't go out of their way to help) • "At mealtimes nurses are so busy with their drug rounds that they cant help with feeding" "On some wards more than 50% of people need help feeding or supervised feeding and its just difficult" "People are offered food but sometimes there is not enough time to ensure that they get it all down" (Nutrition) • "The number of times that you go round at 12 o'clock and you see the little tubful of tablets sitting there since eight o'clock in the morning, or you crunch on something on the floor and it's a tablet you've just stepped on" (Not receiving prescribed medication) • "The busier the ward, the more distractions, the more mistakes" (Prescription or administration errors) • "There is a pressure to get people out before they're ready" (Inappropriate discharges)

Lack of team working	• "There is a lack of good old fashioned camaraderie and colleagueship" (loss of dignity) • "I think it can be difficult for more junior members of the team, because they have the theoretical background but not the practical knowledge of how things work. So they might not know about the role of a speech and language therapist or a dietician, and how we might be involved in the care process. (Problems with MDT working and communication) • "There is a hierarchy in the system and some people are more approachable than others". "Staff feeling intimidated or not confident enough to ask other members of the team" "Junior staff are busy and are learning a great deal, and consultants might not be available apart from at MDMs" (Delays in making decisions) • "Everyone ignores peoples entries in the notes which is not a very MDT way of working" "The MDM is not sufficient to address the day-to-day care needs". (Problems with MDT working and communication) • "We get phone calls with a patchy list of problems from somebody who has not actually seen the patient" "It's hard to find out what has been happening by looking through pages of writing, and people who were working in the night have left". (Poor handover) • "It would be nice to have one big hand over in the morning. The thing is if you're on a ward where you've been based for a long period of time and you know everybody it's okay in a way because you just do an informal handover to the charge nurse or the sister and its fine ... but the fact is often you can go whole days without there being proper communication. So they will come on their shift, handover and go off and us doctors will do our own thing and actually, because nurses don't come on the ward rounds anymore you have this sort of scattered communication throughout the day. There's never a proper formal get together so that everyone can hear the plan or hear what's going on." (Poor communication between doctors and nurses)
Lack of sharing of information between MDT members	• "Physios assess falls risk but doctors and nurses don't read their notes" (Falls) • "No nurses go on the medical ward round" (Poor communication between doctors and nurses)
Institutionalisation, restrictive ward routines	• "It is easier to think for people than to wait for them to do it themselves" "We take away patients clothes and belongings, putting them out of reach in lockers" "We tend to underestimate peoples' abilities" "It's learnt practice I think, its one of those things that you see... I think its time, so it's quicker and easier to leave somebody on the bed and stick them on the bed pan than it is to get two nurses to get them out" (Functional decline) • "Catheters go in because no one can be bothered asking the patients or relatives". "Incontinence is often accepted as it suits the ward routine", "Nurses like patients having catheters in", "Patients often can't wait even though the nurses may need them to sometimes". "If they can't attract attention they have to urinate in their pads" (Continence) • "Decisions are made for patients because it's easier for staff to do it that way" (Lack of empowerment) • "Patients are left between treatments - once their personal care and medications are attended to they are left alone, not engaging with food or their environment" (Isolation, loneliness)

Incorrect or inappropriate equipment	• "Without the right aids they won't mobilise properly and the whole thing gets more protracted" "Their Zimmer frames and call bells are often out of reach" (Functional decline) • "When they come into hospital they lose their glasses" "Hospital pyjamas often don't fit" "We give them inappropriate footwear like those slippery foam slippers" "We put things out of patients reach" "They fall out of chairs and beds because we don't adjust the heights to their needs" "There are housekeeping issues with objects such as incontinence pads or gloves, or spillages, on the floor" (Falls) • "The tables are all the wrong height for the chairs" "Inappropriate food is sometimes ordered and given out" "A lot of them lose their dentures in hospital" (Swallowing problems) • "We fail to use equipment such as commodes as they were designed" "Toilets are not designed around the older person at all" "You are trying to get them in, sit them on the loo, but you have to leave the door open - you cannot get in yourself because there is no space" "They have to wear hospital gowns which are always tied up wrong and go askew" (Loss of dignity) • "They lose their glasses and hearing aids in hospital, which makes them withdraw slightly" (Isolation and loneliness)
Problems with ward design	• "The floors are often bumpy" "Some of the bed spaces lack visibility and it's quite dark on the ward in some areas". "If they are usually furniture walkers and there is no furniture that increases their risk" (Falls) • "Eating by your bed is not the most attractive place to sit and eat a meal" (Nutrition) • "They lose the social aspect of eating, just sitting by their beds opposite someone else" (Isolation and loneliness) • "On the Nightingale wards there are those flimsy curtains that you can hear and smell everything through" (Loss of dignity)
Problems with ward layout	• "Patients who have delirium are often placed away from the nurses station" (Delirium) • "We do not think about the layout of the ward and the position of the lavatories in relation to patients to promote their independence", "If a patient is continent but slow we shouldn't place them far away from the toilet and assume that they are incontinent" (Continence) • "Confused patients are put in unobserved beds" (Falls)
Perceived lack of importance of older people on an organizational level	• "Incontinence is such a big area but it hasn't been given enough airtime in this Trust" "We take low priority so there is a lack of resources" "We sometimes have to fight to get things done" (Continence)
Lack of links with community services	• "There are no links with the community" (Continence)

	• "Blood pressure medications for example, we quite often stop those if patients are dehydrated on admission and then we wonder 'Well should we restart them again now because their blood pressure's normal now', so we often end up asking the GP to review those medicines but that seems like a lot for the GPs to be doing and often they just go back to what they were on before" "They often end up with a pile of tablets not knowing what to do with them", "Nurses and pharmacists often don't have time to go through the whole lot with them", "They end up taking their original tablets home too – they are their property" (Medication errors after discharge from hospital) • "Sometimes things are delayed because they can't get the package in place in time - it can just be mismanagement - somebody not accessing the right person or getting things done" (Unprepared discharges)

Table 4.5. Patient-related contributory factors.

Factor	Illustrative quote (problem that this causes)
Comorbidity and sensory impairment	• "Multiple medical problems" "Limited functional reserve" "Pre-existing functional decline" (Functional decline) • "Visual impairment" "If you are feeling sick you are not going to want to eat" (Nutrition)
Difficulty expressing wishes or needs	• "Patients often find constipation embarrassing and don't tell anyone about it" (Constipation) • "Patients who have no relatives often do not cause fuss because they have no one to back them up" "They want to be good and compliant so won't ask for things to be repeated" "If you show signs of being rushed patients will not ask questions because they feel that they mustn't detain you" "Patients do not want to be a nuisance" (Poor communication with patients and families) • "If there is nothing obvious on examination or in their bloods you can overlook problems, especially in the quieter patients" (Misdiagnosis) • "Patients aren't always able to speak up for themselves if their tablets are wrong" (Medication errors)
Cognitive impairment	• "If say for instance someone's cognitively impaired but they have hand-eye coordination, they don't need feeding as such, but they need prompting. They might not recognise food or they might not remember they're hungry. You might need to sit with them and say "Take your next mouthful, now chew it, now swallow it". And also some people take a really long time to eat, they have a really prolonged oral stage. We had one gentleman who took about two or three hours to finish just one meal." (Nutrition) • "Your instinct is to spend less time with aggressive patients" (Mislabeling/misjudging) • "If they are hard to examine and they are aggressive diagnoses are made late and they may not get blood tests or observations" (Inadequate diagnoses and management)
Difficulty coping with the change in environment	• "They aren't in their normal environment so they're more likely to get problems with constipation or dehydration, because suddenly they've become vulnerable and they're reliant on other people for their care, so they're not getting up and making their own cup of tea, or going to the loo and all that sort of stuff. So just by nature of being in hospital I think is an adverse effect in itself. A contradiction in terms really…" • "Just bringing them into hospital can increase their level of confusion" "They are asked a barrage of different types of questions which can confuse them" "If you are in a cubicle, phones are ringing everywhere and staff are rushing past in a hurry it is very disorientating" (becoming more muddled or disorientated (not delirium))

Table 4.6. Outcomes.

Outcome	Illustrative quote (problem that causes this)
Institutionalisation, prolonged length of stay, social isolation	• "They begin to love the company here and the thought of being home alone terrifies them" (Functional decline) • "In the long run patients lose that bit of independence" "Alot of these patients need institutionalisation or have higher care requirements on discharge from hospital" (Continence)
Cascade of geriatric syndromes	• "Delirious patients often fall and injure themselves- there was one patient who managed to jump out of a fourth floor window" (Delirium) • "They are at risk of developing pressure sores after discharge if they leave incontinent" (Continence) • "A patient slipped on their own urine, then got an infection and needed to have a below knee amputation. That's obviously the worst case scenario" (Continence)
Lack of individualised decision making	• "There are endless rounds of antibiotics, do one round, and another round and another round, and you're right back to the first round and then you try another round and at what point are we going to not give antibiotics or think about the end point of treatment?" (Over-treatment)
Communication breakdowns with families	• "If delirium isn't explained well to families it can lead to them being frightened, they have a bad experience with the ward and communication breaks down" (Delirium) • "They would go to undress her and then she'd start fighting with them and she'd hit out or pinch or whatever and the daughter said 'I find it so distressing when staff regard that as assault, when she doesn't know what she's doing. I know hospital staff have to put up with aggressive people, but there's a big difference between somebody who's drunk and aggressive and someone who is demented and confused, fighting out because they're terrified..." (Mislabelling/misjudging) • "Relatives get confused because you have been preparing them for the worse and then suddenly the patient has a neck line in" (Inappropriate treatments)
Financial costs	• "Alot of money is spent on pads unnecessarily because we assume patients are incontinent" (Continence)
Restraint	• "If someone is delirious or demented, presents with behavioural difficulties and causes are not sought out, treatment not initiated, they face being restrained physically or chemically" (Inappropriate management of acute problems)

Table 4.7. Interventions already in place.

Intervention	Illustrative quote (problem that this helps to solve)
The "OASIS" team	• "We get involved and assess delirium by ringing family or carers, to compare current function to their baseline. Then we can recommend treatment and assess the risk of being hospitalised against the risk of being in their own environment." (Inappropriate admissions)
OT and SALT presence on wards at mealtimes	• "We are trialling ..[this]..so that we can give advice and help with positioning". "OTs have trialled getting a table into the bays and taking people that want to, to go and sit at the table for meals. Straight away if you're sat at a table your sitting position is much better, and it's socially much more acceptable and often if they're witnessing other people enjoying their food it does actually encourage them to eat. It is dependent on the client group but generally it has a positive end. The only negative is its time consuming for the staff and because of that it's not something that happens every day, which is a shame. We only do it when we've got the therapists' support". (Nutrition and swallowing)
The red tray scheme	• "Compliance with red trays boils down to staffing issues" (Nutrition)
A dementia specialist nurse	• "She does a marvellous job educating people about how to calm people with dementia down and how to communicate with them".
Nurse-led discharges	• "Doctors doing their rounds will say a patient can go home this afternoon without realising all the other factors involved – this is better if nurses coordinate things".
Early Supportive Discharge rehabilitation team	• "They provide a link to he community that works really, really well". (inadequate discharges)

Table 4.8. Suggested future interventions.

Intervention	Illustrative quote (problem that this helps to solve)
Improving communication with patients and their families	• "We should keep explaining to patients that it is important to get out of bed as much as possible" (Functional decline) • "I would always, if I could, remove clutter or move the bed away, so that if the patient was likely to get out they could do so safely, that they had a clear route out. I'd make sure that they knew how to use things… I'd never just give them an aid without explaining to them how to use it" (Falls) • "We have to remember that we are dealing with adults as they are often spoken to like children" (Infantilisation) • "We should make sure they have their glasses and know where they are" (Delirium) • "We should make sure we introduce ourselves and familiarize ourselves with our patients and their needs" "We should be providing patients with simple explanations and caring for their little needs – for example making sure they have had a cup of tea" (Lack of courtesy) • "It's about that value of spending time with somebody that's not a medical or not a nursing intervention because ultimately they're not particularly nice things to be doing.... it would be better if somebody comes and spends time with them in a nice way after they've been washed - that would actually be a reasonably easy intervention to offer" (Isolation, loneliness) • "Relatives should be encouraged to bring in food for patients and help at mealtimes" (Nutrition)
Improving pre-emptive prescribing	• "We need to make sure we provide adequate analgesia after falls otherwise they just dot get up" (Functional decline) • "We give patients loads of painkillers and no laxatives" (Constipation)
Encouraging independence	• "We should be encouraging patients to eat and drink sitting out in the chair, not in bed" (Functional decline) • "Where possible they should have their own clothes because it just gives them a sense of 'I'm not too bad'" (Institutionalisation)
Improving mechanisms of patient assessment and documentation	• "We should be spending a bit longer assessing individual patients" (Functional decline) • "Swallow screens should be repeated every 24 hours" (Swallowing mismanagement) • "We should keep a separate sheet in the folder that has a list of the things that the patient is and is not able to do which is easy to locate and read" (Functional decline) • "We should have more documentation and awareness of those at risk of falls" (Falls) • "We should improve bowel documentation" (Constipation) • "We need better ways to work out which ones need to be under close watch" (Delirium) • "Student nurses or more volunteers could be used to find out more about patients (Making assumptions) • "We need an audit of the way in which we fill in Waterlow scores" (Pressure sores)

Shared decision making with patients and their families	• "We should be setting up plans and schedules with patients and relatives to ensure that the patient remains independent" (Functional decline)
Education and training	• "Delirium should be treated as a medical emergency like chest pain or shortness of breath", "We need to teach juniors that delirium is patients acutely manifesting in a different way so they need investigating with the same degree of urgency as everyone else" "We need to learn to be more aware of what is going on in patients minds" (Delirium) • "Staff should remember that patients who have problems with cognitive impairment need things to be gone over again and again" (Poor communication) • "Educating the staff is critical - they need to be calm and gentle with these patients and find ways around their aggression, it is their responsibility not the patients' to change their behaviour" "we should discipline staff who behave inappropriately with acutely confused patients" (Mislabelling/misjudging) • "We should be training people to see the patient as a person from the beginning" (Functional decline) • "We should educate the nurses that telling the patient to be incontinent and use a pad is wrong" (Continence)
Increasing staffing	• "The Tissue Viability Nurse, there's only one in the Trust … I think you should have more than one in a Trust this size, I think she's run off her feet. She's a really valuable resource and all she basically has time to do is see the patient but she is willing to give advice and education to the nurses. So if there were more tissue viability nurses I think they could do a better education programme internally about the types of dressing we should use, about the preventative measures, about what equipment we provide - I would happily buy more stuff that could be ward based to prevent things if I knew it was going to be valuable" (Pressure sores) • "There should be more elderly care link nurses to encourage other nurses to take a special interest in older people" (Basic care) • "There should be a multi-disciplinary continence team within the hospital" "We should have a continence link nurse on every ward" "A continence nurse specialist would be great" (Continence) • "Ideally SALTs should be available at weekends and Bank Holidays" (Swallowing mismanagement) • "If nurses had more time they could take patients to the toilet rather than using the commode all the time, and they could make sure their [patients] hands were washed afterwards)" (Continence, hygiene) • "Staff should be more willing to help each other at busy times" (Teamwork)
Making better use and improving sharing of information collected by the MDT	• "Occupational therapists are good at assessing needs" "Physiotherapy and occupational therapy clearly document in the notes what patients can and can't do, people should read this so they are all aware" "We should have collaborative computerised entries" (Functional decline)

Improvements to the ward environment and equipment	• "We should have proper day rooms" "We could use things like music and signs to remind them the date and day, and make better use of volunteers" (Isolation) • "Patients should have clothes they can actually manage" "We need to buy safer slippers for inpatients" "We could try chair alarms, and we need adjustable height chairs" "We should have lighting like on aeroplanes so they can see the floor and not just the glare on top" "Placing grab rails around the ward" (Falls) • "We could customise lengths of catheters so they don't trip over them, and use leg bags more often to free them up" "We could use disposable female urinals" "We need more bladder scanners" (Continence) • "There should be better provision for storage and re-heating of food on the wards" "Hot food options should be available at all times" (Nutrition) • "We could try using screens rather than curtains" (Loss of dignity) • "We need more areas that are conducive to the needs of older people" (Functional decline)
Improving general attitudes to older people	• "Everyone should make an extra effort and goes the extra mile" "Treat people like they belong to you, so that you want the best for them" (Basic care) • "We should prioritise these issues" "We need to make continence issues a high governmental priority" (Continence)
Changes to practice	• "We should be tough and take catheters out", "We should focus on retraining bladders" (Continence) • "If we get patients out of bed we will reduce chest infections - there needs to be a culture change here" (Hospital acquired infection) • "We should think about using local anaesthetics for cannulation and ABGs [arterial blood gas sampling], or the use of distraction with toys or other members of staff" (Distress, agitation) • "Elderly patients should be returned home by 11.30am on the day of discharge so that care managers can sort out any problems before 5pm" (Inadequate discharges) • "There should be more flexibility in the ward routines for those who take a long time to finish their meals" (Nutrition) • "We should start using handover proformas with neat summaries of the patients problems" (Handover) • "There should be a separate box for changes in medications could be included on electronic discharge summaries, the pharmacists could highlight the changes" (Medication errors after discharge)
Improving public awareness and patent expectations	• "We should educate patients and families that hospital is often not the best place for them" (HAI) • "Alot of the elderly today remember the NHS of the past from when their own mothers were ill, that when they came in they went to the long stay ward" (Functional decline) • "They recognise the word Alzheimer's but they do not recognise the word Dementia" (Poor communication with patients and families)

4.3.4. Top three risks and interventions.

The top three risks identified by participants are displayed in Table 4.9.. and the top three interventions that they would like to see (or "magic wands") are shown in Table 4.10..

Table 4.9. Top Three Risks to an older person in hospital as perceived by staff

No	Job title	Risk 1	Risk 2	Risk 3
1	Occupational therapist	Inadequate discharge planning	Poor positioning, resulting in pressure sores, falls, malnutrition	Incontinence
2	Ward manager (care of the elderly ward 1)	Loss of independence	Not being empowered to participate in one's own care	Incontinence
3	Physiotherapist (1)	Risks associated with being in an unfamiliar environment	Lack of communication within MDT	Hospital acquired infection
4	A&E nurse consultant	Receiving unnecessary interventions in A&E	Being frightened and disorientated	Being overlooked
5	Discharge nurse specialist	Hospital acquired infection	Falls	Confusion
6	Consultant geriatrician	Delirium	Functional decline	Loss of dignity
7	Ward clerk	Inadequate discharge planning	Wandering	Falls
8	Physiotherapist (2)	Falls	Confusion	Disruption of sleep
9	FY1 Medicine for the Elderly	Deterioration in function because of misperceptions of usual ability	Poor quality handover at ward transfer	Difficulties communicating with primary care
10	Geriatric medicine SPR	Inappropriate admissions	Inappropriate medical intervention	Lack of dignity
11	Palliative care specialist nurse	Inappropriate interventions	Poor nutrition	Depression
12	Lead pharmacist for older people	Not having correct drug history on admission	Poor communication with primary care on discharge	Incorrect drug dosing due to unrecognised renal impairment
13	Speech and Language Therapist	Loss of dignity - not being given choices and not being involved in one's care	Poor interdisciplinary communication	Poor feeding practice, leading to aspiration, dehydration and poor nutrition
14	OASIS nurse	Inadequate discharge planning	Communication without respect, courtesy or dignity	Lack of involvement of patient in their own care
15	Ward manager (care of the elderly ward 2)	Hospital acquired infection	Incontinence	Mislabelling patients, losing dignity and respect
16	Ward sister, orthopaedic ward	Unnecessary preoperative starvation	Not being treated as individuals	Receiving inappropriate medication

Table 4.10. Top three interventions or "magic wands" that staff would like to see.

No	Job title	Intervention 1	Intervention 2	Intervention 3
1	OT	Better positioning equipment	A multi-disciplinary continence group	Using volunteers to fill in gaps in care
2	Ward manager (care of the elderly ward 1)	Training to encourage staff to see the patient as a person from the beginning of the admission	Changing the ward environment so that patients feel more secure and valued	Continence Nurse Specialist
3	Physiotherapist (1)	Better community services for older patients, with fewer unnecessary admissions	Improving the ward layout, trying to get a balance between the Nightingale style and isolated rooms	Reduce social isolation in older patients as a whole
4	A&E nurse consultant (these were not specifically rated by the interviewee, but taken from top 3 interventions)	Educating A&E staff, improving attitudes and awareness towards older people, which in turn would minimise risks	Provide an environment which is more conducive to the needs of an older person, in terms of structure and tempo	Improved information about community services, computerised so that the range of different services available in the patients locality could be easily identified and directly booked into
5	Discharge nurse specialist	Having staff who have true willingness to work with elderly people	Making cleanliness a top priority for all who work on COE wards	Things to keep patients occupied on the wards, such as activities or a day room
6	Consultant geriatrician	An elderly friendly A&E department with non geriatric professionals taking an interest	Improved physical environment	Improved links with community services eg rapid access clinics/memory clinics
7	Ward clerk	Properly shutting/electric doors in ward	Increased staffing levels at night	Improving the ward environment
8	Physiotherapist (2)	Increased staff: patient ratio	Better footwear on the wards	More appropriate continence pads
9	FY1 geriatric medicine	A handover proforma with problems lists for ward to ward transfers	Better documentation of functional ability	Staff not underestimating patients functional abilities
10	Geriatric medicine SPR	Making care of older patients more high profile through staff education	More nursing staff to allow more time with patients	Better communication with patients' families
11	Palliative care specialist nurse	Reducing interventions and inappropriate admissions by thinking about the bigger picture for the	More attention from nurses to basic needs such as feeding	Spending time with patients other than for medical/nursing reasons

No	Job title	Intervention 1	Intervention 2	Intervention 3
		patient		
12	Lead pharmacist for older people	Seamless primary and secondary care	Supervision of medication taking in the wards	Giving pharmacists more time on the wards to sort out problems with medications
13	SALT	Improved interdisciplinary communication - make everyone in the MDT read each others notes and be aware of each others plans for the patient	More staff (medical, nursing, therapy)	More training of best practices and ensuring that learning goals are achieved and best practice maintained
14	OASIS nurse	Improved communication with patients to provide more explanation, encouragement and reassurance	Improved attention to basics such as feeding	Humanising/individualising patients
15	Ward manager (care of the elderly ward 2)	Elderly care specialist nurse (for whole hospital)	Making elderly patients a priority within the hospital	Educating staff about geriatric issues
16	Ward sister, orthopaedic ward	Appropriate staffing levels and shared responsibility	Making elderly patients a priority within the trust	Improving multi disciplinary discharge planning

4.4. Discussion.

4.4.1. Breadth of information gained and reflexivity.

We were impressed with the quantity and density of information this study yielded. Participants seemed only too happy to talk to us and tell us the problems for older people that they had observed; it was almost as if they were glad that we were there to listen to them. Several interviewees had prepared detailed notes before the interviews and all were highly passionate about the subject. One participant was moved to tears when talking about some of the more emotive aspects of care for older people.

The value of this qualitative study is that it showed a number of themes which are not widely discussed in the literature, illustrated by the fact that of the 120 themes that participants identified, only 32, or 27%, were also raised in the literature. The themes that came up in the interview study, and not in the literature review, tend to relate to processes of care, systems, attitudes and cultures within the hospital and the wider healthcare system.

The fact that the two interviewers were both doctors may have influenced the responses we were given, particularly by nurses and allied health professionals, as both interviewers had previously worked with the participants. However, this did mean that we were able to build a rapport which we felt allowed the interviewees to give honest opinions. We refrained (as much as possible) from letting our own opinions influence the participants during the interviews, trying to encourage them to tell us as much as possible about every risk they mentioned.

4.4.2. Representativeness

We interviewed a comprehensive range of individuals from different professional disciplines and from different care environments within the hospital. Although the sample size was small, a wide range of views were reported about a wide range of risks, and the

study finished when it appeared that we were reaching thematic saturation. One drawback of this study is that it was conducted on one site only, and some of the problems described, as well as locally implemented interventions, are unique to that one hospital and may not necessarily be representative of other sites. However, the principles behind the practical examples would hold true in most hospitals.

4.4.3. Triangulation

The fact that interviewees were members of different professions provided a degree of triangulation in this study. Interview data were also triangulated by asking participants to list their top three risks and "magic wands" at the end of each interview. Although, as might be expected, individuals chose problems and interventions that most directly reflect their particular roles and care settings, on the whole the cross-cutting themes were similar regardless of profession.

4.4.4. Respondent validation

Interviewees were able to check that our account of what the interviewees told us was accurate, by checking our field notes at the end of the interview. We found that in addition to ensuring the respondents were happy with what we had recorded, that this often prompted them to fill in blanks and provide additional information.

4.4.5. Summary - overall emergent themes

Some underlying themes cropped up again and again, whether participants were describing risks, contributory factors for these risks or interventions.

Some of these recurring themes are as follows:

1. The need for improved education and training so that individuals can gain the knowledge and skills necessary to provide good care for older people, particularly in regards to

effective assessment, communication (with patients, their families and the multidisciplinary team) and decision making (in particular with the aim of reducing unnecessary investigations and treatments.

2. The need to reduce institutionalisation (or making patients fit into hospital routines), particularly in relation to functional decline and incontinence.

3. The need to improve empowerment of older patients, so that they are more involved in decision making processes

4. We need to improve our ability to provide individualised care for older people.

5. The general attitude towards older people within the trust and within society and healthcare systems in general needs to improve.

6. Practical problems with ward design and layout could be addressed.

7. There were frequent calls for more equipment and resources, particularly in terms of staffing for the provision of basic and more specialist nursing care

4.4.6. Implications for future work

It is important to note that many interviewees told us about interventions, processes and good practices that are already in place which enhance the quality of care older patients receive in hospital, as exemplified by the following quote; "It's not all bad though, I mean sometimes you'll see our patients coming in extremely dehydrated or malnourished and then they stay with us for a while and they get excellent care with good positioning and good feeding and good nursing care and good medical care and then they go back and you think oh gosh, that's great".

We also heard many novel, practical suggestions to improve hospital care for the older person, and these could be the focus of future research. It is also important that future research considers reasons why current interventions might not be working as well as they could do, and how to ensure that changes are implemented effectively.

As well as these practical interventions, there is a need to explore in greater depth the processes of care and the attitudes that were described to us as leading to risks for older people in hospital. There was a feeling from our interviewees that they were describing problems that everybody working with older patients in hospital knows exist; efforts should concentrate on exploring the barriers that stop improvements being made.

The findings of this study heavily inform the rest of the thesis, not only in terms of directly providing items to be measured in Section 3, but also in guiding the improvement work described in Section 4.

Chapter 5. Problems with the traditional two stage retrospective record review method for studying adverse events in older people, and an exploration of a novel detailed case record review approach.

5.1. Introduction and aims.

I have described in the two previous chapters in this section how a literature review and qualitative study helped me to learn more about the safety and quality issues pertinent to older medical patients. One of the overall aims of the thesis is to produce novel retrospective case record review tools to measure safety and quality for use in this population, so in this chapter I describe my first exploration of case record review. Findings from this study not only helped to inform the case record review methods carried out in later studies, but also added to the information gained from previous studies about safety and quality in older people.

The aims of this study, the third and final one in this section of the thesis, are:

1) To use the traditional two stage record review process used in the major adverse event studies described in Chapter 3 in older medical inpatients and to describe any problems with using this approach in this patient group.

2) To explore the feasibility of a new detailed retrospective case record review approach for assessing safety and quality of care in older medical inpatients.

3) To use the findings of this first exploratory case record review to add to the safety and quality issues identified in earlier studies, for inclusion in the final record review tools described later in the thesis.

To this end the chapter is divided into two sections: firstly (5.2.) the traditional two stage review process for adverse events approach is described and used in a sample of older

medical inpatients; secondly (5.3.) the development and use of a new approach to using case record review to assess safety and quality in the same patient sample is described.

5.2. Use of the traditional two-stage adverse events review process in older medical patients.

5.2.1. Introduction.

Retrospective analysis of case records provides a wealth of information about a patient's treatment in hospital and has been a primary method of studying the incidence and types of adverse events for many years. The Harvard Medical Practice Study was the first to develop the two stage retrospective review method described below, and all subsequent major adverse event studies described in Chapter 3 (including those who performed secondary analysis of the data to look at adverse events in the elderly (Thomas, 2000; Sari, 2008)) used very similar methods to draw conclusions about the incidence, types and preventability of adverse events. Broadly, the procedure carried out in these studies was as follows:

1) Large numbers of cases from a variety of clinical specialities were screened to identify those in which adverse events may have occurred. This screening process was carried out in most studies by specially trained nurses using a screening tool, RF 1, which consists of 18 or 19 questions; Figure 5.1. shows one version of this form.

2) Case records that screened positive for at least one adverse event using this tool were then further analysed by trained reviewers using a Review Form 2 (RF 2). If more than one adverse event was detected a RF 2 was used for each event.

The Modular Review Form 2 (MRF 2) was subsequently created as an alternative to the RF 2 so that more detailed analysis of adverse events could be performed (Olsen, 2007). This was intended to provide a more informative tool for analysing adverse events than previous RF 2 s used in landmark international studies. The MRF 2 has been found to be robust and reliable. Its modular structure divides care into sections and allows analysis of contributory factors and preventability of adverse events.

All of the studies using this method have used strict definitions of adverse event, generally including the fulfillment of three criteria: a) the adverse event represents an unintended injury; b) the adverse event must result in temporary or permanent disability, including increased length of stay or financial loss and c) the adverse event must have been caused by health care management rather than by the disease process itself.

The aims of this part of the study were to establish the nature and frequency of adverse events in patients on a Medicine for the Elderly ward using the already validated Review Forms 1 and Modular Review Form 2.

Figure 5.1. Criteria used in RF-1 to screen for adverse events (adapted from the form used in the British adverse events study, Vincent et al, 2001).

1. Unplanned admission within the 12 months prior to the index admission as a result of any health care management.
2. Unplanned admission to any hospital, post this discharge.
3. Hospital-incurred patient accident or injury.
4. Adverse drug reaction / drug error.
5. Unplanned transfer from general care to intensive care/higher dependency.
6. Unplanned transfer to another acute care hospital.
7. Unplanned return to the operating theatre on this admission.
   Unplanned visit to the operating theatre on this admission.
8. Unplanned removal, injury or repair of organ or structure during surgery, invasive procedure or vaginal delivery.
9. Other patient complications to include: MI, DVT, CVA, PE etc..
10. Development of neurological deficit not present on admission.
11. Unexpected death (i.e. not an expected outcome of the disease during hospitalisation).
12. Inappropriate discharge home, inadequate discharge plan.
13. Cardiac/respiratory arrest, low Apgar score.
14. Injury or complications related to termination or labour and delivery including neonatal complications.
15. Hospital acquired infection/sepsis.
16. Patient/family dissatisfaction with care received documented in the medical record and/or evidence of complaint lodged.
17. Documentation or correspondence indicating litigation, either contemplated or actual (e.g. letter from solicitor etc.).
18. Any other undesirable outcomes (not covered by any of the other criteria).

5.2.2. Methods.

This was a two-stage retrospective case record review of twenty sequential discharges from an acute Medicine for the Elderly ward in a London teaching hospital. The design of this part of the study was as close as possible to the other UK studies which have utilised the MRF 2 (Woloshynowych et al., 2003).

Setting and sampling.

The cases were sequential discharges from a Medicine for Elderly ward in a large London teaching hospital. The case records were obtained after Trust Approval was granted for the study. In the hospital in which the study was carried out, whether a patient is admitted to a Medicine for the Elderly ward or not is decided using a "triage" system when patients are on the Medical Admissions Unit. This decision is usually based on "need" as well as chronological age. Therefore, all subjects discharged from Medicine for the Elderly wards should by definition be relatively complex elderly patients. It was envisaged that even a small sample of twenty cases would include patients with a variety of different medical (and non-medical) issues. There is a "ward based system" in operation in this hospital, so there should be no outliers from other specialities. It was anticipated that the sample would contain patients who died as well as those who were discharged.

Review Process.

A two-stage review process was carried out. Firstly, all notes were screened using the RF1 that has widely been used in other studies. Any notes that screened positive for an adverse event using this tool then underwent analysis using the MRF 2. One MRF 2 form was used for each adverse event if more than one adverse event was identified in the same patient.

Data Analysis.

Data analysis was conducted as closely as possible in line with previous studies using this method. The proportion of cases that screened positive for an adverse event with RF1 was calculated. The MRF 2s that were subsequently completed were analysed for type, causality and preventability of adverse events.

5.2.3. Results.

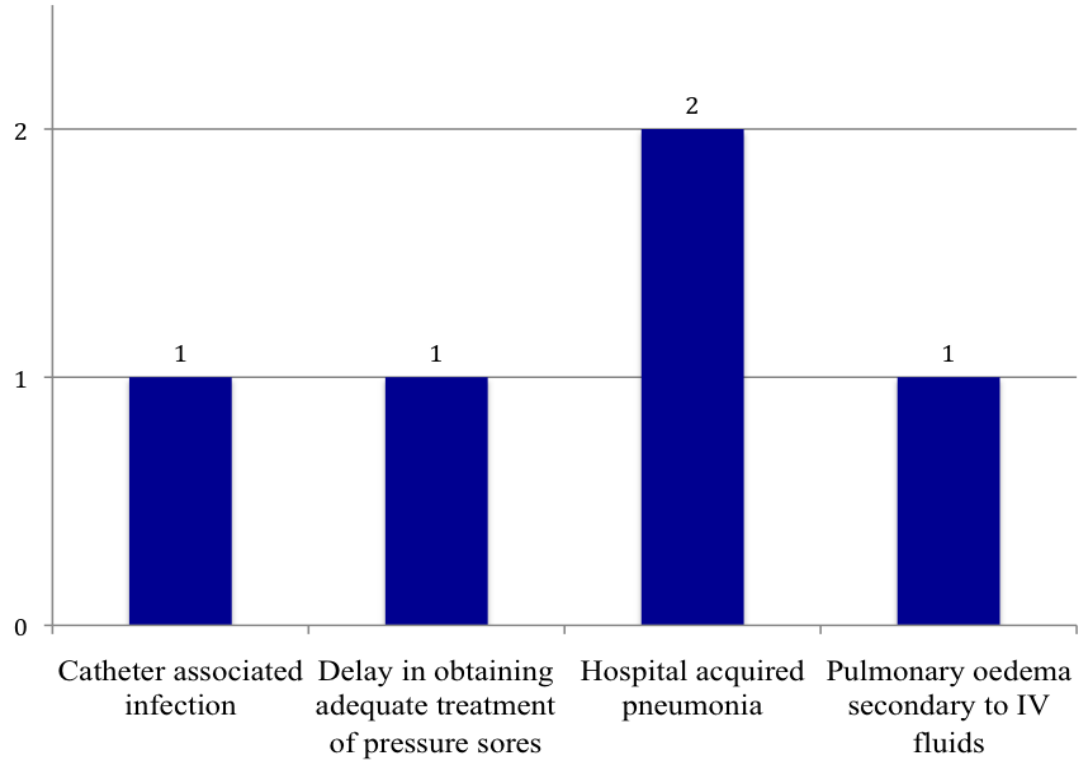
Patient characteristics and adverse event incidence.

11 patients were male and 9 were female. The mean age was 84.2 years. 10 (50%) of the patients had a diagnosis of dementia prior to admission. Two adverse events were identified in cases 5 and 18, and one in case 6 using the two-stage adverse event detection method. In total, five adverse events were identified, which gives an incidence of 25%. A summary of further analysis of these adverse events in terms of classification, outcomes and preventability assessment using MRF 2 is shown below, in Table 5.1. and Figure 5.2..

Table 5.1. Adverse events detected using RF 1 and MRF 2.

Case	Adverse event	Point on RF1 leading to AE detection	Classification of AE on MRF2	Outcome (MRF 2)	Preventability score on MRF 2 (not preventable = 0, certainly preventable = 6)
5	Catheter associated infection	Hospital acquired infection	Medical Procedure related injury	Length of stay possibly increased as a result of the AE	4. Preventability more likely than not; more than 50:50 but close call
5	Delay in obtaining adequate treatment of pressure sores	Any other undesirable outcomes	Clinical Management error	Length of stay definitely increased by the AE	5 Strong evidence for preventability
6	Hospital acquired pneumonia	Hospital acquired infection	Injury or complication	Death	4. Preventability more likely than not; more than 50-50 but close call
18	Hospital acquired pneumonia	Hospital acquired infection	Injury or complication	Length of stay possibly increased as a result of the AE	2. Slight to modest evidence for preventability
18	Pulmonary oedema secondary to fluid overload	Adverse drug reaction	Injury or complication	Length of stay possibly increased as a result of the AE	4. Preventability more likely than not; more than 50-50 but close call

Figure 5.2. Summary of adverse events detected in the twenty cases using RF 1 and MRF 2.



Case summaries.

Clinical summaries of all of the 20 cases included in this study were collected. Figure 5.3. below shows case summaries for the cases in which adverse events were detected using the two stage approach.

Figure 5.3. Clinical summaries of the three cases in which adverse events were detected by the two-stage methodology (adverse events shown in red).

Case 5.
A 78 year old lady who had had a stroke 20 years previously, with a residual left sided hemiparesis, who walked with a stick and lived alone, was admitted after being found on the floor at home. She had been there for a considerable time and had extensive pressure sores affecting her back, arm, knee and thigh. She was treated for a non-ST-elevation myocardial infarction, and required Vac-pump therapy for her pressure sores - there was a lengthy delay in obtaining this treatment. Her lengthy admission was complicated by two catheter associated urinary tract infections. She was eventually discharged for further rehabilitation to an intermediate care bed in another institution.

Case 6.
A 92 year old gentleman with dementia was admitted from an EMI residential home following an unwitnessed fall 24 hours previously. He had apparently been mobile for the 24 hours after the fall, but had then stopped walking which led to his admission. He was found to have an intertrochanteric fractured neck of femur and a fracture of his right superior pubic ramus. It was decided by the orthopaedic team that he should receive conservative (non- surgical) treatment, and he was transferred to the Medicine for the Elderly ward. He subsequently developed a hospital-acquired pneumonia, with associated delirium, which did not respond to treatment. He deteriorated and was cared for using the Liverpool Care Pathway in the two days before his death.

Case 18.
A 92 year old lady previously living in a residential home, with a history of COPD, CCF, leg ulcers and lymphoedema was admitted because some blood tests carried out by her GP revealed acute on chronic renal failure. She had no new symptoms. She was hyperkalaemic and acidotic on admission and was treated with aggressive fluid replacement initially and was then treated intermittently throughout her admission for LVF. She was also treated during the admission for an exacerbation of her COPD and a hospital acquired pneumonia. In addition, a right breast cancer was newly diagnosed during this admission. Initially the patient was cared for by the admitting medical team on the respiratory ward, and was then transferred to the Medicine for the Elderly ward. It emerged that the residential home had asked for patient to be reassessed for nursing home placement before admission because of her deteriorating mobility. The patient was eventually discharged to a nursing home.

5.2.4. Discussion.

During this part of the study, several problems with the two-stage record review approach were observed which are of relevance to my subsequent efforts to create a comprehensive, accurate safety and quality measurement tool for older medical inpatients.

1) Not all of the adverse event screening items in RF 1 are relevant to this group of patients.

The purpose of the studies that used these tools was to look at large hospital patients of all ages and specialities, not to focus on one particular group of patients. However, although these tools have been used to examine cases from multiple specialities including medicine, surgery, geriatrics and obstetrics, the RF 1 (and MRF 2) seems to focus very much on aspects of care most relevant to young, fit, non-emergency, surgical patients. These issues are clearly different to those that affect most patients who are admitted to a Medicine for the Elderly ward. Areas of care that are particularly relevant to older medical patients are not included at all, such as the timely detection and management of several of the major geriatric syndromes such as functional decline, delirium and incontinence (although falls and pressure sores would be picked up). It is therefore likely that the occurrence of these conditions during the hospital admission will not have been considered as adverse events in the results of the large studies described in Chapter 3. Similarly, the areas of the form that are related to surgery, anaesthesia, pre-admission clinics, injury related to abortion and delivery etc. are clearly not relevant to older medical patients.

2) Difficulties in defining and identifying an adverse event and underlying causes in older medical inpatients.

The other major problem observed with using the two-stage retrospective review approach to assess care in older medical patients was that it can be very difficult to accurately identify cases in which an adverse event has occurred during the initial screening phase with RF 1. This was problematic for the following reasons:

The effects of comorbidity and complexity.

The complex nature of older medical inpatients and their healthcare impacts on our ability to define an adverse event in this group. Some of the questions used for screening in RF1 may be difficult to interpret. For example, if "Other Patient complications e.g. PE, MI or DVT" occurs, it is much easier to use the event as a pointer that a healthcare- related problem may have occurred if the patient is a young, fit person admitted for routine elective surgery, than if it occurs in an older frail person with multiple comorbidities. In the latter, the condition may well have occurred whether the patient was in hospital or not. An elderly person may have had myocardial infarction (or stroke – question 10) whilst in hospital, but not because they were on inadequate preventative pharmacotherapy or due to any reason related to their healthcare, but rather that they had extensive, irreversible, multivessel coronary (or cerebral) artery disease.

Of course this then leads to the question of whether the patients frailty and comorbidities were in fact caused or worsened in some preventable way by their healthcare in the past. For example – they may be immobile and therefore more susceptible to thromboembolic disease because they received inadequate rehabilitation after a fractured neck of femur previously.

On the other hand, if the patient experienced a DVT or PE as a result of inadequate prophylactic anticoagulation, this may clearly be considered to be an adverse event, although it is difficult to say whether they would have developed a DVT anyway, regardless of

prophylaxis. But if there was a good reason not to give them prophylactic anticoagulation such as active gastrointestinal bleeding, then no adverse event has occurred, because the safest decision has been made in those circumstances. If, however, the patient experienced active gastrointestinal bleeding after being given DVT prophylaxis, but the prescribing doctor had not known or thought about the patients risk factors for bleeding when prescribing, then one could say that an adverse event had occurred. This also raises the issue of timing when trying to determine causality, and the difficulty of how thorough one should be when checking for risk factors for an adverse outcome when prescribing drugs.

The decisions that are made leading up to (or preventing) an adverse event may be difficult to detect from the clinical notes, as often these sorts of thought processes are not documented clearly. This is true with all patient groups, but probably more so when we are caring for older people. It is also likely that doctors who are not as thorough and careful as others in their decision making processes will not be as thorough and careful with their documentation, so in a way it may be difficult to detect the most unsafe decision making processes.

Another question in RF1 that raises difficulties is question 13 – "Unexpected death". Again, a patient on a Medicine for the Elderly ward is bound to be more likely to undergo sudden unexpected death than a healthy younger person, due to pre-existing frailty and comorbidity. It could be argued that patients whose death is expected are equally susceptible to adverse events as those who die unexpectedly. In fact, patients who are deemed "for palliative care" may be more susceptible to error, for various reasons, and were thus excluded from many of the large adverse event studies described in Chapter 3, as one put it "because of the recognised high risk of iatrogenic complications in this group of patients" (Steel, et al., 1981).

On the other hand, as described in the interview study in Chapter 4, it may be that a significant proportion of elderly medical inpatients patients who die "unexpectedly" are not given adequate care, not because their deaths are preventable, but because they are not identified as "dying". This means that they do not have had access to good quality end of life care that they require, and as often happens when an unexpected death occurs, undignified, futile resuscitation attempts occur which, it could be argued, should be classified as adverse events in their own right.

Lengthy, complex admissions.

Older patients often have lengthy and complex stays in hospital and their clinical trajectory fluctuates widely with time. This means that it can be very difficult to determine with any degree of certainty whether an event did or did not lead to a disability or an increased length of stay.

Multiple adverse events.

Multiple adverse events are likely to occur in this group of patients, leading to difficulties in deciding which are the most important, and whether each should be analysed individually.

Non-specific outcomes of adverse events.

Adverse events are likely to cause different, perhaps more subtle effects on this group of patients than in younger patients. These effects may manifest as the same non-specific geriatric syndromes that may have led to the patients admission, such as delirium, incontinence, reduced mobility or function, or falls. Again, it may be difficult to establish whether these are as a result of their healthcare or the pre-existing condition of the patient – it is likely to be a combination of the two. Whenever a frail elderly patient is admitted to

hospital they are vulnerable to these conditions, regardless of whether a serious healthcare error has been made or not. This leads to the question of whether these conditions should be included in the initial list of screening questions (RF 1). Also, these conditions are notoriously under-diagnosed, which means that they may be difficult to detect using record review – interpretation of events may be required to do so, perhaps leading to bias.

Similarly, because of the vulnerable nature of these patients, small changes or events in their care may lead to large, potentially devastating effects. This means that the initial identification of adverse events (and identification of their causes) may be more difficult to tease out in this group of patients. However, it may be that there are certain situations in which these patients are particularly vulnerable to a large functional or clinical decline when subjected to a small change in their healthcare. These situations may be both predictable and preventable.

5.2.5. Conclusions.

Some important biases applicable to all of the retrospective adverse event studies were also applicable to this study as it employed broadly the same methodology. These include hindsight bias (the inclination to see adverse events as more predictable than they in fact were before they took place) and outcome bias (where errors are made in evaluating the quality of a decision when the outcome of that decision is already known).

This study has significant limitations in terms of sample size and the fact that only one reviewer was involved. However, its aim was not to provide any estimate of adverse event incidence in older medical inpatient populations, rather than to demonstrate the fact that the method used in the large adverse event studies was perhaps not designed with the relevant issues for older people in mind. It is reasonable to conclude that the results of the re-analysis of the large adverse event studies described in Chapter 3 may therefore not be particularly reflective of safety in older medical inpatients, although of course the methods used were designed to be used in all adult hospital inpatients.

5.3. An exploration of a new approach to safety and quality assessment using retrospective case record review.

5.3.1. Introduction.

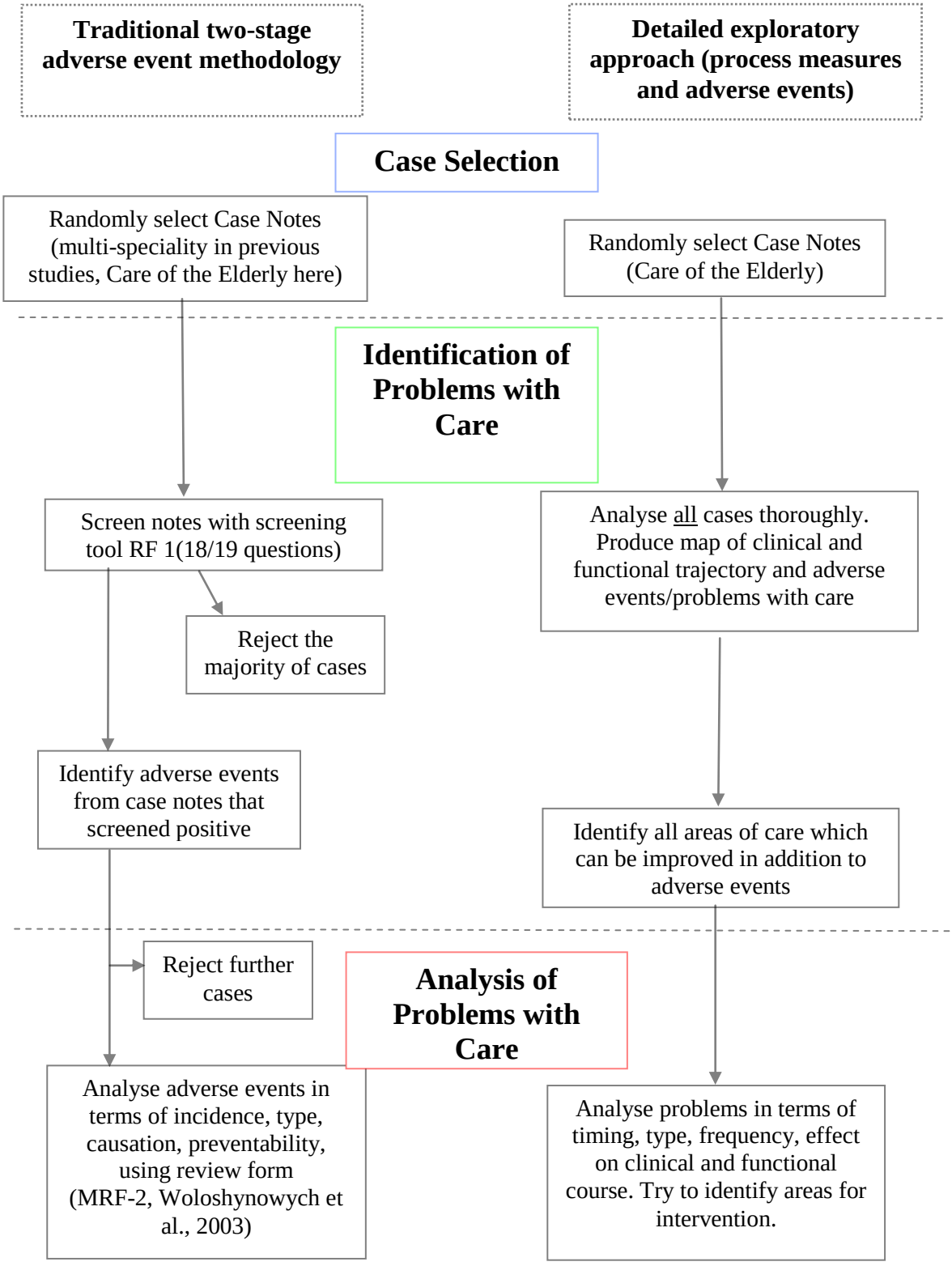
Because of the problems described above in using the traditional two stage record review process for the detection of adverse events in older medical inpatients, it was decided to develop a new, more detailed and comprehensive way of using retrospective case record review to assess the safety and quality of their care. The key differences between this approach and the traditional two-stage method are:

1) The remit is much wider - to look at a range of safety and quality issues including process measures as well as adverse events, rather than adverse events alone.

2) The two stage process was felt to be unnecessary for this purpose and was abandoned - it was felt that it would be a shame to dismiss a significant number of cases using a screening process, but that rather we could learn from all cases.

Figure 5.4. illustrates this with a comparison of the two methods.

Figure 5.4. Comparison of the two approaches to retrospective case record review used in this chapter.



Development of a new approach to retrospective safety and quality case record review.

The new approach was very simple and was developed after experimentation with five pilot sets of notes. The underlying concept was to analyse every section of the available record (medical, nursing, allied health professional and drug charts) in each case from admission to discharge or death to produce a map or trajectory of the patient's clinical and functional course through their admission, noting safety and quality issues as they arose. It was felt that this would help us examine a) the complex nature of these patients and b) the relationship between safety and quality of care and outcomes in terms of clinical and functional measures. In order to keep as open a mind as possible, the tool created for this part of the study took the form of a series of six Excel sheets in which sequential problems were noted, each within one workbook per case. The details of items assessed at each stage are shown in Figure 5.5. below:

Figure 5.5. Items assessed at each stage using the detailed approach.

- **Sheet 1. Demographic Information.**
  - Age, gender, length of admission, presence of delirium and dementia, number of medications on admission and discharge, presence of continence issues, sensory impairment, earliest and latest AMTS and Barthel scores.
- **Sheet 2. The admission process.**
  - Any problems at the time of admission noted.
- **Sheet 3. Timeline of events during the hospital stay itself.**
  - Any problems during ward stay noted.
- **Sheet 4. Ceiling of care and Do Not Attempt Resuscitation (DNAR) decisions.**
  - Any problems with documentation or appropriateness of these decisions noted
- **Sheet 5. Medication management.**
  - Any problems with medication management at any stage noted.
- **Sheet 6. The discharge process.**
  - Any problems relating to the discharge process noted.

5.3.2. Methods.

Design, setting and sampling.

The same cases were used for this case record review as in the first part of the study - 20 sequential discharges or deaths from a Medicine for the Elderly ward.

Review procedure and data analysis.

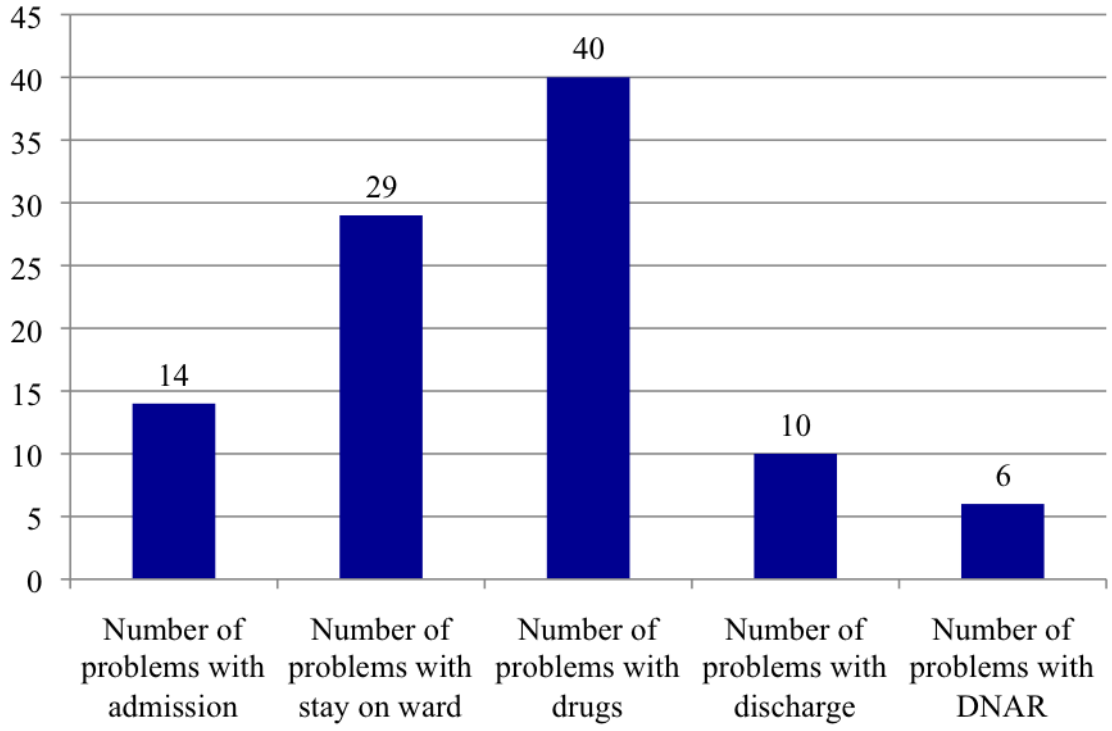
This review was carried out simultaneously with the two-stage adverse event review. In order to minimise any potential bias caused by the learning effect (which can occur when two methods are employed to look at the same cases, as findings from the first influence findings from the second), half of the cases were analysed using the two stage adverse events method first, and half were analysed using my descriptive safety and quality method first.

As data was being entered to create these sheets, any actual or potential problems with care were noted, and a summary of these was made on a seventh sheet for each case. These were then amalgamated and classified.

5.3.3. Results.

A total of 103 safety and quality problems were found using the detailed case record review method. These were divided into five groups according to the categories used during the review process: problems during admission, problems during the ward stay, drug related problems, problem with the discharge process and problems with documentation of DNAR (do not attempt resuscitation) status. Figure 5.6. shows that medication related problems were the most common, representing 40/103 of the issues found, followed by problems that occurred during the ward stay. Tables 5.2. - 5.5. show the details of each issue.

Figure 5.6. Summary of problems identified using the detailed case record review approach.



Cases with multiple problems.

It is interesting to note that more problems were found in some patients than others - as shown in Figure 5.7. The patients in whom there were most problems tended to be those with delirium and dementia, and required high levels of care both before and after discharge. However, the sample size is too small to determine whether there is any significant statistical relationship here.

Figure 5.7. Summary of total number of problems in each case.

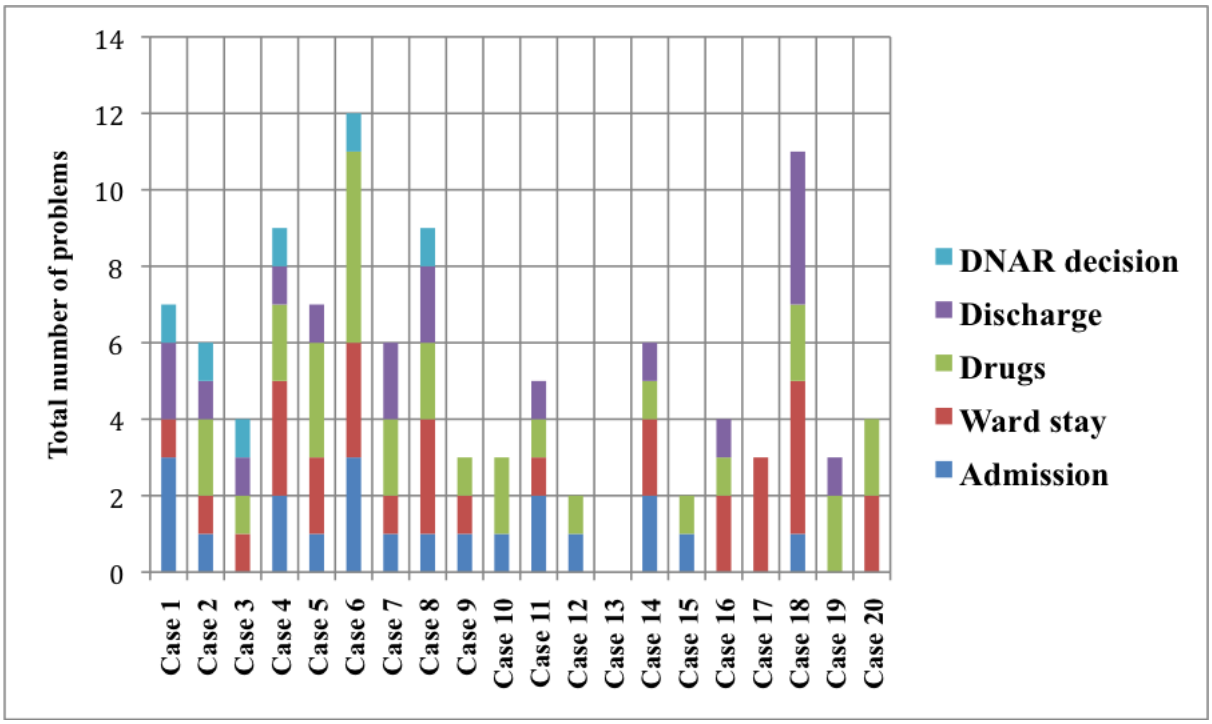


Table 5.2. Detail about problems identified with the admission process.

Unnecessary admission/inadequate discharge from last admission	Unsuitable discharge from A&E prior to index admission leading to further fall and readmission, advice of PT and OT not followed (Case 1)
	Possibly unnecessary admission for a month whilst awaiting NH placement - could have received the same treatment in the community as in hospital (Case 1)
	Possibly unnecessary admission - symptoms longstanding and had had abnormal MRI spine previously although pt was under the impression this was normal. Concern about stroke though and difficult to disprove without admission (Case 12)
	No acute medical reason for admission, but no alternative available (Case 14)
Inadequate assessment or information on admission	Poor history on admission (Case 2)
	Poor information from RH re usual state, swallowing, PMH etc. Very brief letter sent with patient saying "Rapid Response nurse came, thinks pt needs an X-ray as not weight bearing and in pain due to fall. At risk of dysphasia" No further information available or sought (Case 6)
	Poor documentation of medical assessment in A&E (Case 7)
	No information from RH about indication for long term catheter, or when catheter last changed, hence inadequate initial treatment of UTI (Case 1)
	Lack of information for admitting team from residential home about recent symptoms/events. No referral letter, just recent GP latter to liver clinic re USS results (Case 9)
	Referred to surgeons on admission, not clerked for 7 hours as busy in theatre (Case 11)
	No-one aware pt on long term O2 - led to lots of problems with giving O2 and concern as hypoxia assumed to be a new problem. Recurrent BIPAP required, numerous ABG's probably unnecessary (Case 18)
Diagnostic errors	Initial diagnosis of L MCA infarct persisted until stroke SPR reviewed patient (anchoring bias) (Case 4)
Results of investigations not checked or not available	Acute coronary syndrome on admission not recognised until 3/7 later - no mention of ECG's being reviewed at time of clerking (Case 5)
	Old blood results not available on GP letter or computer, and renal failure assumed to be acute on chronic – may have affected degree of concern about patient (Case 8)
	Plan in admission clerking to repeat bloods that evening (acute renal failure, hyperkalaemia, acidosis) - not done (Case 10)
	Difficulty contacting radiology for CT brain overnight even though it was felt to be necessary – so not done until morning (Case 11)
Poor communication	Doctors write NBM until SALT – they are unaware nurses have done screen and are feeding pt - could have given oral medications etc.(Case 4)
Other	Hearing aid left at home on admission – important as patient then unable to communicate for rest of the admission (Case 14)

Table 5.3. Detail of problems identified with ward care

Poor communication between professionals	Nurses noted incontinence – doctors apparently unaware (Case 3)
	Patient fed despite NBM instruction from SALT (Case 4)
	Nurses noted "very, very aggressive, wandering from bed to bed" at night. No documentation that medical team/SW aware if this. F1on nights asked to prescribe zopiclone (Case 7)
	Symptoms at night - vomiting, headaches, epistaxis documented in nursing notes but doctors apparently unaware of these (Case 8)
	Episode of drowsiness, hypoxia (out of hours) assessed as "sleep apnoea, given nebulised salbutamol", no planned review or follow up or hand over to team who were apparently unaware (Case 8)
	Seen by stroke specialist nurse made NBM. Seems that medical team unaware of this - prescribed oral drugs etc (Case 9)
	"Resistant to nursing interventions" written in nursing notes: difficulties giving prescribed drugs, O2 at night; doctors apparently not aware of this (Case 8)
	When developed seizures over weekend, seen by F1, no treatment given as "not for drugs". Senior advice not requested The next F1 was also called as an emergency. (Case 11)
	Nurses under impression that pt has had stroke, although this was never proven. Also discrepancy between nurses who felt pt confused, and doctors who didn't. Nurses did urine dip - positive, doctors never aware (Case 12)
	Physio did full cognitive screen but not mentioned by Drs (Case 16)
	F1 on call asked to review by team as "abdomen rigid ? peritonitis". No mention of team's concern about this in notes. Decides pt is constipated (Case 18)
	Delirium - noted at night by nursing staff. Broke window so walking stick taken away from him. (Case 20)
Recognised hospital acquired infections, delirium, falls	Delirium, secondary to aspiration pneumonia (hypoactive) (Case 4)
	Stool chart - bowels not open for 10 days - doctors not aware, no treatment given (Case 6)
	Fall on ward (Case 4)
	Two catheter associated E Coli UTI's (Case 5)
	Fall on ward - trying to climb out of bed (Case 6)
	Delirium due to hospital acquired/aspiration pneumonia. Difficulty managing this "violent behaviour" (Case 6)
	Hospital acquired pneumonia (Case 18)
Complications of treatment	Given very aggressive fluid therapy (7l in 24 hours) then treated for pulmonary oedema (Case 19)
Delay in receiving	Delay in treatment of pressure sores with vac pump despite persistent requests for plastics review (Case5)

treatment/making diagnosis	Delay in recognising hip pain - first noted by PT 2/7 after admission, doctors seem to be aware much later (Case 16)
Inappropriate decision making	Decision to treat fractured neck of femur conservatively – which may have contributed to hospital acquired pneumonia and led to death (Case 6)
Results attributed to wrong patient	Mistake made with C diff result - found to be positive but wrong patient. Given metronidazole (only one dose) (Case 14)
Unnecessary interventions	BM monitoring unnecessary, continued throughout admission (Case 2)
Investigations not followed up	CXR felt to be suspicious on admission but not followed up (Case 15)
	U&E's supposed to be rechecked pre DC - no mention in notes (Case 17)
	Abnormal CXR noted on admission - plan was to get it formally reported; no further mention of this in notes (Case 20)
Inappropriate ward transfers	Moved to DOME ward 1 day before discharge (Case 17)

Table 5.4. Detail of medication-related problems

Duration of treatment	Long duration of antibiotic treatment; it appears that it was forgotten to review them (Case 2)
	On antibiotics for 20 days before pointed out by pharmacist (Case 5)
Drug history not available on admission	Preadmission drug history not available on admission - long term antidepressant not prescribed until day 17 (Case 2)
	DH not available on admission - given aspirin on admission when aspirin intolerant and on dipyridamole (Case 5)
	DH not documented fully - drugs missed, no doses (list from community pharmacy in notes) (Case 7)
	DH not available until 24 hrs after admission. (Case 8)
	Full DH not obtained until day 5 by pharmacist ringing GP (Case 10)
	Warfarin and thyroxine omitted from initial DH - picked up by pharmacy. Thyroxine not prescribed at all during admission despite this (Case 12)
	No drug history on admission - only packet of old digoxin brought in with pt - F1 found out DH on the day before discharge (Case 20)
Inappropriate antibiotics	Given 7/7 antibiotics for presumed UTI based on urine dipstick, with no temp, normal WCC and CRP (Case 19)
Inappropriate combinations of drugs	Concurrently prescribed tiotropium and atrovent during admission and on discharge (Case3)
Lack of knowledge about compliance with medication use pre admission	SHO phoned GP on admission for DH, but pharmacist subsequently discovered pt had not collected prescription for 2 years (Case 4)
	F1 found out DH pre discharge and didn't reinstate any drugs, including inhalers, because told that pt doesn't take them. No senior review or consideration of this, patient discharged with new care package, carers could have supervised (Case 20)
Medications planned but not prescribed	Quetiapine requested by consultant but not prescribed (Case 4)
	Consultant asked for B blocker to be halved (bradycardia), not changed on D chart (Case 7)
Medications prescribed but not given	Fluids prescribed and not given (Case 6)
	TEDS not signed for during first week, then 7R (refused) written every day (Case 6)
	4 different antibiotics given, intermittent doses only - delirium led to problems receiving drugs (Case 6)
	Analgesia prescribed in A&E (10mg morphine), not given (Case 6)
	IV fluids not given on admission to DOME ward as no IV pump (Case 10)
Medications prescribed on advice of doctors who hadn't seen patient	Drugs prescribed twice on basis of telephone advice - diuretics on base of CXR viewed remotely, ACS treatment on advice of cardiologist over phone without seeing pt (Case 5)

Prescription stopped but medication still given	Buprenorphine remained on for 2 days, despite being crossed off drug chart (stopped due to development of delirium) (Case 6)
Incorrect preparation of drug	Non-liquid tablets given during admission (pt was previously on liquid medication but this was not noted on admission). May have contributed to aspiration. (Case 6)
PRN drugs not reviewed	10mg morphine PRN prescribed on admission, not reviewed. Given when pt developing delirium – possibly mistaken for pain. Doctors apparently not aware that this done (Case 6)
Incorrect use of palliative care drugs	Given midazolam and morphine in syringe driver although in no pain or distress according to LCP front sheet. No PRN doses tried first (Case 9)
Drug prescribed on basis of incorrect result	Metronidazole prescribed and given in error (Case 14)
Delay in prescribing medication	Analgesia given much later than pain noticed (Case 16)
Poor communication of medication changes or plans for review at discharge	Bumetanide stopped on recent admission with instructions for GP to review - presumably not done as admitted with heart failure (Case 3)
	Drugs changed from those prescribed in USA without communication to patient or on discharge summary. (Case 15)
	Lots of PRN analgesia given during admission, then written up regularly on TTA's (Case 18)
	Diuretics stopped on admission with no given reason or communication on discharge summary (Case 19)
	On nebulisers until TTA's written – changed to inhalers for discharge without checking whether patient would manage on this regime (Case 18)
	Information missed on discharge letter – reason for new drug added and new discharge destination (Case 1)
	Forgot to ask GP to review frusemide which was plan in notes (Case2)
	Lack of instruction about reviewing diuretics (stopped pre discharge), particularly given preadmission (Case3)
	Reduced dose of bisoprolol and reason why not communicated to GP (Case 7)
	Gabapentin not mentioned on discharge summary - was on benzodiazepines and amitriptiline preadmission; possibility these drugs which may have contributed to delirium on admission will be recommenced (Case 8)
	Large number of laxatives on discharge - no mention of plans to review this (Case 8)
	Drugs changed but not mentioned e.g. diuretics stopped, inhalers changed, laxatives, analgesia (Case 18)
	GP not informed of reasons for drug changes or DN referral (made by nurses) (Case 19)

Table 5.5. Detail of discharge-related problems.

Delay in discharge for non medical reasons	Delay in obtaining NH placement partly due to delay in completing Health Needs Assessment (Case 1)
	Delay in discharge due to funding uncertainty for equipment (Case 5)
	Long wait for NH; reason unclear (Case 14)
	Delay in completing HNA (Case 18)
Inaccurate information on Discharge summary	Inaccurate summary - says admitted with "confusion and acopia" (Case 14)
Inadequate discharge or follow up plans	Investigations requested for falls e.g. 24 hour tape, no instructions for follow up (Case 16)
	? Adequate follow up of breast ca - surgery OPA 3/12. Analgesia started but no plans for review (Case 18)
	Unclear instructions to GP- says we would recommend if pt develops new neurological signs GP should organise repeat CT - problems with this are 1) GP doesn't know what pt is like now, 2) the GP at the RH is probably a different one anyway, 3) what is the GP supposed to do if it's abnormal, 4) outpatient CT waiting lists long 5) if new neurology really should be readmitted (Case 11)
	Details of discharge not documented - last entry says friends and nephew help with all ADL's but finding it difficult and need help. Plan DW SW. Nothing else written. Discharged same day. (Case 7)
	No mention of cognitive deterioration or that pt discharged to EMI RH in another town (Case 4)

Problems relating to Do Not Attempt Resuscitation (DNAR) decisions.

In all six problems relating to DNAR decisions, the issue raising concern was that DNAR forms were signed appropriately, but there was no documentation of the reasons why this decision was made, or of any discussion with the patient and/or their relatives.

5.3.4. Discussion and conclusions.

This was a small study in which a new approach to assessing safety and quality of care in older medical patients from case record review was piloted. However, I was able to show that this more detailed exploratory approach produces a useful and different safety and quality picture than that provided by the traditional two-stage adverse event detection method. It is difficult to draw direct comparisons between these methods because the aims of each are disctinct, but this approach revealed 103 problems with care, whereas the two-stage approach identified five adverse events in the same group of patients. This suggests that the the more detailed approach may give us more potential for learning from problems.

This first foray into case record review also provided some useful insights which helped me to develop the case record review tools described in the next section of the thesis. The first of these is that the value of case record review is limited by the quality of documentation. This may produce problems with sensitivity, as problems may not have been documented, or may have been simply missed during the review process. Conversely, several of the issues that were detected required much consideration of whether they were or were not important enough to include in the results; the review erred towards including as many issues as possible, which may mean that several of the issues detected may seem rather trivial. In this study, only one reviewer examined the cases. Apart from being very time-intensive, this clearly can lead to numerous biases, and in my later studies this is addressed by having multiple independent reviewers and by assessing inter-rater reliability. On the other hand, the reviewer had previously worked in the department being studied, so understood the systems and care processes in place. This may have led to a higher degree of accuracy in interpreting the results, than if somebody unfamiliar with the department were to conduct the review.

The next challenge was to create a way of performing such detailed case record review in a way that generates a meaningful dataset, allowing analysis to provide valuable insights into safety and quality in older patients, and to assess the effect of interventions. The care problems identified this study were combined with findings from the literature review and interview study to inform the development of the measurement tools described in the next section of the thesis.

It must also be emphasised that a large number of good practices were observed during the course of this study - it is not my aim to criticise care. Some of the positive behaviours and attributes observed were identical to those described in Chapter 8, an investigation of safety skills.

Section 3. Measuring safety and quality in older medical inpatients

Introduction to Section 3.

Why do we need measurement tools to assess safety and quality of care in older medical inpatients?

As described in Chapter 2, there is a clear need for us to be able to assess the quality and safety of care provided to all inpatient groups, using valid and reliable tools. The ultimate purpose of this is that it allows us to improve care, whether at a strategic level within a national healthcare system, or more locally at individual Trust level, within local departments and within individual clinical teams and wards. Measurement tools allow us to make such improvements firstly by identifying areas for improvement and secondly by allowing us to measure the effect of interventions.

The systematic review and reanalysis of international adverse event studies in Chapter 3 showed that very few studies have been conducted to address safety and quality issues specifically in older inpatients, and that most of our knowledge about this field has been extrapolated from larger studies of inpatient populations of all ages. The data presented in Chapter 5 in particular demonstrated that existing methods tend not to have been designed with the unique problems faced by this vulnerable population in mind. It showed that although the well established two stage case record review method of assessing safety allows one to detect adverse events such as hospital acquired infection in older medical patients, a straightforward detailed exploratory approach allows one to identify many more problems with care.

The lack of existing tools for safety and quality assessment in the older medical inpatient population is probably in part due to the difficulty of creating a valid and reliable

tool that adequately reflects the issues associated with the care of older people, purely because of the complex nature of both the patients and their care. The difficulties associated with defining safety and quality described in Chapter 1 also play a part here.

I suspect that another reason why no such tools exist for older people might be that historically research in safety and quality measurement and improvement have been driven by the "horror stories" of healthcare-related harm largely affecting young people - so that measurement efforts have largely ignored the geriatric syndromes that are so important to older people and have therefore failed to take into account pre-existing frailty, complexity and co-morbidity.

Aims of Chapters 6 and 7.

The aims of the work presented in this and the next chapter were to design, develop and test novel retrospective case record review tools to measure the safety and quality of care in older medical patients. The ultimate aims of this were to create tools useful both clinically as a measure of local practice and improvement and academically to provide new insights into the intricacies of safety and quality in older people.

Chapter 6 describes the development and testing of the Long Tool, so called because it consists of all of the major outcome and process measures that were identified in Section 1 of this thesis. Due to the length and level of detail provided by this tool, it is perhaps more useful from an academic point of view than a clinical one. In Chapter 7 I will describe the development and testing of a shorter version of the Long tool, COMPACT (Care of Older Medical Patients Abbreviated Case record review Tool), which it was hoped would be more clinically useful.

Chapter 6. Development and testing of a novel retrospective case record review tool (the Long tool) to measure the safety and quality of care in older medical inpatients.

6.1. Development of the Long tool.

Prior to the development of the Long tool, a list of desirable characteristics of the tool were identified, based on suggestions from key quality and safety measurement reviews (Brown, et al., 2008; Lilford, et al., 2010; Raleigh & Foot, 2010), and what were felt to be useful features for clinicians and researchers. Importantly, it was felt that the tool should use a dual approach of outcome and process measures, as this is widely held to be the best way of providing a sound overall assessment of quality and safety (Donabedian, 1980; Pronovost, et al., 2004).

Table 6.1. shows a summary of these characteristics, which were used to inform the subsequent design and development of the tool.

Table 6.1. Desirable characteristics of the Long tool.

Aspect of the tool	Specific desirable characteristic
General principles:	Allows an overall assessment of safety and quality of care, through the use of both process and outcome measures.
	No screening process - assesses care in all cases without rejecting any, not just those in whom adverse events may have occurred.
Demographic information:	Captures a range of basic demographic details.
Complexity markers:	Mapping of documented information relating to common conditions associated with frailty for further analysis.
Outcome measures:	Produces a "map" of outcomes across the admission so that: 1. The development of new adverse outcomes can be distinguished from pre-existent conditions. 2. Patterns of occurrence of adverse outcomes at different stages of the admission can be identified.

	All of the major clinical problems affecting older people are included - both geriatric syndromes and acute medical problems.
Process measures:	Allows the assessment of all process of care issues relevant in each case, relating to: 1. The management of medical problems and pre-existing geriatric syndromes present on admission. 2. The management of hospital acquired complications and new geriatric syndromes (new adverse outcomes) that occur during the admission. 3. A range of generic issues relevant in all cases.
Validity	1. Internal validity. The tool should have content validity - it assesses a complete range of facets of quality and safety, as described by experts in the field. 2. External validity/generalisability. The tool should have construct validity - where possible the findings resemble those in other studies.
Reliability	Good inter-rater reliability is desirable. To aid this, the use of the tool should be easily trainable.

In order to ensure the internal validity of the tool, the outcome and process measures contained within it were taken from all of the exploratory work described in section 1. A "long-list" of all potential safety and quality problems in older medical patients was systematically created from the findings of the literature review (Chapter 3), interview study (Chapter 4) and preliminary case record review (Chapter 5). Next, these were classified into outcome and process measures.

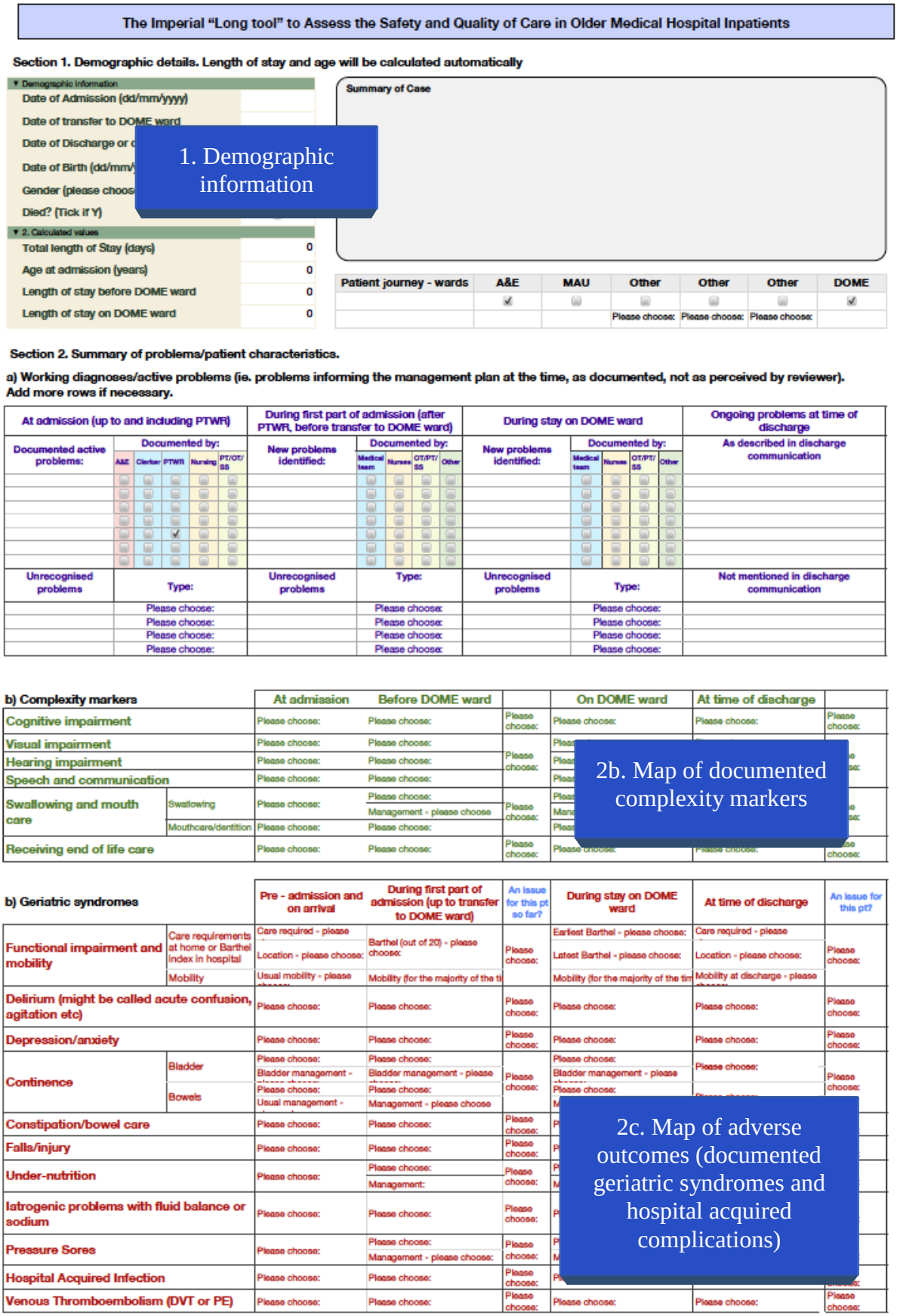
The outcome measures include all of the geriatric syndromes and hospital acquired complications that had been identified in these studies, and will be referred to as "new adverse outcomes" for the remainder of the thesis. A group of related process measures were linked to each new adverse outcome – in this way, each individual process measure provides assessment of one aspect of the management of each clinical problem. An additional set of

process measures were identified which allowed the assessment of the management of generic issues, which it was anticipated would be relevant in all cases.

The long list was then reduced by removing any items which it was felt would be difficult to assess using retrospective case record review. These items tended to originate from the interview study, and usually comprised the assessment of qualitative aspects of care; for example the way in which patients were spoken to by staff. An excerpt of the long list table is shown in Appendix 7.

A pilot phase was carried out, in which the tool was used in test cases, with the help of a co-reviewer (MF, a junior doctor) to ensure that the wording of items was as clear and unambiguous as possible and that the tool was user-friendly. The tool evolved through an iterative process, as minor adjustments were made to each version. Simultaneously, with the help of the co-reviewer, an accompanying manual was produced, designed to help new reviewers to use the tool. The final version of the Long tool, shown in Figure 6.1., was created using the Apple iWork Numbers programme (Apple Inc.).

Figure 6.1. The Long tool (Drop down menus appear in the electronic version, blue boxes have been added to illustrate key sections)



The Imperial "Long tool" to Assess the Safety and Quality of Care in Older Medical Hospital Inpatients

Section 1. Demographic details. Length of stay and age will be calculated automatically

▼ Demographic information

Date of Admission (dd/mm/yyyy)

Date of transfer to DOME ward

Date of Discharge or d

Date of Birth (dd/mm/

Gender (please choos

Died? (Tick if Y)

▼ 2. Calculated values

Total length of Stay (days) 0

Age at admission (years) 0

Length of stay before DOME ward 0

Length of stay on DOME ward 0

Summary of Case

1. Demographic information

Patient journey - wards	A&E	MAU	Other	Other	Other	DOME
	☑	☐	☐	☐	☐	☑
			Please choose:	Please choose:	Please choose:	

Section 2. Summary of problems/patient characteristics.

a) Working diagnoses/active problems (ie. problems informing the management plan at the time, as documented, not as perceived by reviewer). Add more rows if necessary.

At admission (up to and including PTWR)						During first part of admission (after PTWR, before transfer to DOME ward)					During stay on DOME ward					Ongoing problems at time of discharge
Documented active problems:	Documented by:					New problems identified:	Documented by:				New problems identified:	Documented by:				As described in discharge communication
	A&E	Clerker	PTWR	Nursing	PT/OT/SS		Medical team	Nurses	OT/PT/SS	Other		Medical team	Nurses	OT/PT/SS	Other	
	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐	
	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐	
	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐	
	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐	
	☐	☐	☑	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐	
	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐	
	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐	
Unrecognised problems	Type:					Unrecognised problems	Type:				Unrecognised problems	Type:				Not mentioned in discharge communication
	Please choose:						Please choose:					Please choose:				
	Please choose:						Please choose:					Please choose:				
	Please choose:						Please choose:					Please choose:				
	Please choose:						Please choose:					Please choose:				

b) Complexity markers		At admission	Before DOME ward		On DOME ward	At time of discharge	
Cognitive impairment		Please choose:	Please choose:	Please choose:	Please choose:	Please choose:	Please choose:
Visual impairment		Please choose:	Please choose:	Please choose:			
Hearing impairment		Please choose:	Please choose:				
Speech and communication		Please choose:	Please choose:				
Swallowing and mouth care	Swallowing	Please choose:	Please choose:	Please choose:			
			Management - please choose				
	Mouthcare/dentition	Please choose:	Please choose:				
Receiving end of life care		Please choose:	Please choose:	Please choose:	Please choose:		

2b. Map of documented complexity markers

b) Geriatric syndromes		Pre - admission and on arrival	During first part of admission (up to transfer to DOME ward)	An issue for this pt so far?	During stay on DOME ward	At time of discharge	An issue for this pt?
Functional impairment and mobility	Care requirements at home or Barthel index in hospital	Care required - please	Barthel (out of 20) - please choose:	Please choose:	Earliest Barthel - please choose:	Care required - please	Please choose:
		Location - please choose:			Latest Barthel - please choose:	Location - please choose:	
	Mobility	Usual mobility - please	Mobility (for the majority of the ti		Mobility (for the majority of the tim	Mobility at discharge - please	
Delirium (might be called acute confusion, agitation etc)		Please choose:	Please choose:	Please choose:	Please choose:	Please choose:	Please choose:
Depression/anxiety		Please choose:	Please choose:	Please choose:	Please choose:	Please choose:	Please choose:
Continence	Bladder	Please choose:	Please choose:	Please choose:	Please choose:	Please choose:	Please choose:
		Bladder management -	Bladder management - please		Bladder management - please		
	Bowels	Please choose:	Please choose:		Please choose:		
		Usual management -	Management - please choose				
Constipation/bowel care		Please choose:	Please choose:	Please choose:			
Falls/injury		Please choose:	Please choose:	Please choose:			
Under-nutrition		Please choose:	Please choose:	Please choose:			
			Management:				
Iatrogenic problems with fluid balance or sodium		Please choose:	Please choose:	Please choose:			
Pressure Sores		Please choose:	Please choose:	Please choose:			
			Management - please choose:				
Hospital Acquired Infection		Please choose:	Please choose:	Please choose:			
Venous Thromboembolism (DVT or PE)		Please choose:	Please choose:	Please choose:	Please choose:	Please choose:	Please choose:

2c. Map of adverse outcomes (documented geriatric syndromes and hospital acquired complications)

Section 3 a) During admission (in A&E and MAU, prior to transfer to DOME ward)

Domain	Relevant? If Y please rate quality, if N leave this section	Criteria that need to be achieved in order to score 5 (excellent)		Not applicable or really can't tell	1 Not done (or not documented)	2 Partially achieved	3 About half achieved	4 Almost completely achieved	5 Completely achieved
All	Yes	Early and effective geriatric specialist input, and advice followed							
Management of acute medical problems	Yes	Thorough history and examination - all relevant areas covered, no parts missing	A&E						
			Medic/other						
		Availability and use of information such as observations, old results and notes, information from community	A&E						
			Medic/other						
		Diagnoses - none missed or incorrect							
		Investigations - appropriate (none unnecessary or missed), timely, indications clear							
		Management plans - appropriate (none unnecessary or missed) and timely							
		No evidence of discomfort or complications as a result of investigations or treatments							
		Good planning and handover of result checking, patient review and actions to be taken							
		Senior review (PTWR or earlier) - timely and adequate							
Functional Impairment	Please choose:	Early ascertainment of baseline function, mobility and care needs							
		Seen by OT/PT as soon as possible							
		Encouraged to sit out/ mobilise /self care early							
Delirium	Please choose:	Prompt and correct recognition, with no misiabelling							
		Compassionate care, including environmental considerations (eg delirium room, lighting etc)							
		Attempts made to find and correct underlying cause?							
		Cautious management eg with sedation							
Depression/Anxiety	Please choose:	Identified on admission							
		Possible effects on presentation and management of other problems considered							
		Reassurance given if appropriate							
Continence and urinary catheters	Please choose:	Enquiry about continence made at admission							
		Appropriate initial management and investigations (eg PR, MSU)?							
		Proactive management (ie assessment and regular toileting) rather than just containment?							
		If catheterised, good indication documented, plans for early removal							
Constipation	Please choose:	Enquiry about bowels made on admission?							
		Appropriate management initiated, with clear plans for review							
		Pre-emptive management - e.g. laxatives with opiates							
		Appropriate investigations requested if applicable							
Falls	Please choose:	Risk assessment of falls made and acted upon							
		Referral to falls services made where appropriate							
		Treatment with bisphosponates/calcium/vitamin D considered							
		Efforts made to identify cause of fall(s) including medication review							
Swallowing problems and mouthcare	Please choose:	Enquiry about usual swallow, dentition and mouth care made on admission - problem identified early							
		Correct consistency of food identified, ordered and given to patient							
		Good management of dysphagia - handed over, correct positioning, SALT referral if necessary							
		Medication review carried out and alternatives sought where possible							
		If NG inserted - minimal distress, minimal insertions and CXR's, correct patient positioning for feeding, plans for review							
Undernutrition	Please choose:	Enquiry about ability to self feed made on admission							
		Steps made to ensure help given if needed (eg red tray)							
		Nutrition risk score (eg MUST) carried out and patient weighed, and findings acted upon							
		Any other concerns eg Hx of weight loss acted upon							
Iatrogenic problems with fluid balance/ sodium	Please choose:	Problems with sodium and hydration identified on admission							
		Encouraged to drink and helped where necessary							
		Appropriate management of any problems - including medication review							
Pressure Sores	Please choose:	Pressure areas examined where appropriate							
		Waterlow score done and acted upon							
		History obtained from community of recent management strategies and progress							
		Considered as a source of sepsis if appropriate							
Hospital Acquired Infection	Please choose:	Infection control precautions taken							
		Consideration of HAI if recent admission							
		Appropriate management - eg catheter changed, appropriate AB's used							
		Consideration of C diff if diarrhoea or recent Ab use							
		Appropriate cultures/tests sent and results followed up							
Venous Thromboembolism	Please choose:	Consideration of VTE among diagnoses if appropriate							
		Appropriate management of anticoagulation on admission							
		Appropriate VTE prophylaxis started on admission							
Cognitive Impairment	Please choose:	Acknowledged on admission							
		Challenging behaviour not misiabelled as aggression or poor cooperation							
Communication difficulties	Please choose:	Strategies used to minimise these and maximise communication (eg wax removal, written communication, interpreter etc)							
End of Life Care	ase choos	Appropriate DNAR and level of care decisions							
		Appropriate involvement of other professionals eg ITU/palliative care							
		Appropriate discussion/explanation with relatives +/- patient?							
		Avoidance of unnecessary investigations or treatment?							

3a. Process measures, for the period of the admission before transfer to the DOME ward

Section 3b) During time on medicine for the elderly ward

Domain		Criteria that need to be achieved in order to score 5 (excellent)	Not applicable or really can't say	1 Not done (or not documented)	2 Partially achieved	3 About half achieved	4 Almost completely achieved	5 Completely achieved
Management of acute medical problems	Yes	Prompt recognition of acute problems						
		Thorough clinical assessment when new problems arise						
		Use of all available information e.g. observations, old results and notes						
		Diagnoses - none missed or incorrect						
		Investigations - appropriate (none unnecessary or missed) and timely						
		Management plans - appropriate (none unnecessary or missed) and timely						
		No discomfort or complications as a result of investigations or treatments						
		Good planning and handover of result checking, patient review and actions to be taken, including rescue plans and contingency planning						
		Senior involvement - timely and adequate						
Functional impairment	Please choose:	Allowed/encouraged to use same strategies as at home						
		Encouraged to sit out / mobilise and self care wherever possible						
		No delays in therapy assessments/treatments						
Delirium	Please choose:	Prompt and correct recognition, with no mislabelling						
		Compassionate care, including environmental considerations (e.g. lighting)						
		Attempts made to find and correct underlying cause?						
		Cautious management e.g. with sedation						
Depression/Anxiety	Please choose:	Appropriate management including referral to psychiatric services if necessary						
		Possible effects on management of other problems considered						
		Reassurance given when needed						
Continence and urinary catheters	Please choose:	Continence assessment (history and examination)						
		Appropriate investigations?						
		Proactive management rather than just containment?						
		Active promotion of continence - e.g. regular toileting, involvement of OT's.						
		If catheterised, good indication documented and removed as soon as possible, and adequate plans to ensure TWOC successful						
Constipation	Please choose:	(Proper) monitoring of bowel habit - stool charts filled in and acted upon						
		Adequate and timely management of problems						
		Appropriate and timely investigations if necessary						
		Pre-emptive management - e.g. laxatives with opiates						
Falls	Please choose:	Risk assessment of falls made and acted upon						
		Referral to falls services made where appropriate						
		Adequate management - (nursing and medical) of underlying causes and of injuries etc.						
		Treatment with bisphosponates/calcium/vitamin D considered						
		Efforts made to identify cause of fall(s) including medication review						
Swallowing problems	Please choose:	Was a timely swallowing assessment made and recommendations followed?						
		Correct consistency of food identified, ordered and given to patient						
		Problems with oral hygiene, dentition, candida identified and treatments initiated						
		Good management of dysphagia - handed over, correct positioning, recommendations from SALT handed over and followed						
		Medication review carried out						
		If NG inserted - minimal distress, minimal insertions and CXR's, correct patient positioning for feeding, plans for review						
		If PEG inserted (or considered) no complications, good decision making (MDT, risk benefit discussion with pt/family), plans for review						
Undernutrition	Please choose:	Referral to dietician if necessary and recommendations followed						
		Steps made to ensure help given if needed (eg red tray), dentures						
		Nutrition risk score carried out (eg MUST) and acted upon						
		Patient weighed and any concerns acted upon						
Iatrogenic problems with fluid balance/ sodium	Please choose:	Problems with sodium and hydration identified						
		Encouraged to drink and helped where necessary						
		Appropriate management of any problems - including medication review						
Pressure Sores	Please choose:	Pressure areas examined where appropriate						
		Waterlow score done and acted upon						
		History obtained from community of recent management strategies and progress						
		Considered as a source of sepsis if appropriate						
Hospital Acquired infection	Please choose:	Infection control precautions taken						
		Consideration of HAI if recent admission						
		Appropriate management - eg catheter changed, appropriate AB's used						
		Consideration of C difficile if risk factors and symptoms						
		Appropriate cultures/tests sent and results followed up						
Venous thromboembolism	Please choose:	Consideration of VTE among diagnoses if appropriate						
		Appropriate management of anticoagulation during ward stay and on discharge						
		Appropriate VTE prophylaxis						
Cognitive impairment	Please choose:	If new diagnosis, discussed with pt/ family, investigations considered, follow up arranged?						
		Appropriate use of MCA/DOL guidance						
		Challenging behaviour not mislabelled as aggression or poor cooperation						
Communication difficulties	Please choose:	Strategies used to minimise these and maximise communication (eg wax removal, written communication, interpreter etc)						
End of Life Care	Please choose:	Appropriate DNAR and level of care decisions made during ward stay and communicated at discharge to avoid unnecessary readmission etc.						
		Appropriate involvement of other professionals eg ITU/palliative care						
		Appropriate use of medications and LCP						
		Appropriate discussion/explanation with relatives +/- patient						
		Avoidance of unnecessary investigations or treatment						

3b. Process measures, for the period of the admission <u>after</u> transfer to the DOME ward

Section 4. Medication Management. Use drug charts as well as notes to complete this	Score						
Criteria that need to be achieved in order to score 5 (excellent)	Not applicable	Not documented	1 Poor, not achieved at all	2 Partially achieved	3 About half achieved	4 Almost completely achieved	5 Completely achieved
Full DH on admission, including doses and allergies, documented in notes							
Full DH within first 24 hours, including doses and allergies							
Assessment and management of concordance issues (pre-admission and during admission)							
Appropriate use of PRN drugs							
No delays in obtaining drugs or giving treatment							
If new treatment started (or changed or stopped), indication and plans for review documented clearly							
No problems with inappropriate prescribing							
No problems with fluids, analgesia, diabetic management or anticoagulation							
No adverse drug reactions							
Good medication review where appropriate - no problems that could have been prevented by this							

3c. Medication Management Process Measures.

Section 5. Scores for selected process of care issues (use information from admission and ward stay)		Done?			
Domain		Not applicable	No	Sometimes, not always	Yes
Multi-disciplinary team working, communication and handover	Appropriate and thorough handover between day team and out of hours team (doctors, nurses, therapists)?				
	Appropriate and thorough communication between professions?				
	Documented information is consistent between different team members				
	Recommendations from specialists (including therapists and pharmacists) followed				
Communication with patient and family	Discussion or explanation of diagnoses and treatment plans with patient (and family if appropriate).				
	Reassurance if patient frightened or anxious.				
Access to Services/ Equipment	Use of best equipment to enhance mobility, function, nutrition, communication (including patients own if necessary - including hearing aids, dentures etc)				
	Trouble-free transport around the hospital (eg for investigations)?				
	Received investigations in a timely fashion?				
	Good access to higher levels of care if needed?				
	Number of ward transfers kept to a minimum?				
Decision Making	Appropriate ceiling of care and DNAR decision making?				
	Appropriate use of MCA/DOL guidance				
	All investigations necessary				
Discharge Planning	Swift identification of care/social needs, early in admission				
	Good MDT discharge planning				
	Appropriate involvement of discharge co-ordinator				
	Appropriate use of MCA/DOL guidelines when making discharge decisions				
	Adequate documentation of new problems and treatments to GP and community services				
	Clearly documented communication of PT/OT concerns and arrangements/referrals made				
	No unnecessary time in hospital				
	Clear documentation of plans for review and/or follow up				

3d. Generic Process Measures

Susannah Long, Centre for Patient Safety and Service Quality, Imperial College London, 2009

6.2. Description of the Long tool.

The final version of the Long tool comprises several sections, as illustrated in Figure 6.1.. A separate document was used for each case.

Section 1 of the tool is a table containing demographic information, including boxes that perform automatic calculation (so that the reviewer simply has to enter the dates easily obtained from the case records) of age at admission and length of stay (total length of stay and length of stay before transfer to the Department of Medicine for the Elderly (DOME) ward and length of stay on the DOME ward itself), and drop down boxes containing options for site, reviewer, patient gender, death or discharge. There is also a table to record the locations within the hospital that the patient journeyed through during their stay before arriving on the DOME ward, and a free-text box for the reviewer to document a summary of the case. During the pilot phase, this free text clinical summary was felt to be useful both for the case note reviewer, in that its completion after the rest of the Long tool had been created often reminded them of relevant issues that had occurred which then went on to affect the scores given.

Section 2 was designed to produce a "map" in the form of a grid of adverse outcomes (geriatric syndromes and hospital-acquired complications) in all relevant clinical domains across the admission, so that the development of new adverse outcomes could be easily identified. In Section 2c, at each stage of the admission (at or immediately pre-admission, before transfer to the DOME ward, during the stay on the DOME ward, and at discharge), data is recorded about each adverse outcome. Each box within the "map" has drop down boxes in which options can be chosen according to the clinical state of the patient at each stage. These options obviously vary depending on the adverse outcome being assessed, but in general comprise options of increasing clinical severity, together with an option to record non-documentation. Each list of options was converted into a "scale of severity",

which later formed the values of corresponding variables in the SPSS database used for data analysis. Conditional formatting is used, so that as the reviewer enters data, each cell changes colour according to the score obtained.

Positive scores (indicating that the patient had some degree of the geriatric syndrome in question) make the cells turn yellow, cells with zero scores (indicating that the patient had no degree of the adverse outcome in question) become green, and where the item was not documented, a purple colour is shown. If a yellow (positive) score is obtained at any point in any of the geriatric syndromes, the relevant process measures in Section 3 are automatically highlighted and the reviewer prompted to fill them in. This mechanism was designed to reduce the time spent completing the tool, by focusing the reviewers' attention only on the areas of relevance for the patient in question. It also minimises the possibility of missing data, as blank cells are strikingly obvious to the reviewer. Two completed examples of the tool are shown in the Appendix 8 to illustrate this.

In Section 2b, information about "complexity markers" which were identified during the exploratory work in the first part of this thesis is recorded in the same way, in a grid form, across the admission. These complexity markers - cognitive impairment, hearing and visual impairment, dysphagia, communication difficulties and being in receipt of end of life care were identified in the interview study (Chapter 4) in particular as being patient attributes which were felt to be contribute greatly to safety and quality concerns in older people. Once again, conditional formatting is used to highlight areas of relevance for individual patients, so that if the complexity marker was an issue in the case being reviewed, the reviewer is prompted to go on and complete the process of care measures for the domain in question.

Section 3 of the tool contains process measures, where the reviewer is asked to rate certain aspects of care relating to the management of specific adverse outcomes and

complexity markers, not applicable in all cases. Section 3a consists of a series of process measures for each of these for the portion of the admission before transfer to the DOME ward and Section 3b contains equivalent process measures for the second portion of the admission, during the time on the DOME ward. Rating of these process measures is done using a six point Likert Scale: 0=Not applicable, 1=Not done, 2=Partially done, 3=About half done, 4=Almost completely done, 5=Completely done.

In Section 4 the reviewer is asked to give assessments of the process measures relating to generic issues applicable in all cases; medication management, multidisciplinary team working, communication and handover, communication with the patient and their family, access to services and equipment, decision making and discharge planning. The same 6 point Likert scale is used for medication management as for the previous process measures, but for multidisciplinary team working, access to services/equipment, decision making and discharge planning it was felt that a 4 point scale was more appropriate (0=Not applicable, 1=No, 2=Sometimes, 3=Yes). This was because these aspects of care are assessed in all cases, and require a great deal of judgement on the part of the reviewer; it was felt that if the reviewer was forced to choose between fewer options scoring variability would be reduced. For all process measures any items scoring 0 “Not applicable” were removed from data analysis so as not to negatively influence mean scores.

6.3. Testing the Long tool – methods.

6.3.1. Design and case selection.

A retrospective case record review was carried out using the Long tool in a hundred randomly selected, completed admissions (to discharge or death) from three different Department of Medicine for the Elderly wards in one London teaching hospital. Case records were obtained from the Clinical Coding department shortly after completion of the admission. As with the study presented in Chapter 5, the "ward based" system in operation in the hospital meant that by definition it was anticipated that patients cared for on these wards (and therefore included in this study) would be the most complex, frail older medical patients in the hospital.

6.3.2. Case record review procedure.

One Long tool form was completed for each case, electronically. All notes, made by medical, nursing and allied health professionals, together with drug charts were read as the tool was completed. In the pilot phase it was found that the tool was easiest to complete if the reading of the case record was broken down into sections as shown in Figure 6.2. below (this guidance was also included in the accompanying manual):

Figure 6.2. Procedure for optimal completion of the Long tool.

In order to complete the Long tool optimally the reviewer is advised to follow these steps:

1. Complete section 1 (demographic details) - usually obtainable from information on the discharge summary.
2. Read all notes (medical, nursing and AHP) up to and including PTWR and complete the first column in sections 2a, b, c.
3. Read all notes (medical, nursing and AHP) from after PTWR to transfer to DOME ward and complete the second column in sections 2a, b and c.
4. Complete Section 3a based on everything you have read so far.
5. Read remainder of notes and complete third and fourth columns in 2a, b and c.
6. Complete Section 3b based on everything you have read since transfer to the DOME ward.
7. Look at all drug charts and complete Section 4, together with information from all the notes you have read.
8. Complete Section 5 from all of the notes you have read.
9. Complete case summary (at top of the form)

In order to test inter-rater reliability of the tool, a random sample of ten of the hundred cases were also assessed by a second reviewer who had a similar degree of clinical experience to the principal reviewer (a Specialist Registrar in Geriatric/General Internal Medicine) from the same department.

6.3.3. Data entry, measures and analysis.

All data were analysed using PASW Statistics 18 (SPSS Inc.). The Long tool generates 297 raw variables for each case, the data for which must be entered manually into an SPSS database.

1) Demographics and presence of complexity markers

Descriptive analyses were carried out to determine the demographic characteristics of the sample. The Long tool allows us to collect detailed information about the documented

incidence of the following complexity markers that were identified in the earlier studies in the thesis as being particularly relevant to safety and quality outcomes in this group of patients:

a) Cognitive impairment

b) Swallowing problems

c) Problems with mouthcare and oral hygiene

d) Visual impairment

e) Hearing impairment

f) Speech and communication difficulties

g) Being in receipt of end of life care

The severity and number of complexity markers documented in each case were examined at the four different stages of the admission (at admission, pre-DOME, on the DOME ward and at discharge), then collated for the sample as a whole.

2) New adverse outcomes.

The next part of the Long Tool was designed to allow us to detect whether the following new adverse outcomes (geriatric syndromes or other hospital acquired complications) had occurred during the admission:

- Functional decline
- Decline in mobility
- New delirium
- New or worse depression

- New faecal incontinence
- New or worse constipation
- New urinary incontinence
- Falls during the admission
- Nutritional decline
- New problems with fluid balance and sodium
- New pressure sores
- Hospital-acquired infection
- New venous thrombo-embolic disease

Data relating to the presence of each adverse outcome were examined for each stage of the admission in each case, then collated for the whole sample. Distinction was made between prevalence (present on admission) and incidence (developing newly during the admission) for these adverse outcomes by performing cross-tabulation of the status for each at different stages of the admission, then assessing the change in scores across the admission. For example, in order to achieve this with data gathered relating to functional and mobility decline, cross tabulations were made between functional ability pre-admission and at discharge, place of care pre-admission and at discharge, changes in functional ability during the hospital stay itself (recorded as Barthel score (Mahoney & Barthel, 1965), and mobility pre-admission and at discharge.

In order to ascertain the prevalence and incidence of the other adverse outcomes, the detailed data provided by the Long tool were combined to produce graphs or "maps" of the

documented incidence of each one across the admission. The clinical narratives from each case were read and checked against the map produced by the Long tool to ensure consistency.

3) Process Measures

The mean and range scores for each of the following groups of process measures were calculated:

1) Management of adverse outcomes

2) Management of complexity markers

3) Management of acute medical problems

4) Medication management

5) Management of other generic issues:

- Multi-disciplinary team working, communication and handover
- Communication with the patient and their family
- Access to services and equipment
- Decision making
- Discharge planning

Where any case scored "0 - not applicable" for any process measure, cases were removed from the analysis for that process measure only, so that they would not negatively influence mean scores. In order to demonstrate the potential clinical usefulness of this information, the interquartile range (the limits of which the middle 50% of scores fall) was calculated for each group so that outlying items (process measures done particularly poorly, below the lower quartile, or particularly well, above the upper quartile) could be identified.

4. Relationships between the number of new adverse outcomes and process measure scores.

The relationships between the number of new adverse outcomes and scores for each of the process measure groups were investigated using Spearman's rho correlation tests. This test was used because several groups of data were found to be not normally distributed even after transformations, when assessed using normal Q-Q plots and Kolmogorov-Smirnov tests (number of new adverse outcomes: ($D(100) = 0.223$, $p<0.001$), process scores for the management of complexity markers: ($D(66) = 0.117$, $p<0.05$) and process scores for medication management: ($D(100) = 0.097$, $p<0.05$)). In addition, correlations were sought for between scores for each of the process measure groups themselves.

4) Relationships between patient characteristics and the number of new adverse outcomes and process measure scores.

One-way tests of "analysis of variance" (ANOVA's), independent sample *t* tests and correlations were then carried out in order to investigate how various patient characteristics (including age, gender, length of stay and the presence of complexity markers) related to the number of new adverse outcomes, and each group of process measure scores. The statistical test used to assess each relationship depended on the number of groups being compared and the parametricity of each type of data.

5) Inter-rater reliability.

Finally, assessment of inter-rater reliability was carried out using Cohen's Kappa test for identification of each of the new adverse outcomes, and correlation tests for each group of process measure scores as detected by the two reviewers.

6.4. Results.

6.4.1. Demographic characteristics of the sample.

Of the hundred patients included in this study, 55 were female and 45 male. The mean age at admission was 82.7 years (SD 7.132, range 66 – 97 years). The mean total length of stay was 26.56 days (SD 24.234, range 3 – 152 days). The mean length of stay before transfer to the DOME ward was 5.04 days (SD 5.908, range 0 - 38 days,) and the mean length of stay on the DOME ward was 21.55 days (SD 23.177, range 1 – 142 days). Ten patients died and ninety survived to discharge.

6.4.2. Complexity markers.

The graphs given in Appendix 9 demonstrate the level of detail that can be acquired using the Long tool regarding the documented incidence of these characteristics across the admission. Table 6.2. shows a summary of the overall incidence of each of these complexity markers in this sample, together with a series of observations for each regarding various aspects of ease of obtaining data for these using retrospective case record review.

Table 6.2. Summary of documented incidence of complexity markers and observations regarding their detection using case record review.

Complexity marker	Overall incidence	Trend in documented assessment throughout the admission	Ease of identification from case records	Non-documentation indicates that it was likely not to have been present
Cognitive impairment	65% definite, 13% probable	Increases throughout admission	Not easily identified, becomes clearer as admission progresses	No
Swallowing problems	18%	Increases throughout admission	Not easily identified, becomes clearer as admission progresses	No
Problems with mouthcare and oral hygiene	6%	Increases throughout admission	Not easily identified, becomes clearer as admission progresses	No
Visual impairment	15% (8% present but has no documented impact on care, 7% present and has impact on care e.g. assessment, treatment, falls risk)	Low incidence throughout admission (probable vast under-estimation)	Consistently poor throughout admission	No
Hearing impairment	15% (7% present but has no documented impact on care, 8% present and has impact on care e.g. assessment, treatment)	Low incidence throughout admission (probable vast under-estimation)	Consistently poor throughout admission	No
Speech and communication problems	21% (7% language barrier, 6% difficulty due to hearing impairment, 2% dysphasia, 6% non-communicative (delirium or dementia))	Low incidence throughout admission (probable correct estimation)	Easily identified	Yes
In receipt of end of life care	11%	Low incidence, increases throughout admission	Easily identified	Yes

6.4.3. New adverse outcomes.

These are the geriatric syndromes and hospital-acquired complications which were identified in earlier chapters as being particularly important safety and quality outcome measures in frail older people, as their presence has clear clinical implications in terms of morbidity, mortality and for ongoing care requirements. As argued previously, their occurrence during the hospital stay should be considered to be adverse events in this population.

As with the complexity markers, the Long tool is able to give us a great deal of detailed information about the documented occurrence of these adverse outcomes across the admission. Because these problems are often present at admission, the key aim here was to be able to use the Long tool to correctly differentiate their new or worsening (incident) occurrence during the admission from pre-existent (prevalent) occurrence. The detailed cross-tabulations and graphs that were created from these data are provided in Appendix 10.

A summary of findings regarding the incidence and prevalence of each of the adverse outcomes is shown in Table 6.3..

Table 6.3. Summary of the prevalence and incidence of adverse outcomes detected by the Long tool.

Adverse Outcome	Prevalence at admission, % (n/100)		Incidence / new occurrences, % (n)					
			All patients (n = 100)		In those who died (n = 10)		In those who survived to discharge (n = 90)	
Functional decline	NA		31.8%†		100%	(10)	20.9%†	
Decline in mobility	NA		34.4%‡		100%	(10)	26.7%‡	
Delirium	29%	(29)	26%	(26)	60%	(6)	22.2%	(20)
Depression and anxiety	31%	(31)	10%	(10)	20%	(2)	8.9%	(8)
Faecal incontinence	13%	(13)	4%	(4)	0%	(0)	4.4%	(4)
Urinary incontinence	42%	(42)	6%	(6)	0%	(0)	6.7%	(6)
Constipation	18%	(18)	24%	(24)	40%	(4)	22.2%	(20)
Falls	51%¶	(51)	14%	(14)	0%	(0)	12.6%	(14)
Nutritional decline	12%	(12)	6%	(6)	30%	(3)	3.3%	(3)
Problems with fluids/electrolytes	15%	(15)	9%	(9)	50 %	(5)	4.4%	(4)
Pressure sores	5%	(5)	6%	(6)	20%	(2)	4.4%	(4)
Hospital acquired infection (confirmed)	4%§	(4)	18%	(18)	50%	(5)	14.4%	(13)
Hospital acquired infection (suspected)	0%	(0)	10%	(10)	20%	(2)	8.9%	(8)
Venous thrombo-embolic disease	4%	(4)	1%	(1)	0	(0)	1.1%	(1)

† Mean of a) the number of patients with greater care needs on discharge than pre-admission (all patients 33%, those who survived 25.6%) and b) the number of patients with worse functional ability at discharge than at admission (all patients 30.5%, those who survived 21.1%).

‡ The number of patients with worse mobility on discharge than pre-admission.

¶ 38% of which were the primary cause of admission.

§ These patients were admitted with presumed HAIs from admissions within the previous two weeks.

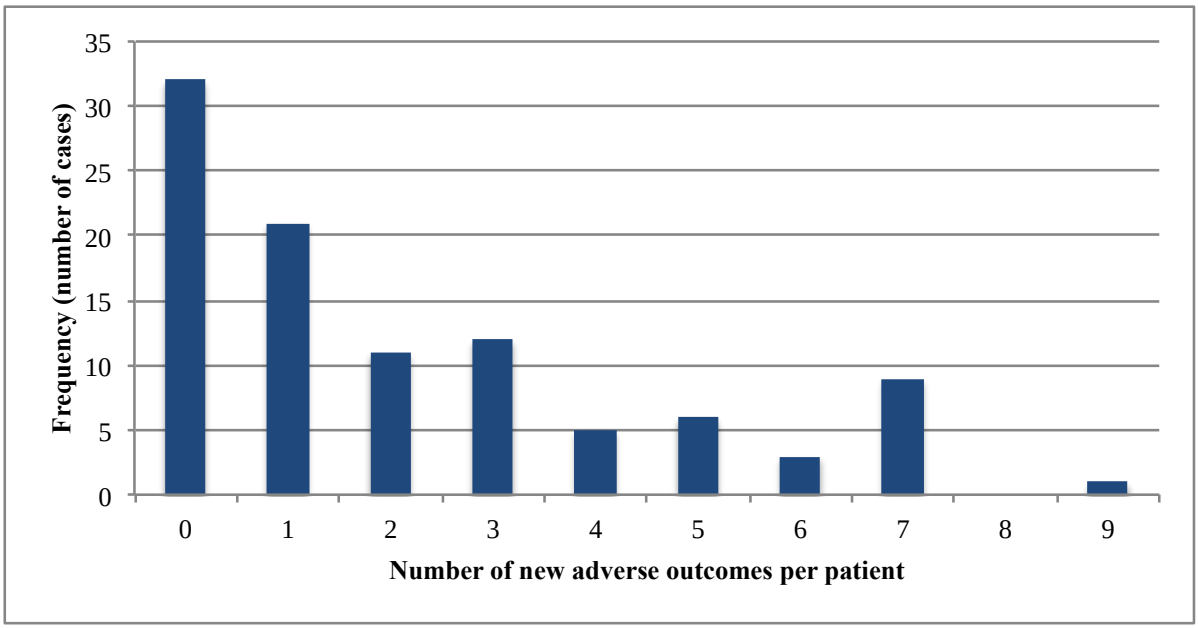
Table 6.4. shows a comparison of these results with what is available in the literature.

Table 6.4. Comparison of the incidence of new adverse outcomes detected by the Long tool with that in other published studies.

Adverse outcome	Incidence as detected by the Long tool (total)	Incidence in other studies
Functional decline	31.76% (mean of A+B)	30% - 60% (Hoogerduijn et al., 2007)
Decline in mobility	34.38%	No direct estimates, related to function
Delirium	26% (26/100)	14-56% (Inouye, 1994)
Depression and anxiety	10% (10/100)	26% (Givens et al., 2009)
Faecal incontinence	4% (4/100)	No comparable data found
Urinary incontinence	6% (6/100)	No comparable data found
Constipation	24% (24/100)	No comparable data found
Falls	14% (14/100)	3 – 13/1000 bed days (patients of all ages)(Oliver et al., 2007)
Nutritional decline	6% (6/100)	No comparable data found
Problems with fluids/electrolytes	9% (9/100)	No comparable data found
Pressure sores	6% (6/100)	10% (Perneger et al., 1998)
Hospital acquired infection	18% (plus 10 suspected)	4.5% (Klevens et al., 2007)(all hospital admissions)
Venous thrombo-embolic disease	1%	17% (General medical patients)

Figure 6.3. demonstrates that a significant proportion of patients (47%) developed 2 or more new adverse outcomes during the hospital admission, whilst 32% developed none and 21% developed one. The total number of new adverse outcomes in the 100 cases was 219, giving a mean value of 2.19 per case (SD 2.364, range 0 - 9).

Figure 6.3. Multiple occurrences of new adverse outcomes within the sample.



6.4.4. Process Measures – how well was care delivered?

As described previously, the Long tool uses a dual approach of outcome and process measures, in order to give an overall assessment of safety and quality. In order to fill in the process measure sections of the tool, the reviewer is asked to rate specific aspects of care, using six or four point Likert scales outlined earlier.

Full tables with mean scores for each process measure are given in Appendix 11. In order to demonstrate the potential clinical applicability of these scores, for each group of process measures, individual items scoring below (done poorly) and above (done well) the interquartile range were identified. Individual process measures with mean scores below and above the interquartile range within the complexity marker- and adverse outcome-related groups are shown in Table 6.5. for the first part of the admission, and Table 6.6. for the second part of the admission, (after transfer to the DOME ward). In the same way, outlying items for the groups of generic process measures are shown in Table 6.7. .

Table 6.5. Process measures done particularly well or poorly within complexity marker and outcome-related groups for the first, pre-DOME part of the admission.

Group of process measures	Lowest scoring items, below the interquartile range	Mean score	Highest scoring items, above the interquartile range	Mean score
Management of complexity markers (mean score 3.228)	Enquiry about usual swallow, dentition and mouth care made on admission and any problems identified early (Swallowing)	1.65	Appropriate discussion/explanation of end of life care issues with relatives +/- patient? (End of life care)	5.00
	Strategies used to maximise communication (e.g. wax removal, written communication, interpreter etc.) (Communication)	1.96	Avoidance of unnecessary investigations or treatment? (End of life care)	4.50
Management of adverse outcomes (mean score 2.717)	Prompt and correct recognition, with no mislabelling (Delirium)	1.97	Early ascertainment of baseline function, mobility and care needs (Functional and mobility decline)	3.72
	Compassionate care, including environmental considerations (e.g. delirium room, lighting etc.) (Delirium)	1.37	Seen by OT/PT as soon as possible (Functional and mobility decline)	4.24
	Possible effects on presentation and management of other problems considered (Depression)	1.90	Problems with sodium and hydration identified on admission (Fluid balance and sodium)	3.42
	Appropriate initial management and investigations (e.g. PR, MSU)? (Continence)	1.95	Appropriate management - e.g. catheter changed, appropriate AB's used (Hospital acquired infection)	4.10
	Proactive management (ie assessment and regular toileting) rather than just containment? (Continence)	1.39	Consideration of C diff if diarrhoea or recent AB use (Hospital acquired infection)	4.33
	Risk assessment of falls made and acted upon (Falls)	1.809	Appropriate cultures/tests sent and results followed up (Hospital acquired infection)	3.33
	Referral to falls services made where appropriate (Falls)	1.72	Pressure areas examined where appropriate (Pressure areas)	3.36

	Treatment with bisphosphonates/calcium/vitamin D considered (Falls)	1.45	Consideration of VTE among diagnoses if appropriate (VTE)	4.0
	History obtained from community of recent management strategies and progress (Pressure sores)	1.75	Appropriate management of anticoagulation on admission (VTE)	4.17
	Considered as a source of sepsis if appropriate (Pressure sores)	1.67	Appropriate VTE prophylaxis started on admission (VTE)	4.00
Management of acute medical problems (mean score 3.519)	Early and effective geriatric specialist input, and advice followed	2.44	Investigations – appropriate (none unnecessary or missed), timely, indications clear	4.03
	Good planning and handover of result checking, patient review and actions to be taken	2.98	No evidence of discomfort or complications as a result of investigations or treatments	4.12

The following six point Likert scale was used to rate each process measure: 0=Not applicable, 1=Not done, 2=Partially done, 3=About half done, 4=Almost completely done, 5=Completely done.

Table 6.6. Process measures done particularly well or poorly within complexity marker and outcome-related groups for the second, DOME ward part of the admission.

Group of process measures	Lowest scoring items, below the interquartile range	Mean score	Highest scoring items, above the interquartile range	Mean score
Complexity markers (mean score 3.19)	If new diagnosis, discussed with pt/ family, investigations considered, follow up arranged? (Cognitive impairment)	1.78	Correct consistency of food identified, ordered and given to patient (Swallowing)	3.91
	Challenging behaviour not mislabeled as aggression or poor cooperation (Cognitive impairment)	2.26	Appropriate discussion/explanation with relatives +/- patient (End of Life care)	4.00
	Problems with oral hygiene, dentition, candida identified and treatments initiated (Swallowing)	1.78	Avoidance of unnecessary investigations or treatment (End of Life care)	4.14
Management of new adverse outcomes (mean score 2.986)	Prompt and correct recognition, with no mislabelling (Delirium)	1.95	Allowed/encouraged to use same strategies as at home (Functional and mobility decline)	4.36
	Compassionate care, including environmental considerations (e.g. lighting) (Delirium)	1.28	No delays in therapy assessments/treatments (Functional and mobility decline)	4.69
	Attempts made to find and correct underlying cause? (Delirium)	2.17	Nutrition risk score carried out (eg MUST) and acted upon (Nutrition)	4.06
	Continence assessment (history and examination) (Continence)	1.73	Patient weighed and any concerns acted upon (Nutrition)	3.81
	Appropriate investigations? (Continence)	1.7	Problems with sodium and hydration identified (Fluid balance)	4.38
	Proactive management rather than just containment? (Continence)	1.63	Pressure areas examined where appropriate (Pressure sores)	4.53
	Active promotion of continence - e.g. regular toileting, involvement of OT's (Continence)	1.96	Waterlow score done and acted upon (Pressure sores)	4.22
	Pre-emptive management - e.g. laxatives with opiates (Constipation)	2.23	Appropriate management - eg catheter changed, appropriate AB's used (Hospital acquired infection)	4.30
	Encouraged to drink and helped where necessary (Fluid balance and sodium)	1.75	Consideration of C difficile if risk factors and symptoms (Hospital acquired infection)	4.18
	History obtained from community of recent	1.8	Appropriate management of anticoagulation	5.00

	management strategies and progress (Pressure sores)		during ward stay and on discharge (VTE)	
Management of acute medical problems (mean scores 3.838)	Use of all available information e.g. observations, old results and notes	3.70	Management plans – appropriate and timely	4.0
	Good planning and handover of result checking, patient review and actions to be taken, including rescue plans and contingency planning	3.30	No evidence of discomfort or complications as a result of investigations or treatments	4.09

The following six point Likert scale was used to rate each of the process measures: 0=Not applicable, 1=Not done, 2=Partially done, 3=About half done, 4=Almost completely done, 5=Completely done.

Table 6.7. Outlying scores for generic process measures.

Group of process measures	Items below the interquartile range (lowest scores)	Mean score	Items above the interquartile range (highest scores)	Mean score
Medication management (mean score 3.833)[†]	Assessment and management of concordance issues (pre-admission and during admission)	1.71	Full DH within first 24 hours, including doses and allergies	4.37
	Good medication review where appropriate - no problems that could have been prevented by this	3.47	No adverse drug reactions	4.68
Other generic issues (mean score 2.551)[‡]	Appropriate and thorough handover between day team and out of hours team (doctors, nurses, therapists)?	2.26	Recommendations from specialists (including therapists and pharmacists) followed	2.89
	Reassurance if patient frightened or anxious.	2.19	Trouble-free transport around the hospital (eg for investigations)?	2.94
	Appropriate ceiling of care and DNAR decision making?	1.88	Good access to higher levels of care if needed?	2.83
	Adequate documentation of new problems and treatments to GP and community services	2.24	Good MDT discharge planning	2.86
	No unnecessary time in hospital	2.16	Appropriate use of MCA/DOL guidelines when making discharge decisions	2.82

[†]The following six point Likert scale was used to rate each of the process measures relating to medication management: 0=Not applicable, 1=Not done, 2=Partially done, 3=About half done, 4=Almost completely done, 5=Completely done.

[‡]The following four point Likert scale was used for other generic process of care issues: 0 = not applicable, 1= not done, 2 = sometimes, not always done, 3 = Done.

6.4.5. Relationships between the number of new adverse outcomes and process measure scores, and between scores for different groups of process measures.

Table 6.8. shows the results of correlation between the number of new adverse outcomes and scores for the different groups of process measures. Significant negative correlations were found between the number of new adverse outcomes and the following groups of process measure scores: management of acute medical problems, medication management, and the management of generic issues, (all *p*s < 0.05). This suggests that lower scores in these items were associated with higher numbers of new adverse outcomes during the admission.

A significant positive correlation was found between the number of new adverse outcomes and process measure scores relating to the management of complexity markers ($p = 0.001$). There was no significant correlation between the number of new adverse outcomes and process measure scores relating directly to the management of these adverse outcomes.

Between the groups of process measures themselves, significant positive correlations were found between scores for the management of acute medical problems, medication management and the management of generic issues (all *p*s ≤ 0.001). Scores for the management of adverse outcomes correlated significantly with scores for medication management and management of generic issues.

Table. 6.8. Correlation between the number of new adverse outcomes and scores for each of the process measure groups.

		Number of new adverse outcomes	Management of acute medical problems	Management of complexity markers	Management of adverse outcomes	Medication management	Management of generic issues
Number of new adverse outcomes	r_s	1.000	**-.184***	**.376****	.059	**-.229***	**-.191***
	p	.	**.033**	**.001**	.282	**.011**	**.028**
	n	100	100	66	99	100	100
Management of acute medical problems	r_s	**-.184***	1.000	-.036	.076	**.467****	**.456****
	p	**.033**	.	.386	.229	**.000**	**.000**
	n	100	100	66	99	100	100
Management of complexity markers	r_s	**.376****	-.036	1.000	.185	.061	.183
	p	**.001**	.386	.	.068	.313	.071
	n	66	66	66	66	66	66
Management of adverse outcomes	r_s	.059	.076	.185	1.000	**.203***	**.341****
	p	.282	.229	.068	.	**.022**	**.001**
	n	99	99	66	99	99	99
Medication management	r_s	**-.229***	**.467****	.061	**.203***	1.000	**.394****
	p	**.011**	**.000**	.313	**.022**	.	**.000**
	n	100	100	66	99	100	100
Management of generic issues	r_s	-.191	**.456****	.183	**.341****	**.394****	1.000
	p	.028	**.000**	.071	**.001**	**.000**	.
	n	100	100	66	99	100	100

r_s denotes Spearmans rho
*** p < 0.05**
**** p ≤ 0.001**

6.4.6. The number of new adverse outcomes and process measure scores in different groups of patients.

Analyses were carried out to explore the relationships between the number of new adverse outcomes and process measure scores and various patient characteristics. The statistical tests used varied according to the nature of the variable being assessed. Findings of these analyses are summarised in Table 6.9.

Table 6.9. Effect of patient characteristics on the number of new adverse outcomes and total process measure scores.

Characteristic	**Effect on the number of new adverse outcomes**			**Effect on total process measure score**		
	Trend	Statistical Test	Significance	Trend	Statistical test	Significance
Female Gender	→	$t(98) = -0.982$	p = 0.329	↓	**$t(98) = 2.354$**	**p = 0.021**
Increasing age	→	$F(2, 97) = 1.978$	p = 0.144	↓	**$F(2,97) = 4.039$**	**p = 0.021**
Died	↑	**$t(98) = 5.463$**	**p < 0.001**	→	$t(98) = -0.093$	p = 0.926
Increased total length of stay	↑	**$r_s = .703$**	**p < 0.001**	→	$r = -0.079$	p = 0.435
Definite or likely delirium at admission	→	$t(98) = -1.066$	p = 0.289	↓	**$t(98) = 2.989$**	**p = 0.004**
Evidence of chronic cognitive impairment	→	$t(97) = -0.461$	p = 0.646	↓	**$t(97) = 2.416$**	**p = 0.018**
Worse function pre-admission	→	$F(3,94) = 0.691$	p = 0.560	↓	**$F(3, 94) = 2.893$**	**p = 0.04**
Any dysphagia	↑	**$t(98) = -2.921$**	**p = 0.004**	→	$t(98) = 1.262$	p = 0.21
Higher level of care on discharge	↑	**$F(9,98) = 12.620$**	**p < 0.001**	→	$F(9,98) = 0.525$	p = 0.710

t: Independent samples t test. p is 2 tailed.
F: ANOVA
r_s: Spearmans rho correlation
r: Pearsons correlation

Groups of patients that had significantly higher numbers of new adverse outcomes than others included those who died, those with longer lengths of stay, those with dysphagia and those requiring greater levels of care on discharge from hospital. Process measure scores were significantly lower in the following groups: those who were female, those who were older, those with evidence of delirium at admission, those with evidence of dementia and those who were functionally less able before admission.

No significant differences were found in the number of adverse outcomes or process measure scores in those who required different levels of care pre-admission, or those who had sensory impairment or speech and communication difficulties.

6.4.7. Inter-rater reliability of the Long Tool.

Table 6.10. shows the results of Cohen's Kappa test for agreement between the two reviewers for the number of outcomes. This test was used here because the data were categorical rather than continuous. Very good agreement (Kappa > 0.8) was obtained for the detection of seven new adverse outcomes, good agreement (Kappa > 0.7) was obtained for two new adverse outcomes, and moderate agreement (Kappa > 0.6) was obtained for the remaining five new adverse outcomes (Peat, 2002). The same test was used to assess inter-rater agreement about the presence of the different complexity markers; here very good agreement was obtained in two complexity markers and moderate agreement in the remaining two.

Table 6.10. Inter-rater reliability for the detection of new adverse outcomes and complexity markers.

New adverse outcome	Kappa score	Level of agreement (Peat, 2002)
Functional decline		
A. Greater care needs on discharge than on admission	1.0	Very good
B. Worse functional ability on discharge than on admission	0.783	Good
Decline in mobility	1.0	Very good
Delirium	0.825	Very good
Depression and anxiety	0.615	Moderate
Faecal incontinence	0.608	Moderate
Urinary incontinence	0.661	Moderate
Constipation	0.643	Moderate
Falls	0.737	Good
Nutritional decline	0.615	Moderate
Problems with fluids/electrolytes	1.0	Very good
Pressure sores	1.0	Very good
Hospital acquired infection	0.808	Very good
Venous thrombo-embolic disease	1.0	Very good

Complexity Marker	Kappa score	Level of agreement (Peat, 2002)
Dysphagia	0.615	Moderate
Cognitive impairment	0.808	Very good
Sensory impairment	0.615	Moderate
End of life care	1.00	Very good

In order to assess the inter-rater reliability for the (parametric) data sets obtained for process measure scores, two tests were performed - Pearson's bivariate correlation, and assessment of the intracorrelation coefficient. As can be seen in Table 6.11, all types of process measures showed significant reliability in all of these tests, except process measures relating to medication management.

Table 6.11. Inter-rater reliability for process measures groups.

Process Measure group	**Pearson correlation**	**Intraclass correlation coefficient**
Management of acute medical problems	***r* = .55, p = 0.05**	**ICC = .545, df = 9, p = 0.041**
Management of adverse outcomes	***r* = .811, p = 0.002**	**ICC = .706, df = 9, p = 0.008**
Management of complexity markers	***r* = .973, p < 0.001**	**ICC = .971, df = 9, p < 0.001**
Medication management	*r* = .433, p = 0.106	ICC = .419, df = 9, p = 0.1
Management of generic issues	***r* = -803, p = 0.03**	**ICC = .682, df = 9, p = 0.01**

6.5. Discussion and conclusions.

6.5.1. Clinical significance of the findings of this Long tool review.

Before drawing conclusions from this data about the Long tool itself, I would like to comment on the interesting findings that this study yielded regarding the safety and quality of care provided to this particular group of older medical patients. Detailed information was garnered about the prevalence and incidence of adverse outcomes in this sample and the identification of process measures carried out particularly poorly or well point to clear areas for potential improvement initiatives within the hospital in question.

I have been able to show here that the number of new adverse outcomes increased as process measure scores decreased, signifying that worse care resulted in poor outcomes. This seems to confirm that the Donabedian model of care applies in these patients as much as any other group.

The fact that cases were removed from analyses for individual process measures where they scored "0, not applicable" is likely to explain some findings – for instance, the apparent significant positive correlation between the number of new adverse outcomes and process measure scores relating to the management of complexity markers is likely to appear because these process measures were only assessed for patients with the corresponding complexity markers who tend to have a higher number of new adverse outcomes. Similarly, the fact that no significant relationship was found between the number of new adverse outcomes and process measure scores relating directly to the management of these adverse outcomes was presumably because these process measures were only assessed in patients who had experienced the adverse outcomes.

It is interesting that there were significant positive relationships between the scores for several of the different groups of process measures, indicating that the performance seems

to be at the same level for these very different aspects of care. Further work could be carried out to assess common underlying factors which might explain this.

The data presented here confirms what one might expect, that more new adverse outcomes (geriatric syndromes and hospital acquired syndromes) occur in patients who die during the admission, and in those with longer hospital stays. Also, patients with higher care needs on discharge from hospital tend to have experienced more new adverse outcomes during their hospital stay – whether the adverse outcomes themselves result in higher care needs, or whether this is a reflection of overall frailty is difficult to assess, but again would warrant further work. The fact that the only complexity marker which was associated with an increased number of new adverse outcomes was dysphagia is also noteworthy, and may reflect the fact that dysphagia is a feature of very frail older people, and leads directly to adverse outcomes such as aspiration pneumonia.

In this study, care was poorer (as measured by all of the process measure groups) in patients who were female, had delirium on admission, had chronic cognitive impairment and were less functionally able pre-admission. Again, the underlying reason(s) for this are unclear and need further investigation, but these findings may be partially explained by the difficulties in effective communication and initial assessment of these patients that are often encountered, as described in previous chapters.

6.5.2. Strengths and limitations of the Long tool.

The Long tool was designed to provide a way of collecting relevant safety and quality data from detailed but comprehensive analysis of the wealth of information available in case records, in perhaps the most complex of all hospital inpatients. It uses all the information that is routinely recorded by the entire multidisciplinary team in order to distinguish between complexity markers, new adverse outcomes and process measures. In

other words it allows us to determine what happened to patients and how well care was delivered.

The way in which the tool is structured to produce a map of adverse outcomes across the admission means that we can accurately distinguish the prevalence (incidence at admission) from the incidence of new problems, and the tool allows us to focus on process measures that are applicable to these problems, as well as those that affect all patients. The use of a combination of process and outcome measures in this way has been previously suggested to be the best way of assessing quality and safety (Donabedian, 1980; Pronovost, et al., 2004).

Validity

The fact that all possible items from the exploratory work in Section 1 of the thesis (literature review, interview study and initial case record review) were used in the Long tool means that conceptually it has good face validity. It should have good content reliability, in that the measures that it uses really do reflect safety and quality of care in older medical patients. To assess this further it would be necessary to ask a separate group of experts to rate each item in terms of importance and to identify any areas which were not included but perhaps should have been.

Construct validity for the tool can be assessed by comparing the results of the study with those in the published literature. This is only possible for the adverse outcomes, as there is nothing comparable to the wide variety of process measures used. Table 6.4. (p. 194) shows such a comparison, but this is difficult to interpret as the results of other studies vary widely depending on the methods used and the populations studied, and for many items no comparable data can be found, but on the whole it seems that the Long tool generally has reasonable construct validity.

Reliability

The data presented in Tables 6.10. and 6.11. show that inter-rater reliability for the Long tool appears to be good, for all components except medication management process measure scores. It is not clear why the two reviewers did not agree well here - the second reviewer tended to give very high scores for these items, suggesting perhaps that they omitted to use information available on drug charts, instead relying only on problems only recorded in the medical notes. Other studies have found that inter-rater reliability for case note review tends to be less good for process than outcome measures (Lilford et al., 2007). Test-retest reliability was not carried out (i.e. the same reviewer completing the Long Tool in the same cases after a period of time), but this would have added another measure of reliability to the tool.

Limitations.

Retrospective case record review in any form has particular limitations, perhaps the most important being that we can only assess what is documented in the notes, and we do not know how this actually relates to the quality of care that is delivered. Indeed, it might be the case that where problems with process of care are documented, perhaps leading to lower scores in the tool, the care is better than in hospitals where these problems are not addressed at all. A problem in previous retrospective case record reviews has been hindsight bias, described earlier in the thesis, particularly when making judgements about preventability of adverse events. It is hoped that when using the Long tool this is less of a problem, because the questions that are being asked are more specific.

The Long tool reviewer needs to have a good overall understanding of local care processes and of the terminology and practice of geriatric medicine in order to provide an judgement for the process measures (although it should be more easy for a less well trained

reviewer to assess the presence of new adverse outcomes). This may well limit the practical use of the tool. Another limitation in terms of practical usability of the tool is that it takes a long time to complete (during this study it took between an hour to several hours per case, depending on the length of the clinical records for the admission). Also, in its current form, data from the tool has to be entered manually into a statistical database, which is time consuming and may be prone to error. These were the main reasons for going on to develop a shorter version of the tool, COMPACT, described in the next chapter.

The sample selection used means that certain patients were automatically excluded from the study. Because all the included patients died or were discharged form DOME wards, we may have missed those who were transferred to other wards before discharge, such as those requiring higher levels of care in ITU, for example. These would have been an interesting group to have studied, because they may have developed more complications during their stay than other patients. Of the case records obtained for inclusion in this study, one set was excluded, because the majority of nursing notes were missing - the patient in question had a very long length of stay, which may have been why not all of the notes could be included in the volume of notes available for review. It is obviously an undesirable characteristic of the study design if those with very long lengths of stay have to be excluded because of a lack of available information.

Observations were made during this study about the variability of usefulness of documentation when trying to assess the true incidence of complexity markers using retrospective case record review, as demonstrated in Table 6.2.. This may have useful implications for the design of future studies.

Another problem observed during this study was that documentation of routinely recorded information varied hugely in terms of accuracy and completeness. There was a sense that occasionally some types of information were being recorded “for the sake of it”

rather than with any desire to accurately reflect the state of the patient. There was an additional concern about the possibility that documentation early on in the admission, based on assumptions, may have affected the data collected by the Long tool. For example, it is possible to envisage a situation where cognition or continence would assumed to be normal on admission and documented so, only to be properly assessed for the first time in the admission when the patients were transferred to the DOME wards. It is possible that this may have led to an over-estimation of new problems arising during the admission.

6.5.3. Conclusions and next steps

In this chapter, I have described the development and testing of a new approach to assessing quality and safety in the care of older medical patients, using a novel retrospective case record review tool which uses a combination of outcome and process measures felt to be particularly relevant to this patient group.

It is important to stress that although the tool was tested in a sample of patients from one hospital, the purpose of this work was not to assess quality of care in that hospital in particular, rather to test the tool itself.

Data has been presented about characteristics of the sample in terms of demographics and complexity, the incidence of adverse outcomes, including the geriatric syndromes, and information about a wide range of process measures, with identification of outlying issues. I have been able to show that the number of adverse outcomes correlates well with lower scores in the groups of process measures used. The tool allows the identification of particular groups of patients who are more at risk of developing new adverse outcomes during their hospital stay than others. In addition, I have been able to show that the tool has good inter-rater reliability.

The next steps were to produce and test a more practically usable version of the Long tool, described in the next chapter.

Chapter 7. Development and testing of COMPACT (Care of Older Medical Patients Abbreviated Case record review Tool).

7.1. Introduction and aims.

The Long tool described in Chapter 6 was designed to be a reliable and valid way of measuring safety and quality of care in older medical inpatients using all of the information available to us in case record review. One of the strengths of the tool is its comprehensiveness - in that it assembles data pertaining to all of the complexity markers, new adverse outcomes and process measures that were identified in earlier chapters to be important for this group of patients.

However, by its very nature, the tool takes a long time for the reviewer to complete and, as data from the tool must be entered manually into a database, this is also time consuming and may be susceptible to error. If the tool were to be used on a larger scale than in the work presented in this thesis, these would be major drawbacks.

Another major limitation of the work presented in Chapter 6 is that data were only collected from one hospital, so the generalisability of the findings is uncertain.

The aims of this study were:

1. To determine whether it is possible to create a shorter version of the Long tool, in a form which is more user friendly but which retains its reliability (including inter-rater reliability) and usefulness as a measure of safety and quality.

2. To explore the feasibility of using this shorter version in different hospitals.

It was hoped that the shorter version of the tool could then be used as a measure of quality improvement initiatives, investigated in Chapter 9.

The acronym COMPACT was chosen for the tool as both definitions of the word fit with these aims - relative brevity and efforts to help us uphold a promise to provide good care for older patients.

Definitions of "COMPACT" (from Chambers English Dictionary):

compact[1] */kəm-pakt′/*
adj closely placed or fitted together; tightly grouped, not spread out; (of a person) smallish; close; brief; (of a car) medium-sized and economical (*N Am*); composed or made up of (with *of*).

compact[2] */kom′pakt/*
n a mutual bargain or agreement; a league, treaty or union.
adj /kom-pakt′/ united (eg in a league).
[L *compactum*, from *compacīscī*, from *com-* with *pacīscī* to bargain]

7.2. Development of the Care of Older Medical Patients Abbreviated Case record review Tool (COMPACT) and assessment of correlation between COMPACT and the Long tool.

7.2.1. Introduction.

When designing COMPACT, it was felt important that its overall structure was identical to that of the Long tool, thus yielding useful data about complexity markers, new adverse outcomes, and process measures. However, in order to produce a tool which requires significantly less time for the reviewer to complete, yet which retains the principles and features of the Long tool, it was judged necessary to select about half of the items in the Long tool for inclusion in COMPACT.

There are clearly various ways of doing this - it was decided to choose a subset of the original measures in the Long tool based on a criterion-led scoring system.

7.2.2. Procedure for the development of COMPACT.

The following steps were taken to produce COMPACT:

1. It was decided to take three complexity markers, four new adverse outcomes, and four groups of generic process of care issues from the Long tool to include in COMPACT. This would allow us retain about half of the content of the Long tool, with the aim of reducing the time taken to complete the tool by half.

2. In order to decide which specific measures would be included in COMPACT, five inclusion criteria were developed with the overall aims of the tool in mind. These are shown in Table 7.1. Each group of items from the Long tool was subjected to a scoring system based on these five criteria, as shown in Table 7.2.. The highest scoring four new adverse outcomes (functional decline, mobility decline, delirium and urinary incontinence), three complexity markers (cognitive impairment, speech and communication and end of life care), and four groups of process measures (management of acute medical problems, medication management, decision making and discharge planning) were chosen for inclusion in COMPACT. Process measures applicable for each of the new adverse outcomes (but not prioritised on their own merits) were also included.

3. COMPACT was made by simply taking each applicable section from the Long tool, and copying them (including the same drop-down options) into a .pdf document, created using Adobe Acrobat Pro (Adobe Systems Inc.). This programme allows the creation of forms which can be completed by reviewers remotely and electronically, with easy compilation of results into a .pdf database. This database can be exported to the .csv file format, then into .xls files which can be directly imported into SPSS, thus avoiding perilous manual data entry.

4. In order to check that COMPACT is representative of the Long tool, a COMPACT dataset was made from the data collected for the 100 cases examined with the Long tool presented in Chapter 6, (Site 1 - a London Teaching hospital), by removing items from the Long tool database that were not included in COMPACT. This was then compared with the original Long tool database by calculating correlation coefficients between the scores produced with COMPACT and those produced with the Long tool.

Table 7.1. The five criteria used to select items from the Long tool for inclusion in COMPACT.

Criterion	Explanation/rationale
1. Clinical Importance (for affected patients).	Included items should be clinically important and relevant, in other words address common clinical problems which if scored poorly result in adverse outcomes such as mortality, increased care requirements such as institutionalisation, length of stay, reduced quality of life and non-reversibility.
2. Incidence/relevance to all older medical inpatients.	Items must occur frequently enough that a relatively small random sample of case notes will be most likely to give a fair reflection of what is actually happening to the larger population.
3. Wide range of underlying safety and quality themes.	They must pertain to issues involving a wide range of underlying safety and quality themes such as individual errors or omissions, team working and communication, systems failures and basic care and compassion.
4. Multidisciplinary nature.	They must contain measures which reflect a wide range of multi-disciplinary aspects of the care of an older person (e.g. not just nursing or medical issues) - with many team members having responsibility for detection, reporting and management of the problem.
5. Ease of detection from case records.	They must be relatively easy to detect from case records (to reduce time taken and to encourage completion), both when done well and when done poorly.

Table 7.2. Criterion-based scores which were used for selecting items from the Long tool to be included in COMPACT.

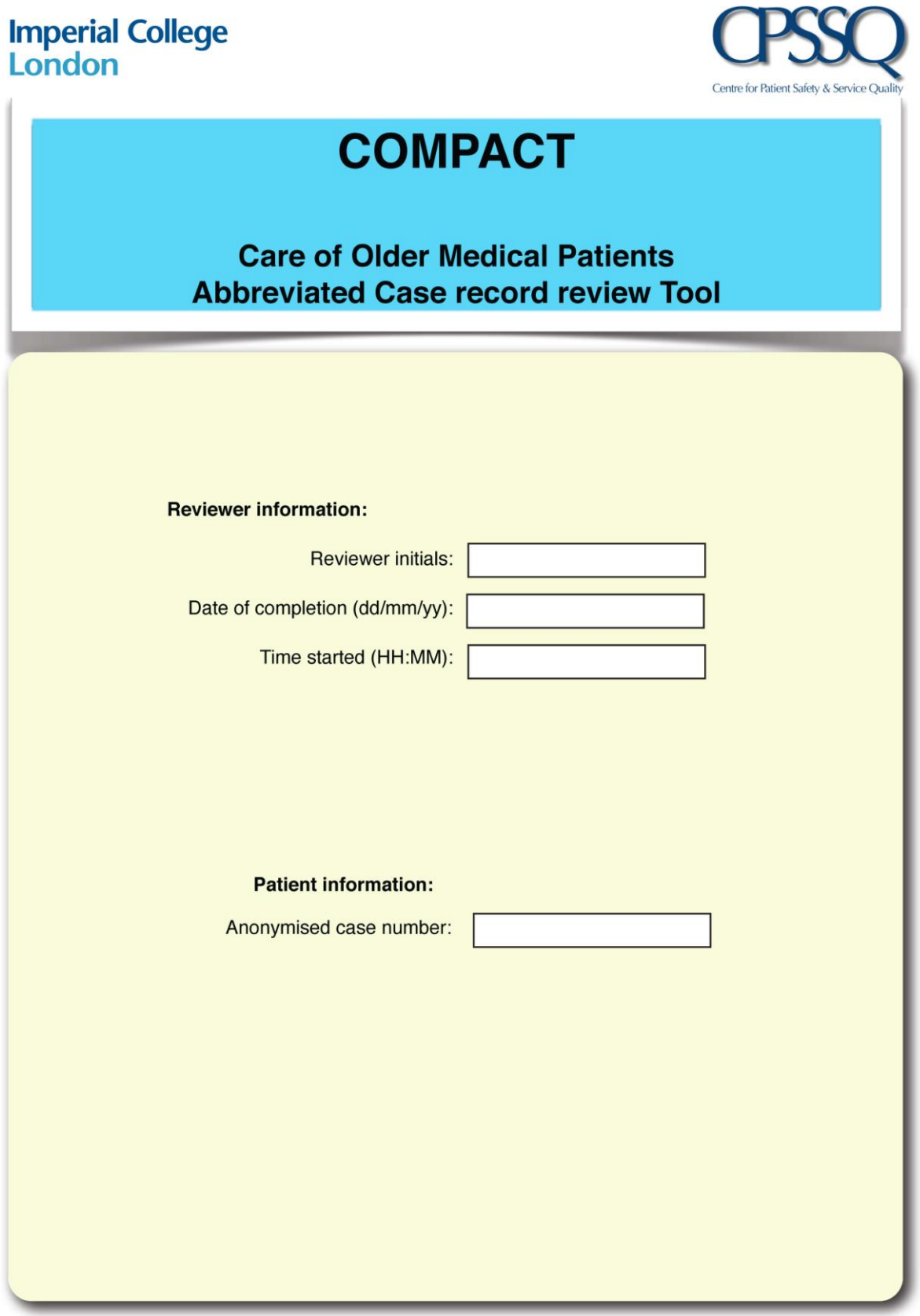
(Shaded items were selected for inclusion).

	Items from the Long tool	Criterion 1. Clinical Importance (/10)	Criterion 2. Incidence, relevance to older medical patients (/10)	Criterion 3. Variety of underlying S&Q themes (/10)	Criterion 4. Multi-disciplinary nature (/10)	Criterion 5. Ease of detection from notes (/10)	Total (/50)
Geriatric / clinical syndromes	Mobility	10	3.4	10	10	8	41.4
	Functional impairment	10	3.2	10	10	7	40.2
	Delirium	10	2.6	10	8	8	38.6
	Urinary incontinence	10	0.6	10	10	8	38.6
	Falls	10	1.4	10	8	8	37.4
	Faecal incontinence	10	1.3	9	8	8	36.3
	HAI	10	1.8	8	7	8	34.8
	Under-nutrition	10	0.6	9	8	7	34.6
	Pressure sores	10	0.6	9	7	8	34.6
	Depression and anxiety	8	1.0	8	8	8	33
	Constipation/bowel care	8	1.8	8	7	8	32.8
	VTE	9	0.1	8	6	7	30.1
	Fluid balance and sodium	8	0.9	8	7	5	28.9
Frailty markers	Speech/communication	10	2	8	10	8	38
	End of life care	10	1.0	10	9	8	38
	Cognitive impairment	9	6.5	8	6	8	37.5
	Swallowing	10	1.8	8	9	8	36.8
	Visual impairment	9	1.5	6	7	6	29.5
	Hearing impairment	9	1.5	6	7	7	29.5
Generic process of care issues	Medication management	10	10	10	8	8	46
	Management of acute medical problems	10	10	10	6	9	45
	Decision making	10	10	8	10	7	45
	Discharge planning	10	10	8	10	7	45
	Communication with pt. and family	10	10	5	10	7	42
	MDT working	8	8	6	10	6	38
	Services & equipment	8	8	7	8	7	38

7.2.3. The final version of COMPACT.

The final version of COMPACT is shown over the next four pages in Figure 7.2. There are 134 variables in a COMPACT database (compared to 279 in a Long tool database), per case.

Figure 7.1. COMPACT.



1. Pre-or at admission:

Read all notes (medical, nursing, therapy, pharmacy) from admission up to and including the Post Take Ward Round:

Functional ability:
Mobility:
Cognition:
Delirium:
Urinary continence:
Management of urinary continence:
Speech and communication:
End of Life Care:

2. During the first part of the admission:

Read all notes (medical, nursing, therapy, pharmacy) from the Post Take Ward Round until admission to the care of the elderly ward:

Ability to self care on the ward:
Mobility:
Not documented
Delirium:
Urinary continence:
Management of urinary continence:
Speech and communication:
End of Life Care

Management of acute problems, geriatric syndromes and frailty indicators during the first part of the admission:

Use all of the notes you have read so far (from admission to hospital until transfer to the care of the elderly ward) to rate the following aspects of care:

0- Not applicable or can't tell.
1- Not done or not documented.
2- Partially achieved.
3- Almost fully achieved.
4- Almost completely achieved.
5- Completely achieved.

		0	1	2	3	4	5
Management of Acute Problems	Early and effective specialist geriatric input, and advice followed						
	Thorough history and examination - no relevant areas missing						
	All efforts made to obtain relevant information from all sources e.g. old notes, community, relatives						
	Diagnoses - none missed or incorrect						
	Investigations - appropriate (none unnecessary or missed) and timely						
	Management plans - appropriate (none unnecessary or missed) and timely						
	Good planning and handover of result checking, patient review and actions to be taken						
Functional impairment	Early ascertainment of baseline (medical, functional, mobility)						
	Encouraged to sit out/self care early						
Urinary continence	Enquiry about usual continence made at admission						
	Appropriate initial management and investigations for urinary incontinence (e.g. PR, MSU)?						
	Proactive management of continence (i.e. assessment and regular toileting) rather than just containment?						
	If catheterised, good indication documented, plans for early removal						
Delirium	Prompt and correct recognition, with no mislabelling						
	Compassionate care, including environmental considerations (e.g. delirium room, lighting etc)						
	Attempts made to find and correct underlying cause?						
	Cautious management e.g. with sedation						
Cognitive impairment	Acknowledged on admission						
	Challenging behaviour not mislabelled as aggression or poor cooperation						
Speech and communication	Strategies used to minimise any problems and maximise communication (e.g. wax removal, written communication, interpreter etc)						
End of Life Care	Appropriate DNAR and level of care decisions						
	Appropriate involvement of other professionals e.g. ITU/palliative care						
	Appropriate discussion/explanation with relatives +/- patient?						
	Avoidance of unnecessary investigations or treatment?						

3. During stay on care of the elderly ward: *Read all notes (medical, nursing, therapy, pharmacy) from transfer to ward until discharge*	4. At discharge:
Ability to self care on the ward:	Functional ability:
Mobility:	Mobility:
Cognition:	Cognition:
Delirium:	Delirium:
Urinary continence:	Urinary continence:
Management of urinary continence	Speech and communication:
Speech and communication:	End of Life Care:
End of Life Care:	

Management of acute problems, geriatric syndromes and frailty indicators during stay on the care of the elderly ward:

Use all of the notes during the time spent on the care of the elderly ward to rate the following aspects of care:

0– Not applicable or can't tell.
1– Not done or not documented.
2– Partially achieved.
3– Almost fully achieved.
4– Almost completely achieved.
5– Completely achieved.

		0	1	2	3	4	5
Management of Acute Problems	Prompt recognition of acute problems						
	Thorough clinical assessment when new problems arise						
	Use of all available information e.g. observations, old results and notes						
	Diagnoses - none missed or incorrect						
	Investigations - appropriate (none unnecessary or missed) and timely						
	Management plans - appropriate (none unnecessary or missed) and timely						
	No discomfort or complications as a result of investigations or treatments						
	Good planning and handover of result checking, patient review and actions to be taken, including rescue plans and contingency planning						
Functional impairment	No delays in therapy assessments/treatments						
	Encouraged to sit out / mobilise and self care wherever possible						
Urinary continence	Continence assessment (history and examination) and appropriate investigations?						
	Active promotion of continence - e.g. regular toileting, involvement of OT's, rather than just containment?						
	If catheterised, good indication documented and removed as soon as possible, and adequate plans to ensure TWOC successful						
Delirium	Prompt and correct recognition, with no mislabelling						
	Compassionate care, including environmental considerations (e.g. lighting)						
	Attempts made to find and correct underlying cause?						
	Cautious management e.g. with sedation						
Cognitive impairment	If new diagnosis, discussed with pt/family, investigations considered, follow up arranged?						
	Appropriate use of MCA/DOL guidance						
	Challenging behaviour not mislabelled as aggression or poor cooperation						
Speech and communication	Strategies used to minimise any problems and maximise communication (eg wax removal, written communication, interpreter etc)						
End of Life Care	Appropriate DNAR and level of care decisions made during ward stay and communicated at discharge to avoid unnecessary readmission						
	Appropriate involvement of other professionals eg ITU/palliative care						
	Appropriate use of medications and LCP						
	Appropriate discussion/explanation with relatives +/- patient						
	Avoidance of unnecessary investigations or treatment						

Management of selected process of care issues:

Having now read all of the notes, please use information from the <u>entire</u> admission to complete the following:

0= Not applicable or can't tell
1= Not done or not documented
2= Poorly achieved
3= Almost half achieved
4= Almost completely achieved
5= Completely achieved

		0	1	2	3	4	5
Medication management:	Full DH on admission, including doses and allergies, documented in notes						
	Full DH within first 24 hours, including doses and allergies						
	Assessment and management of concordance issues (pre-admission and during admission)						
	Appropriate use of PRN drugs						
	No delays in obtaining drugs or giving treatment						
	If new treatment started (or changed or stopped), indication and plans for review documented clearly						
	No problems with inappropriate prescribing						
	No problems with fluids, analgesia, diabetic management or anticoagulation						
	No adverse drug reactions						
	Good medication review where appropriate - no problems that could have been prevented by this						
Decision Making	Appropriate ceiling of care and DNAR decision making?						
	Appropriate use of MCA/DOL guidance						
	All investigations necessary						
Discharge planning	Swift identification of care/social needs, early in admission						
	Good MDT discharge planning						
	Appropriate involvement of discharge co-ordinator						
	Appropriate use of MCA/DOL guidelines when making discharge decisions						
	Adequate documentation of new problems and treatments to GP and community services						
	Clearly documented communication of PT/OT concerns and arrangements/referrals made						
	No unnecessary time in hospital						
	Clear documentation of plans for review and/or follow up						

<u>Brief summary of case:</u> *(please describe the main medical/social/therapy problems in this case, and the patients progress)*

Time finished (HH:MM)

Thank you very much! Any questions or comments, please contact Susy Long - s.long@imperial.ac.uk, 0790 6112005

7.2.4. Results – correlation of COMPACT with the Long tool.

Table 7.3. shows that each aspect of COMPACT was extremely highly correlated with its corresponding section of the Long tool. This indicates that the approach used to create COMPACT by taking a subset of items from the Long tool was effective in producing a shorter tool which offers a good representation of the longer version.

Table 7.3. Correlation between groups of scores in COMPACT and the Long tool

Group of scores	Long Tool		COMPACT		Correlation coefficient
	Mean	SD	Mean	SD	
Mean number of new adverse outcomes per patient	2.19	2.36	0.88	1.04	r_s = 0.86**
Mean number of complexity markers per patient	1.66	1.25	1.17	0.79	r = 0.86**
Mean process score for the management of new adverse outcomes	2.86	0.71	2.37	0.91	r = 0.60**
Mean process score for the management of complexity markers	2.59	1.10	2.74	1.24	r = 0.93**
Mean process score for the management of generic issues	2.55	0.24	2.44	0.34	r = 0.85**

** p (two tailed) < 0.001

7.3. Testing COMPACT in different settings.

7.3.1. Introduction.

One of the main limitations of the study presented in Chapter 6 was that the Long tool was only tested at one site. Many of the items chosen for inclusion were derived from work (the interview study resented in Chapter 4 and the preliminary case record review presented in Chapter 5) in which the participants and case records were from the same site. Therefore, one of the purposes of this study was to assess the usability of COMPACT at other hospitals, where systems (and documentation) of care differ.

7.3.2. Methods.

Design and subjects

To test the reliability, feasibility and utility of using COMPACT in other hospitals, two further case record reviews were carried out, in 50 cases in a District General hospital (Site 2) and in 53 cases in a second London teaching hospital (Site 3). Case records used in this study were random completed discharges from acute Medicine for the Elderly wards.

Reviewers and reliability.

In order to assess the inter-rater reliability of COMPACT, and to determine whether it can be used by reviewers with differing degrees of seniority and clinical experience, a subset (10/100) of the cases at Site 1 were re-examined using COMPACT by 2 independent reviewers (one Consultant Geriatrician and one Registrar). In addition, at Site 2, 10/50 cases were co-reviewed by a Senior House Officer in Geriatric Medicine.

A summary of the cases and reviewers included in this study, and how this study overlaps with those presented in Chapters 6 and 9, is shown below in Table 7.4.

Table 7.4. Overview of cases and reviewers at each site.

Chapter/study	Site[†]	Tool	Number of cases	Principal reviewer(s)[‡]	Co-reviewers	Proportion co-reviewed
Chapter 6. Long tool	1	Long tool	100	Registrar 1	Registrar 2	10/100
		↓Data reduced to form COMPACT dataset for Site 1				
Chapter 7. COMPACT	1	COMPACT	100	Registrar 1	Consultant 1 and Registrar 3	10/100
	2	COMPACT	50	Registrar 1	SHO	10/50
	3[¶]	COMPACT	53	Consultant 2 and Registrar 3	0	0

[†] Site 1 = London Teaching hospital 1, Site 2 = District General Hospital, Site 3 = London Teaching Hospital 2

[‡] All reviewers were trainees or consultants in Geriatric/General Internal Medicine.

[¶] The data from Site 3 were also used in Chapter 9.

Procedure of case record review.

As with the Long tool review presented in Chapter 6, case records were reviewed systematically and thoroughly, with all multidisciplinary notes being used in a comprehensive and structured way. A manual for completion was created by modifying the Long tool version.

Measures and data analysis.

Demographic data for Sites 2 and 3 were analysed descriptively. The numbers of patients with each outcome and complexity marker were calculated at each site, and mean values were obtained. One-way analysis of variance (ANOVA) tests were carried out to compare results across the three sites.

Mean scores were produced for the process measure scores at each site, and outlying items (items scoring above and below the interquartile range) were identified.

Inter-rater reliability at Sites 1 and 2 was calculated using Kappa scores for the detection of complexity markers and new adverse outcomes, and using bivariate correlation tests and the intraclass coefficient for process measure scores.

Trust approval.

Approval was given by each Trust to carry out the case record review.

7.4. Results of the COMPACT review across the three sites.

7.4.1. Demographic characteristics.

Table 7.5. shows the demographic characteristics of the cases assessed at the three sites. Comparison using one way ANOVA tests showed that the length of stay at Site 1 was significantly longer than at Sites 2 and 3. At sites 2 and 3 the case records of patients who died were filed elsewhere and were thus unintentionally excluded from the study.

Table 7.5. Demographic characteristics of study populations across the three sites.

Site	**1**	**2**	**3**
Sample size	100	50	53
Mean age at admission (years)	82.70	84.00	84.04
Mean total length of stay (days)**	26.56	12.54	21.94
Mean length of stay pre-DOME ward (days)**	5.04	1.52	4.02
Mean length of stay on the DOME ward (days)**	21.55	11.02	17.92
% Died**	10	0	0
% Female	55	62	66
% Male	45	32	34

*****Comparison made using ANOVA shows significant differences across sites, p< 0.001.***

7.4.2. Complexity markers.

Table 7.6. shows the incidence of complexity markers as detected by COMPACT. Here one way ANOVA tests showed there was no significant difference between the incidence of patients receiving end of life care across the three sites, but the incidence of cognitive impairment were significantly different, with both occurring more frequently in Site 1.

Table 7.6. Incidence of complexity markers as identified by COMPACT

	Chronic cognitive impairment**	**Speech and communication problems****	**Formal End of Life Care****
Site 1			
Incidence	78%	24%	15%
Site 2			
Incidence	60%	14%	12%
Site 3			
Incidence	69.8%	32.1%	3.8%
Mean	**68% (SD = 9.165)**	**23.37% (SD = 9.07)**	**10.27% (SD = 5.8)**

*****Comparison made using ANOVA shows significant differences across sites, p< 0.001.***

7.4.3. New adverse outcomes.

Table 7.7. shows the prevalence and incidence of the four adverse outcomes included in COMPACT across the three sites. One way ANOVA tests showed that there were no significant differences between the incidence of these new adverse outcomes across the three sites ($p > 0.05$).

Table 7.7. Prevalence and incidence of adverse outcomes as measured by COMPACT.

	Functional decline†	**Decline in mobility‡**	**Delirium**	**Urinary incontinence**
Site 1				
Prevalence	NA	NA	29% (29/100)	42% (42/100)
Incidence	30.52% (29/95)	34.58% (33/96)	26% (26/100)	6% (6/100)
Site 2				
Prevalence	NA	NA	54% (27/50)	33.33% (15/50)
Incidence	14% (7/50)	10% (5/50)	38% (19/50)	2% (1/50)
Site 3				
Prevalence	NA	NA	33.9% (18/53)	37.74% (20/53)
Incidence	28.9% (10/53)	17% (9/53)	26.4% (14/53)	5.7% (3/53)
Mean				
Prevalence	**NA**	**NA**	**38.97% SD 13.24**	**37.69% SD 4.34**
Incidence	**24.47% SD 9.10**	**20.53% SD 12.664**	**30.13% SD 6.81**	**4.57% SD 2.23**

†**Worse functional ability on discharge than on admission**

‡**Worse mobility on discharge than on admission**

7.4.4. Process measures.

Full tables of scores for all of the process measures at the three sites using COMPACT are given in Appendix 12. Table 7.8. shows the lowest scoring items at each site, and Table 7.9. shows the highest scoring items at each site. These data show that in some groups of measures, such as the management of complexity markers the sites performed differently, in that different process measures were identified as areas for improvement or as being carried out particularly well. For other groups of measures, such as the management of outcomes or geriatric syndromes, similar issues were identified as areas for improvement at each of the hospitals.

Table 7.8. Lowest scoring process measures (below the interquartile range).

Group	Part of admission	Item	Below interquartile range at: Site 1	Site 2	Site 3
Management of complexity markers	Pre-DOME	(Speech and communication) Strategies used to maximise communication (e.g. wax removal, written communication, interpreter etc)	✓		
		(End of Life Care) Appropriate DNAR and level of care decisions		✓	
		(End of Life Care) Appropriate discussion/explanation with relatives +/- patient?			✓
	DOME	(Cognitive Impairment) If new diagnosis, discussed with pt/ family, investigations considered, follow up arranged?	✓	✓	
		(Cognitive impairment) Challenging behaviour not mislabeled as "aggression" or "poor cooperation"	✓		
		(End of Life Care) Appropriate DNAR and level of care decisions made during ward stay and communicated at discharge to avoid unnecessary readmission etc.		✓	
		(End of Life Care) Appropriate use of medications and LCP			✓
		(End of Life Care) Appropriate discussion/explanation with relatives +/- patient			✓
Management of new adverse outcomes	Pre-DOME	(Delirium) Compassionate care, including environmental considerations (e.g. delirium room, lighting etc.)	✓	✓	✓
		(Continence) Proactive management (ie assessment and regular toileting), not just containment?	✓	✓	✓
	DOME	(Delirium) Compassionate care, including environmental considerations (e.g. lighting)	✓		✓
		(Continence) Active promotion of continence - e.g. regular toileting, involvement of OT's	✓	✓	✓
		(Continence) Continence assessment (history and examination)		✓	
Medication management		Assessment and management of concordance issues (pre-admission and during admission)	✓	✓	✓
		If new treatment started (or changed or stopped), indication and plans for review documented clearly		✓	✓
		Good medication review where appropriate - no problems that could have been prevented by this	✓		
Management of acute medical problems		Early and effective geriatric specialist input, and advice followed	✓		✓
		Good planning and handover of result checking, patient review and actions to be taken		✓	
Generic process measures		(Decision making) Appropriate ceiling of care and DNAR decision making?	✓	✓	
		(Discharge planning) No unnecessary time in hospital	✓		✓
		(Discharge Planning) Clearly documented communication of PT/OT concerns and arrangements/referrals made		✓	
		(Discharge planning) Appropriate involvement of discharge coordinator			✓

Table 7.9. Highest scoring process measures (above the interquartile range).

Group	Part of admission	Item	Above interquartile range at: Site 1	Site 2	Site 3
Management of complexity markers	Pre-DOME	(End of Life Care) Appropriate discussion/explanation with relatives +/- patient?	✓		
		(Cognitive Impairment) Challenging behaviour not mislabelled as "aggression" or "poor cooperation".		✓	
		(End of Life Care) Avoidance of unnecessary investigations or treatment?			✓
	DOME	(End of Life Care) Appropriate discussion/explanation with relatives +/- patient	✓		
		(End of Life Care) Avoidance of unnecessary investigations or treatment	✓	✓	✓
		(End of Life Care) Appropriate involvement of other professionals eg ITU/pall. care		✓	
		(Cognitive impairment) Challenging behaviour not mislabelled			✓
Management of new adverse outcomes	Pre-DOME	(Functional decline) Seen by OT/PT as soon as possible	✓		
		(Functional decline) Early ascertainment of baseline function, mobility, care needs	✓		✓
		(Delirium) Attempts made to find and correct underlying cause?		✓	✓
		(Delirium) Cautious management e.g. with sedation		✓	
	DOME	(Functional decline) No delays in therapy assessments/treatments	✓	✓	✓
		(Functional decline) Allowed/encouraged to use same strategies as at home	✓		
		(Functional decline) Encouraged to sit out / mobilise and self care wherever possible		✓	
		(Delirium) Attempts made to find and correct underlying cause		✓	✓
Medication management		No adverse drug reactions	✓		✓
		Full DH within first 24 hours, including doses and allergies	✓	✓	✓
		No delays in obtaining drugs or giving treatment		✓	
Management of acute medical problems		No evidence of discomfort or complications as a result of investigations/treatments	✓		
		Investigations – appropriate (none unnecessary or missed), timely, indications clear		✓	✓
Generic process measures		(Discharge Planning) Good MDT discharge planning	✓		✓
		(Discharge Planning) Appropriate use of MCA/DOL guidelines when making discharge decisions	✓		
		(Decision Making) All investigations necessary		✓	✓
		(Discharge Planning) Appropriate involvement of discharge coordinator		✓	

7.4.5. Inter-rater reliability

Very good inter-rater reliability between two registrars for the items included in COMPACT has already been demonstrated in Chapter 6.

Very good inter-rater reliability is also demonstrated in Table 7.10. for the detection of complexity markers and new adverse outcomes using COMPACT between two further reviewers (consultant and registrar) at Site 1 (see Table 7.4. p.226) for details of the coreviews). Values are Kappa scores (a score of 0.8 - 1.0 indicates very good inter-rater reliability, a score of 0.7 - 0.8 indicates good inter-rater reliability and a score of 0.6 - 0.7 indicates moderate inter-rater reliability (Peat, 2002). Very good inter-rater reliability was also found for the detection of these measures between reviewer 1 (registrar) and reviewer 5 (SHO) at Site 2, except for the detection of decline in mobility, where only moderate inter-rater reliability was found.

Table 7.10. Inter-rater reliability for detection of new adverse outcomes and presence of Complexity Markers using COMPACT.

New adverse outcome	Kappa	
	Site 1[†]	Site 2[‡]
Functional decline	1.0	1.0
Decline in mobility	1.0	0.615
Delirium	1.0	1.0
Urinary incontinence	1.0	1.0

Complexity Marker	Kappa	
	Site 1[†]	Site 2[‡]
Cognitive impairment	1.0	0.8
End of life care	1.0	1.0
Speech and communication difficulties	1.0	1.0

[†] Consultant vs. Registrar at Site 1.
[‡] Registrar vs. SHO at Site 2.

Table 7.11. shows that there was significant correlation (indicating excellent inter-rater reliability) between scores for each of the five different groups of process measures assessed using COMPACT between a consultant and a registrar at Site 1. At Site 2, significant correlations between scores given by a registrar and an SHO were found in three out of the five groups of process measures.

The fact that inter-rater reliability for process measures, which require the reviewer to make judgements about care, appears to be less good between a registrar and a SHO than between more experienced members of staff, is interesting, and indicates that COMPACT is perhaps more accurately used by reviewers with more clinical experience.

Table 7.11. Inter-rater reliability for process measure scores using COMPACT.

	Site 1[†]	**Site 2**[‡]
Process Measure	**Pearson correlation**	**Pearson correlation**
Process measures for management of acute medical problems	***r* = .890****	*r* = -.01
Process measures relating to management of new adverse outcomes	***r* = .938****	*r* = .336
Process measures relating to management of complexity markers	***r* = .912****	***r* = .924****
Process measures relating to medication management	***r* = .794****	*r* = -.063
Process measures relating to generic issues	***r* = 0.910****	***r* = .759***

[†]1 Consultant vs. Registrar at Site 1.
[‡]2 Registrar vs. SHO at Site 2.

*** indicates p< 0.05, ** indicates p <0.001**

7.5. Discussion and conclusions.

7.5.1. Strengths of COMPACT.

Effectiveness of COMPACT as a measure of safety and quality.

COMPACT is essentially an abridged version of the Long tool described in Chapter 6. In this chapter I have been able to demonstrate that scores for new adverse outcomes, complexity markers and process measures detected by COMPACT correlate very well with those produced by the Long tool. Thus, COMPACT is as effective as the Long tool as a method of using case record review to provide an overall assessment of quality and safety in older medical patients. The software used for its design means that data entry and analysis is easier, quicker and less error-prone than the manual method required for the Long tool.

Time taken to complete.

One principal aim of COMPACT was that it was designed to be less time consuming for the reviewer to complete than the Long tool. The method of review for both tools requires the entire clinical record (including all documentation by medical and nursing staff and by allied health professionals, and drug charts). The time taken to do this is very much dependent on the length of the admission, which determines the volume of notes that need to be read by the reviewer. However, because fewer (134) items are needed to be filled in by the reviewer into a COMPACT form compared to a Long tool form (279), the overall time taken to complete a review was found to be significantly shorter - on average a Long tool review takes around an hour per patient and a COMPACT review takes around 30 minutes. This was found to be the case for all co-reviewers, regardless of their level of clinical experience, and for the principal reviewer, indicating that reviewing experience did not affect the overall time taken to complete a review.

Feasibility of use across different sites.

The data presented in this chapter shows that it is feasible to use COMPACT at different sites, despite the use of different documentation systems. COMPACT is able to detect difference between sample populations in terms of demographics and complexity markers. It is able to allow us to identify areas of good practice at different sites, aswell as potential areas for improvement. This could be clinically useful as a "diagnostic tool" for departments of Medicine for the Elderly in different hospitals to address their local systems of practice and perhaps adopt practices from elsewhere.

Inter-rater reliability.

Very good inter-rater reliability was demonstrated for reviewers of different degrees of clinical experience for the detection of complexity markers and new adverse outcomes using COMPACT. This reflects the ability of COMPACT to use readily available detailed information from clinical records and to convert subtle changes in this information across the admission into useful measures. The finding that identification of this information was accurate regardless of clinical seniority is not surprising, as this part of COMPACT requires little clinical judgement from the reviewer.

Conversely, however, inter-rater reliability was shown to be excellent for process measures when reviews were completed by more experienced doctors, but less when carried out by more junior members of staff. This indicates that accurate assessment of the process measure scores requires clinical judgement. It may be concluded, then, that COMPACT itself should ideally be used by doctors of registrar level or above.

7.5.2. Limitations of COMPACT.

The way in which the items from the Long tool were selected for inclusion in COMPACT could have been more robust. For example, it may have been better if they had been based on expert opinion rather than my judgement alone. However, the fact that the current version of COMPACT is a good representation of the Long tool is reassuring.

By its very nature COMPACT does not assess a number of clinically important aspects of care, which may cause some unease when stating that it provides an overall assessment of quality and safety of care in older people. However this is a necessary compromise if the ease of review and data analysis is important.

As described in Chapter 6 for the Long tool, COMPACT has other limitations in common with any other retrospective case record review tool, the most important of which are hindsight bias, the fact that a great deal of clinical processes are not documented and will therefore be missed, and the fact that many of the more qualitative aspects required for high quality care are not easily identifiable from case records.

7.5.3. Overall conclusions and implications for future work.

In this chapter, COMPACT was tested in relatively small sample populations, by a relatively small number of reviewers. However, the data presented here shows that it has the potential to be used more widely in future work, and that it seems to be as good as the Long tool in providing an overall assessment of the safety and quality of care for older medical inpatients. This needs to be explored further in larger populations. COMPACT has the potential to be adapted for use in different clinical settings, wherever older people are treated, for example perhaps in surgical or rehabilitation environments. The data presented here indicates that COMPACT should ideally be used by reviewers with experience of geriatric medicine.

Section 4. Improving safety and quality of care in older medical inpatients.

Introduction to Section 4.

In this section of the thesis I shall turn from measurement to look at ways in which we can improve the safety and quality of care in older medical inpatients. As described in the introductory chapters, two of the main ways in which care can be improved in all patient groups are firstly improving education and skills in individual practitioners and secondly improving systems or processes in which care is delivered.

The next two chapters of the thesis report preliminary work to explore the feasibility of using these two main mechanisms of improving care for older people in hospital. In Chapter 8 I describe a study which was designed to inform future patient safety curriculae by identifying trainable and important safety skills in clinicians of all specialities. In Chapter 9 I describe a study in which an intervention designed to enhance the way in which care is delivered to older medical inpatients by improving multidisciplinary collaboration on an acute medicine for the elderly ward. The effect of this intervention was assessed using COMPACT (described in Chapter 7) and other measures.

Chapter 8. Qualities and attributes of a safe practitioner: identification of safety skills in healthcare.

8.1. Introduction.

Findings from earlier studies in the thesis, in particular the interview study in Chapter 4, but also from observations made during my case record review work, show that in the care of older people in hospital (as with all patient groups), safety (and therefore quality) may either be eroded by the actions and omissions of individuals or, conversely, created by skilful, safety conscious professionals. Clinical staff maintain safety by being conscientious, disciplined and following rules, for example by washing their hands or adhering to prescribing guidelines. However keeping patients safe, particularly older patients with complex and fluctuating conditions, requires additional skills, such as anticipation, awareness of hazards, preparedness, resilience and flexibility. These are the qualities that those studying high reliability organisations have sought to capture and articulate (Vincent et al., 2010).

As described in Chapter 2, to try and instil these qualities into the next generation of clinicians, patient safety is being incorporated explicitly into both undergraduate and postgraduate training (Department of Health, 2008; Ellis, 2009; Institute of Medicine, 1999). To aid this endeavour, there has been some work to identify the desirable knowledge, skills, behaviours and attitudes of a safe healthcare practitioner within the Safety Competencies Framework (Frank JR & Brien S). Despite this, however, many current curricula teach comprehensively the role of systems in patient harm and error, but do not address in any depth the necessary skills that future frontline clinicians will need as individual healthcare professionals to maximise the safety of their patients.

Although the teaching of safety attitudes and behaviours is a recent development in healthcare it has been deeply embedded in a number of hazardous industries for some time. For instance, the Western Mining Corporation in Western Australia is an exemplar of

creating “error wisdom” within its organisation and frontline staff. Their motto is “Take time, take charge” which aims to get workers to stop and think, to spend time assessing potential hazards before acting. Furthermore, trainee British Army officers are taught to carry out mini-risk assessments of their environment, resources, terrain, and contingencies by repeatedly cycling through a series of questions as they plan and implement a mission (Taylor-Adams, 2008). Although such foresight skills are clearly important in medicine, they are seldom made explicit and are rarely incorporated into formal training curricula, and not yet into geriatric medicine curricula.

Within healthcare, training clinicians to be safe has always been part of medical education in the sense that good clinical practice is the foundation of safe care. Moving beyond these basic clinical competencies, however, there has been an initial attempt to identify some of the important safety skills in other specialities, most notably in the context of non-technical skills in anaesthesia and surgery. Pioneered by Rhona Flin and colleagues, non-technical skills can be defined as, ‘The cognitive, social and personal resource skills that complement technical skills and contribute to safe and efficient task performance’ (Flin, 2008). The identification of these non-technical skills has stemmed partly from direct observation of experts in real clinical situations and in simulated environments, but also on analyses of accidents where a lack of these skills has precipitated or failed to prevent disaster.

Much of the current evidence on non-technical skills has focused on the operating theatre, expanding the repertoire of skills and training to include communication, stress management, teamwork, decision making and leadership (Arora et al.; Sevdalis et al., 2009). Importantly, evidence that these skills can be trained is rapidly emerging (Mishra et al., 2008; Moorthy et al., 2005). Furthermore, interventions which range from simple briefings and checklists (Haynes et al., 2009) to complex, high fidelity full team simulations (Arora & Sevdalis, 2008; Undre et al., 2007) have been developed to improve teamwork and non-

technical skills and consequently clinical processes and outcomes (Haynes, et al., 2009). Little is known how these non-technical skills differ from those required in the geriatric medicine care setting, but given all of the complexities involved in the care of older people described in the thesis so far, it is reasonable to assume that they play a vital role in providing safe and high quality care to older people.

Reflection on clinical practice and review of the literature, both inside and outside healthcare, suggests that safety skills might require a broader conceptualisation than what is currently known as "non-technical skills".

In this study I set out to describe and classify safety skills in healthcare without reference to any specific clinical environment, although as described above these skills are particularly relevant for the care of older medical patients.

The aims of this study were:

1. To capture a broad range of generic safety skills relevant to all clinical settings/specialities
2. To assess whether there is a consensus amongst front-line clinicians regarding formal training of these skills.

8.2. Methods.

The study was carried out in two stages. In Stage 1, a list of potential safety skills was generated from a written survey and a focus group of patient safety experts and experienced clinicians. In Stage 2, the skills extracted from these processes formed the items of a questionnaire, which were used to determine skill importance and trainability.

8.2.1. Stage 1. Generation of a list of safety skills.

a) Survey of patient safety experts.

A qualitative approach was used to elicit skills and behaviours, as it was felt that this would produce a wider range of skills than is described in the literature. An electronic survey was administered to 10 experienced patient safety researchers, purposively selected for their understanding of patient safety and diverse backgrounds (medicine, surgery and academic psychology). In the survey, open questions were asked, designed to elicit participants' beliefs and perceptions of key safety skills (these questions are shown in Figure 8.2.). A reminder was sent to non-respondents two weeks later. One hundred per cent of the individuals selected for participation responded. Using standardised qualitative techniques in the form of emergent theme analysis, 58 distinct skills were extracted from the free text survey data by two independent coders.

Figure 8.1. Initial scoping questions asked of patient safety researchers in Stage 1.

What are the behaviours and skills that come with experience which enhance patient safety? Please list these skills below, and if you can, provide a short example/case illustration for each one of them.
Think of an example of a clinical scenario where an error or adverse event nearly occurred but was averted by behaviours or actions taken by staff. Briefly describe what happened and how the actions taken averted harm to the patient. (If you are a clinician, think of an actual example from personal experience, if not then please think what the potential behaviours and actions could be).
Imagine you are the most senior member of a clinical team and today is the first day of a new group of junior staff joining you. Ideally, what characteristics, skills and behaviours would you like your team to demonstrate, apart from clinical competency, in order to make sure your patients are safe?
What skills are required to recognise and prevent a hazardous situation (one that can potentially lead to an error/adverse event?)
If an error occurs, what skills are required to prevent a future error from occurring?

b) Focus group of safety experts.

After completing the survey, the same 10 individuals participated in a focus group where the list of skills extracted from the survey were presented and discussed (member-checking). This led to a dialogue during which participants were able to clarify and expand on their thoughts, adding skills that had not described in the survey. The focus group was recorded and transcribed, and the transcript was analysed using emergent theme analysis. An additional 22 distinct skills were identified from the focus group.

c) Generation of a list of safety skills.

The 58 skills extracted from the survey results and the 22 skills from the focus group were combined to form a long-list of safety skills. The wordings used to describe the skills by the participants were left unchanged for use in Stage 2, because it was felt important not to alter the underlying constructs in any way. This meant that there were some skills in the eventual list which were very similar to others - however subtle differences between them were preserved. There were 7 exact duplicates, which were removed. This left 73 skills for inclusion in the final questionnaire.

8.2.2. Stage 2. Questionnaire administration and data analyses

Questionnaire design

The 73 safety skills generated in Stage 1 were collated into a questionnaire in which participants were asked to rate on Likert scales (1-5) how important each skill is to being a safe practitioner and whether it is trainable. Prior to being deployed, the questionnaire was piloted with five clinicians to ensure comprehension and usability.

Study population

45 physicians and 45 surgeons were selected from a University Teaching Hospital in London using stratified random sampling. The aim was to obtain the views of experienced clinicians, so the study population was restricted to specialty trainees of year 3 or higher, specialist registrars and consultants.

Procedure

The questionnaire was administered an online surveying tool (surveymonkey.com). Between January and May 2009, clinicians were sent an email that outlined the purpose of our study and contained a link to the questionnaire. Subjects were informed that

questionnaires were anonymous, that their responses would be kept confidential, and participation was voluntary. No incentives were offered for survey completion. Non-respondents were given two reminders via email.

Categorisation of safety skills and data analyses.

Although respondents were presented with the 73 individual skills in a non-categorised manner, for the purposes of data analysis the skills were subsequently categorised using an iterative process with the agreement of two investigators (SL and KM). Table 8.1. shows the 18 categories generated (column 1), and the individual 73 skills (column 2), with illustrative quotes from both the initial scoping survey and the focus group (column 3). Importance and trainability data for each of the individual skills were grouped into these categories and cross-tabulated according to the respondents' specialities. Finally, any difference in perceived trainability between specialities was examined for significance by calculating the z ratio and associated two-tailed probabilities.

Table 8.1. The Safety Skills. Illustrative quotes and individual skills are as they appeared on the final questionnaire.

(S indicates an illustrative quote from the survey, and FG indicates an illustrative quote from the focus group).

Category	Individual skills (questionnaire items in Stage 2)	Illustrative quotes
Anticipation and preparedness	• Anticipation of organisational problems • Being able to anticipate the deteriorating patient • Contingency planning with clearly defined levels of care • Developing risk averse methods of working • Thinking "what could go wrong today" and trying to prepare for it	"Contingency planning - if patient fails to improve with a we will try b and c. If x happens, we will escalate care to y" (S) "One thing that I do on a daily basis, and I would like my juniors to do as well, is to think, what could go wrong today? And I try to cover for that..." (FG)
Awareness of the patient (including empathy)	• Caring about patients • Empathy • Not hating patients you can't solve • Not thinking of re-attenders as a nuisance • Thinking physiologically	"Remember 'The secret of care of the patient is caring for the patient'" (S)
Awareness - of oneself	• Not letting your emotions interfere with patient care • Continuous questioning of self and others • Having up to date knowledge/training • Learning from previous mistakes • Reflective thinking • Self awareness – recognising one's own limitations • Thinking "how am I today" (tiredness etc.) • Know who, when and how to call for help appropriately	"Be aware of your own abilities – when negative life events will affect your judgements and working ability." (S) "If you are tired, you take a break, and you actually stop and … you say, I'm going out" (FG)
Awareness - of the situation	• Being able to minimise distractions • Recognising error prone situations • Information gathering	"Being error- aware and recognising situations that may give rise to errors e.g. a high workload." (S)

Awareness - of one's team	• Awareness of others around you • Being aware of unsafe members in the team • Being receptive to others in the team • Team awareness and monitoring	"Recognising the skills and limitations of one's team and delegating accordingly" (S)
Common sense	• Having a common sense approach • Being able to follow instructions	"Just having common sense" (S)
Confidence	• Being able to speak up • Being confident in decision making • Having an appropriate level of confidence/assertiveness	"Having the confidence to speak up if you notice any potential hazards." (S)
Conscientiousness	• Being thorough /paying attention to detail • Checking and re checking • Conducting a thorough history and examination • Going out of your way to help • Hunting for answers	"Cogitate if there is an unexplained clinical problem – keep thinking (and hunting)." (S)
Crisis Management	• The ability to think clearly in a crisis situation • Acting decisively in a crisis	"Risk mitigation - knowing either what to do if something does go wrong or who to ask to come and fix the problem if one cannot do so personally" (S)
Honesty	• Honesty • Proactive and open communication • Being open about error	"Honesty – i.e. openly communicating mistakes, issues and areas of concern" (S)
Humility	• Taking criticism constructively • Humility • Courteous and considerate • Willingness to listen/take advice • Allowing others to take over	"Doesn't have a chip on his/ her shoulder about taking advise from nurses and juniors" (S)
Leadership	• Having good leadership skills	"The leadership and the behaviour of the team as a whole, influences one's behaviour..." (FG)
Open mindedness	• Being open minded	"Recognising clinical patterns but not ignoring facts that don't fit." (S)

Organisational skills and efficiency	• Organisational skills/efficiency • Co ordination • Prioritisation/multi tasking	"The ability to process multiple information sources at the same time and prioritise." (S)
Responsiveness	• Acting decisively if hazards are noticed • Changing one's behaviour in response to tiredness • Responding to changes in circumstances • Thinking and problem solving	"The ability to adapt to rapidly changing circumstances" (S)
Team working and communication	• Asking team for reminders • Being available and perceived as available • Delegating appropriately • Encouraging frequent/regular team meetings • Giving constructive feedback • Having a sense of togetherness within the team • Team-working	"If you initiate an action make it absolutely clear who is to do what, when – and who is to be called if the patient goes 'off track' and – and who will review progress when" (S)
Technical Skills	• Having good technical skills	"In surgery, it's the doing, it's about technical skills and the high level technical skills" (FG)
Vigilance	• Alertness/ being 'on the ball' • Pattern recognition and vigilance for deviation from patterns • Regularly re-reviewing the situation	"Through knowledge and experience comes vigilance for any deviation from an expected course of events." (FG)

8.3. Results of the questionnaire.

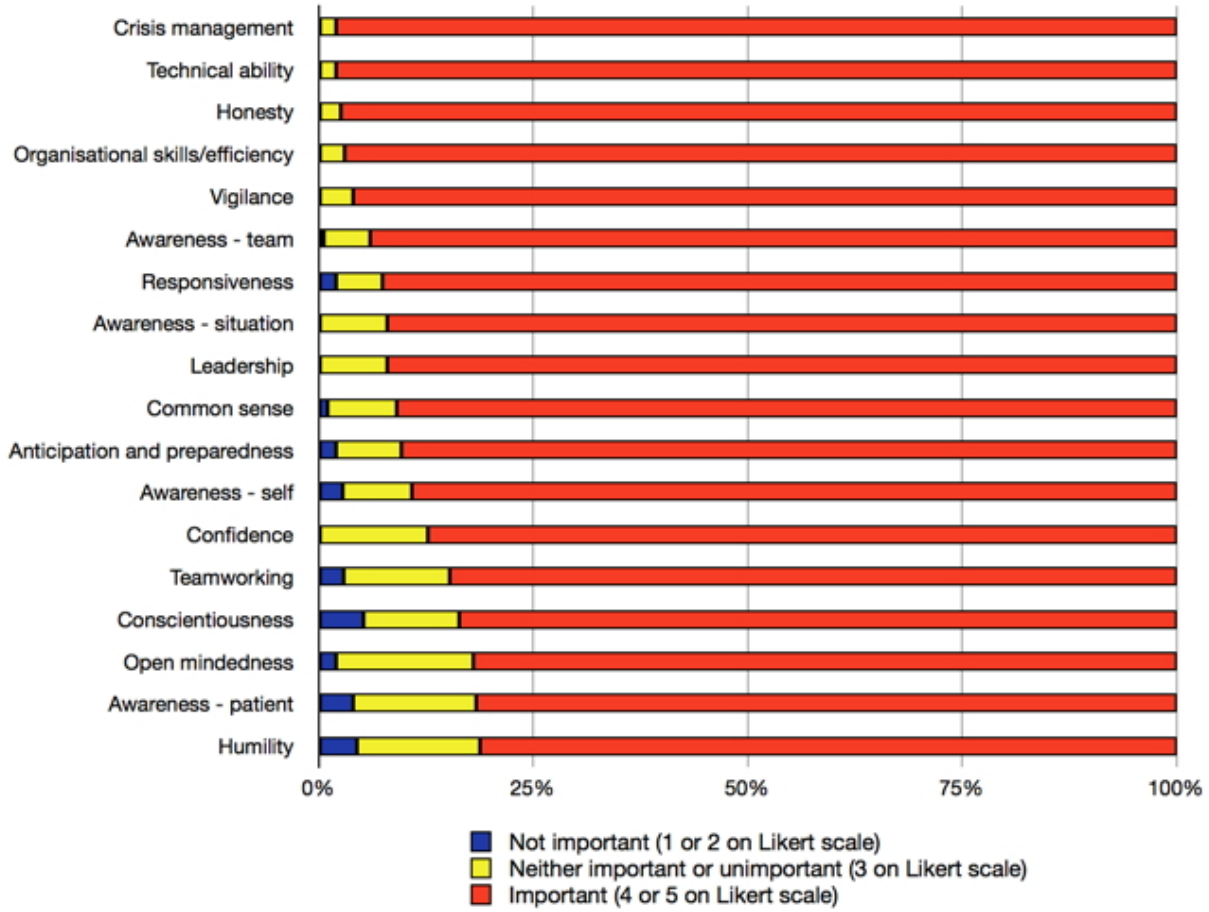
8.3.1. Respondents

Of 90 potential respondents, 64 started to complete our questionnaire, and 50 fully completed it, giving an initial response rate of 71% and an analysable response rate of 56%. Of analysable respondents, 33% were speciality trainees year 3 or 4, 22% were specialist registrars and 43% were consultants. Regarding specialities, 42% of respondents came from General Surgery, 39% from General Medicine and 16% from Emergency Medicine.

8.3.2. Skill importance

Respondents felt that the majority of skills were important (4 or 5 on the Likert scale) to patient safety (Figure 8.3.). The highest scoring skills in terms of importance fell into the following categories: crisis management (98%), technical skills (98%) and honesty (97.5%). The skills felt to be least important were those in the categories open-mindedness (82%), patient awareness/empathy (81.7%) and humility (81.2%).

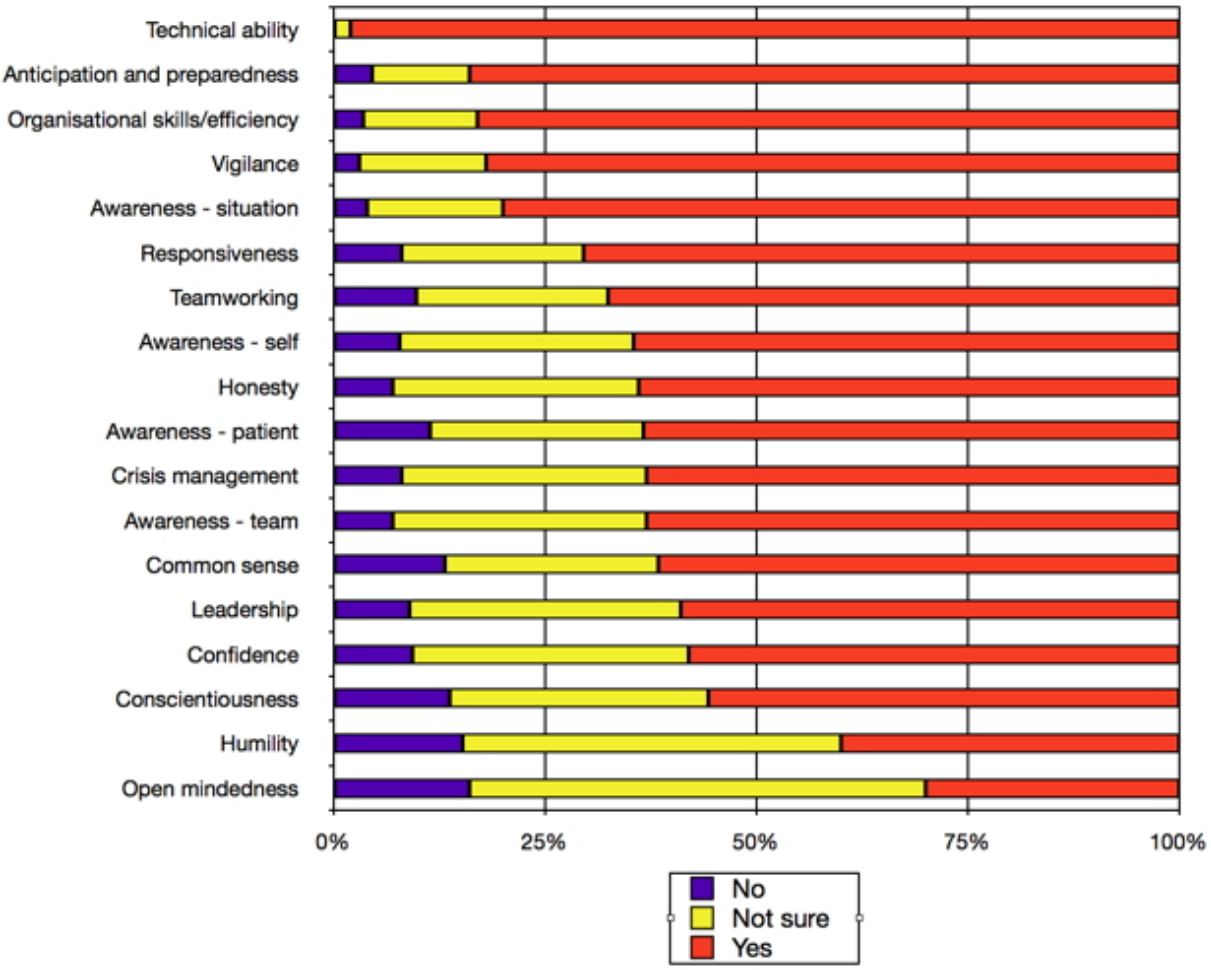
Figure 8.2. Relative importance of categories of safety skills, in descending order.



8.3.3. Skill trainability

Participants exhibited lower agreement regarding skill trainability than importance (Figure 8.4.), although in the majority of categories (16/18) more respondents felt that the skills were "trainable" than "not sure" or "not trainable". As might be expected, virtually 100% of the sample felt that technical ability was trainable. The next most trainable categories were anticipation and preparedness (84%) and organisational skills/ efficiency (83%). Conscientiousness (56%), humility (40%) and open-mindedness (30%) were felt to be the least trainable categories of skills.

Figure 8.3. Perceived trainability of safety skills (all specialities), in descending order.



Physician and surgeon participants largely agreed on the trainability of the safety skills (Table 8.2.). The only obtained differences were that that significantly more surgeons than physicians perceived that skills within the team awareness and crisis management categories are trainable (p=0.0099, p=0.025, respectively).

Table 8.2. Comparison of the proportions of surgeons and non-surgeons who felt each category of skills were trainable.

Skill category	Proportion of participants who rated the skill as trainable		z score	p (2 tailed)
	General Medicine and Emergency Medicine	Surgery		
Anticipation and preparedness	103/130	92/115	-0.149	0.882
Awareness - patient	113/182	102/161	-0.242	0.809
Awareness - self	131/208	119/184	-0.348	0.728
Awareness - situation	59/78	58/69	-1.264	0.206
Awareness - team	56/104	66/92	-2.579	**0.010**
Common sense	34/52	25/45	0.989	0.323
Confidence	44/78	40/69	-0.191	0.849
Conscientiousness	99/182	89/161	-0.164	0.870
Crisis Management	27/52	34/46	-2.241	**0.025**
Honesty	63/104	61/92	-0.83	0.407
Humility	44/130	51/115	-1.684	0.092
Leadership	26/52	31/46	-1.742	0.082
Open mindedness	9/26	5/23	0.996	0.319
Organisational skills & efficiency	83/104	79/92	-1.119	0.263
Responsiveness	50/77	52/69	-1.371	0.170
Team working & communication	157/234	138/207	0.095	0.924
Technical Skills	25/26	23/23	-0.95	0.342
Vigilance	54/78	47/69	0.145	0.885

8.4. Discussion and conclusions.

This study has identified a set of 73 safety skills within 18 categories, providing a template for a broader exploration of the skills and attributes of the safe practitioner. The results demonstrate congruence between the views of experts and practitioners about the importance of the individual skills. While some of these skills (e.g., decision making (Croskerry, 2002b) or teamwork (Leonard, 2004)) have already been the subject of considerable research in medicine, others (e.g., conscientiousness or humility) are less well explored. These skills in particular were also identified in the interview study (Chapter 4) as being important for successful care of older people. One might have expected skills such as teamworking, leadership and anticipation to have been ranked higher in terms of importance, as might be the case in other high reliability industries.

The skills that we have identified are broader and more comprehensive than those alluded to in current patient safety curricula. As these curricula evolve further, this suggests that consideration should be paid to the possibility of including explicit training of these skills. Some of the skills identified might be considered to be attributes of character rather than skills, but are nevertheless thought to be potentially trainable (Nelis et al., 2009). While such attributes cannot be taught in the lecture theatre, the training, enculturation and 'hidden curriculum' of medical practice can be a powerful determinant of the development of safety attributes.

The only significant differences across specialities in terms of perceived skill trainability were that significantly more surgeons felt that team awareness and crisis management skills were trainable. This may reflect the increase in team training and crisis management training available to surgeons (Moorthy et al., 2006), but not yet to physicians, and implies that involvement in safety-related activities can change the attitudes of individual clinicians, in turn enhancing safety. The obtained consensus amongst physicians and

surgeons that the majority of skills are important and trainable is encouraging in terms of creating a generic cross-speciality safety training curriculum. Clearly, the skills identified overlap to some extent with those identified in other studies (Frank JR & Brien S) and with some skills currently being taught in undergraduate medical curricula (e.g. communication skills and professionalism) (Swick et al., 1999). Careful consideration however will be needed on how best to teach the other skills which might be considered to be inherent personality traits, such as honesty, humility or conscientiousness (Nelis, et al., 2009).

These skills are not only desirable in doctors, but also in nurses and allied healthcare professionals, and it may be beneficial to consider the possibility of multi-professional safety training curricula in the future, which may be particularly valuable in those teams caring for older people.

The main limitation of this study is that the sampling frames were relatively small. However, when generating the initial list of safety skills, although only ten individuals were surveyed, this produced a wide range and large number of safety skills. The richness of this data was preserved by not reducing the number of items for inclusion in Stage 2. The large number of items generated in Stage 1 may have hampered the response rate achieved in Stage 2 – the questionnaire containing 73 items may have been too time-consuming for busy clinicians. Having said that, the analysable response rate of 56% in this study is comparable with other internet-based surveys of clinicians (Braithwaite et al., 2003). The fact that we used experts in the field and experienced clinicians in both parts of the study allows us to be confident with the face and content validity of the questionnaire items.

This list of 73 skills in 18 categories could be regarded as a template for the development of a formal taxonomy of the qualities and attributes of the safe practitioner. Future work might included further exploration of these, so that they may be refined into a clearer hierarchical framework, that may be of practical use to designers of patient safety

curricula. Further work is needed in other clinical settings and in other countries to refine and formalise these skills and to examine their relationship to safety outcomes and clinical performance. Crucially, we need to explore how best to provide training in these skills.

This study was deliberately carried out with participants from a variety of hospital clinical specialties, as its main aim was to create a generic, cross-speciality list of skills. However, older people comprise the majority of patients in most of the settings in which our participants work, and the safety skills are particularly important in their care. The interview study (Chapter 4), identified specific issues around the knowledge, skills, attitudes and behaviours of staff towards older people with the geriatric syndromes, cognitive and sensory impairment. Part of this is due to the lack of knowledge around how to manage the specific challenges presented by these patients (Teodorczuk et al., 2009). Thus future work might consider whether care can be improved by incorporating safety skills training alongside a greater emphasis on the identification and management of problems specific to older people into multidisciplinary curricula for staff working in all applicable clinical settings.

Chapter 9. Does the use of a multidisciplinary goal sheet improve the quality and safety of care in older medical inpatients?

9.1. Introduction.

Current practice: the potential for improved information sharing and team decision-making.

The findings of the case record review studies described in chapters 5-7 (and in the interview study in Chapter 4) suggest that clinical teams had not been effectively mapping out all problems for patients or using this information to make individualised care goals for patients. This led to the concept of the current study, which aims to determine whether the use of a multidisciplinary goal sheet to "map out" care in older medical inpatients leads to an improvement in overall care. The proposed methods are adapted from a study published by Pronovost et al in 2003 (Pronovost, 2003), in which the use of a sheet of clinical goals on an adult intensive care unit (ICU) in the USA led to a reduction in length of stay and an increased awareness of care goals for individual patients. The same research team later published studies where goal sheets were trialled successfully on a paediatric ICU (Schwartz et al., 2008) and on general surgical-oncology wards (Holzmueller et al., 2009). To my knowledge, no similar work has been carried out on medicine for the elderly wards.

There are a number of clinical and organisational problems with the way in which care is delivered in hospital for older people. When the older medical patient first comes into hospital, and during their first few days, which are usually spent on the Medical Admissions Unit under a non-geriatric medical team (albeit often with specialist geriatric review and advice), information about the geriatric syndromes both pre-admission and during that part of the admission is often not sought and this is therefore not always documented. During the first 24-48 hours of admission information can be lost at handover, as shifts of medical teams and nurses try to deal with the acute problems that the patient has been admitted with. This is

often a “fire fighting” exercise rather than a comprehensive attempt to address all the problems relevant to the individual patient, with simultaneous focus on the prevention of hospital-associated complications.

If the patient does not recover sufficiently quickly to be discharged straight from the MAU, and it is deemed appropriate, they will be transferred to the medicine for the elderly ward for management of their medical problems, rehabilitation and discharge planning. Other patients admitted to medicine for the elderly wards come from other parts of the hospital; they may be initially admitted under other specialist teams (such as surgery, intensive care, cardiology). However, when input from these specialists is no longer felt to be indicated, they are transferred to the care of the elderly team for the rest of their stay.

Thus, when a patient is admitted to the medicine for the elderly ward they may have any or all of the following: ongoing acute medical problems they were admitted with, new acute medical problems that have developed since admission, complications of their hospital stay so far including new geriatric syndromes, as well as other long term geriatric syndromes and comorbidities. Therefore it is necessary that the new team of healthcare professionals reassess and summarise all diagnoses, management and progress so far, and, in order to start immediate discharge planning, also try to establish the patients’ comorbidities and pre-admission state. At this point useful information gained by the admitting team can be lost; equally, useful information missed by the admitting team can be discovered.

All professionals (medical, nursing and therapy) make these assessments, usually by reading the case notes, and talking to the patient and their families. Sometimes there is also a verbal or written handover from the previous team - this can tend to focus on issues that are immediately important and focus less on more long term problems. During this initial assessment, each member of the team will make his or her own “plans” for the patient. The

different professions initially do this separately, and these findings and plans are shared later at weekly multidisciplinary team (MDT) meetings.

As time goes on, although in addition to the weekly MDT meetings there is great deal of ad-hoc communication between multidisciplinary team members, both verbally on the ward and written in the notes. Communication and team work are of varying quality and sometimes team members work quite separately. A striking observation during the case record review work presented in Chapters 5 to 7 was that day to day on the medicine for the elderly ward, some aspects of care are forgotten or missed by some team members whilst others have been documenting them in their separate section of the notes: similarly acute problems (particularly out of hours) can be picked up by one discipline and then not communicated effectively to others the next day. The weekly MDT's serve as a reminder for all members of the team what are the important issues in the case, but in these meetings where time is limited it can be difficult to remember all potential areas of concern and therefore certain aspects can be forgotten or not considered at this crucial time of team decision-making. This has become increasingly the case over recent years, where, due to time pressures, the focus of the weekly MDT is increasingly on discharge planning rather than optimization of health and function during the hospital stay.

Nursing staff in particular carry out several assessments designed to identify and deal with the risk of hospital associated complications that doctors are often apparently unaware of and don't consider or use in their decision making. Often the risks aren't communicated to the team as a whole, because they are documented separately. This means that action plans for the risks are not made by the team as a whole, and that when the team makes general patient care decisions this information is not used or taken into consideration. Another potential consequence of this lack of joined-up information sharing is that as the information is not used, those collecting it do so poorly and with a lack of purpose - there is

an impression that the information is collected because guidelines and policies demand it rather than because it will actually improve outcomes for the individual patient. This in turn may lead to poor information gathering for these assessments and reduced staff morale and motivation.

In summary, there appears to be a need to improve the sharing of information amongst all multidisciplinary team members, so that the team can work as a whole towards common goals geared towards restoring health and function to pre-admission levels. The aims of the study were:

1. To improve the awareness of all aspects of the patients care amongst all members of the team, thus improving multidisciplinary collaboration in the development of clear goals in all areas of care.

2. To improve the anticipation and prevention of hospital acquired complications by encouraging staff to be more proactive rather than reactive, thus improving overall quality of care and reducing the rate of hospital associated complications as measured by COMPACT.

9.2. Methods.

9.2.1. Design, setting and subjects.

This was a non-randomised, prospective quality improvement study, in which the effects of the intervention were assessed using both time interrupted and continuous measures. The study was carried out on an acute Medicine for the Elderly ward in a large London teaching hospital. The ward is a 20-bedded unit for complex, acutely unwell elderly patients. There are on average between eight and ten new admissions to the ward per week, and approximately 20 permanent clinical staff of all disciplines work there at any one time. All new admissions during the study period were cared for using the goal sheet (in addition to usual care).

9.2.2. Measures.

Two main types of measures were used in this study:

1. Before and after the introduction of the goal sheet:
    a. COMPACT reviews were carried out to assess overall quality of care.
    b. Staff questionnaires were carried out to assess awareness of the incidence of hospital associated complications and perceptions of team-working.
2. Continuous measures - throughout the study period staff were asked about the following in regard to specific (anonymised) patients:
    a. Understanding of goals of care.
    b. Understanding of steps necessary to avoid hospital complications.

9.2.3. Procedure.

Table 9.1. shows a summary of the study procedure.

Table 9.1. Summary of study procedure.

Phase	Research activity	Timeframe
1. Pre-intervention	Pre-intervention COMPACT reviews of 26 complete admissions to the ward	2 weeks
	Administration of pre-intervention staff questionnaire (Appendix 13), which assesses perceptions of the incidence of different hospital acquired complications and of team working and information sharing.	
	Staff consultation and training period	2 weeks
2.Intervention period	Use of multidisciplinary goal sheets (Figure 9.1.) in the care of all new admissions to the ward	10 weeks
	Twice a week questioning of three random members of staff involved in the care of three randomly selected patients on the ward, Staff were asked a) How well they understand the goals of care for the patient b) How well they understood what needed to be done to prevent hospital acquired complications in the patients	
3. Post-intervention	Post-intervention COMPACT review of the last 27 cases in whom the goal sheets were used	2 weeks
	Administration of post-intervention staff questionnaire (Appendix 14), which is identical to pre-intervention questionnaire, but also includes an assessment of the burden/usefulness of the goal sheets)	

Phase 1. Staff consultation and training period and pre-intervention measures.

Before the intervention period commenced, there was a two-week consultation period, during which all staff who work on the ward were made aware of the study, at a pre-arranged briefing session, at routine ward meetings and informally ad-hoc on the ward. Staff were trained in the use of the multidisciplinary goal sheet and were encouraged to provide the research team with feedback: any suggested adjustments were made to the sheet, to ensure maximal clinical usefulness, user-friendliness and effectiveness.

COMPACT was used to assess the quality and safety of care in 26 sequential discharges from the ward during the two week period before the goal sheet was used. Cases were identified immediately after discharge by the clinical team and the reviews were carried out by two members of the team who usually care for the patients (the consultant and Specialist Registrar).

In addition, a pre-study questionnaire (Appendix 13) was administered to all multidisciplinary staff who work on the ward. The questionnaire was designed to provide us with two types of information - firstly a measure of the perceived incidence of hospital associated complications/geriatric syndromes, and secondly data relating to staff perceptions of the degree to which information is shared effectively between team members. Staff were recruited to fill in the questionnaire at ward meetings and handover. Confidential sealed boxes were left on the nursing station and in the doctors office on the ward, so that responses could be collected from members of staff who may be absent during the day, for example those who work night shifts, and so that staff could take their time when completing the questionnaires.

Phase 2. Intervention period.

For a period of ten weeks, the multidisciplinary goal sheet was used in each new admission to the ward (estimated at 80-100 over the study period). The sheet was filed at the front of the patient's medical notes for easy reference. Laminated sheets with suggested actions for each domain were provided for use in the MDM and were left at the nursing station and doctors office.

As a continuous measure, twice a week during the 10 week intervention period, three members of staff were asked by the chief investigator how well they understand what the important problems and goals of care are for three randomly selected patients (selected by

bed number, with the use of a random number generator). Attempts were made to ask all disciplines in turn, although this was not always practically possible. These professionals were asked to rate on a scale of 1 (not at all) to 5 (completely) how well they understand the goals of care for the patients, and how well they understood what needed to be done to prevent hospital acquired complications for the patient.

Phase 3. Post-intervention measures.

After the study period, the last 27 cases in which the goal sheet was used underwent COMPACT review, by the same reviewers as pre-intervention. The post-intervention questionnaire (Appendix 14) was administered during a two week period in exactly the same way as the pre-intervention questionnaire. This questionnaire is identical, except that there are extra items that seek participants' opinions on the value and burden of the goal sheet.

9.2.4. The intervention.

The final goal sheet, after adjustments made during the consultation period took the form of an A3 folded, yellow sheet of paper (a smaller version is shown in Figure 9.1., and a scanned copy of a completed sheet is included in Appendix 15). It is a grid, with all the geriatric syndromes and hospital acquired complications, as well as boxes for ceiling of care decisions and medication management on the left. Each column was for different time periods during the admission - the first column was for all members of the multidisciplinary team to complete on the patients arrival to the ward, based on information regarding the patients pre-admission and pre-DOME status for each of the items. Subsequent columns are for weekly reviews of each item, at MDMs and on consultant ward rounds. Each column is divided into two - so that goals as well as action plans for the item could be documented. The goal sheet was designed to be a easily accessible source of all important information so that the geriatric syndromes could be identified and managed pre-emptively.

9.2.5. Data analysis.

Comparison was made using independent sample t-tests between the 26 pre-intervention cases and the last 27 patients in whom the goal sheet is used, in terms of the numbers of outcome and process measures as detected by COMPACT. Correlations were calculated to estimate any changes in goal understanding and understanding of actions need to prevent hospital-acquired complications throughout the study period. In addition, independent t tests were conducted to assess any changes in length of stay, the mean perceived number of new geriatric syndromes during the hospital admission (using the pre- and post-study questionnaires), and attitudes to team working and multidisciplinary collaboration, as well as any differences between "real" (using COMPACT) and "perceived" number of new geriatric syndromes during the hospital admission.

9.2.6. Trust and research ethics approval

Prior to commencement of the study, approval was gained from the clinical leads for all the disciplines involved in the study within the Trust and the Essex 2 Research Ethics Committee (REC reference number 10/H0302/24).

Figure 9.1. The multidisciplinary goal sheet

Multidisciplinary goal sheet to prevent hospital acquired complications in older medical patients

Patient's name: | Hospital number: | Date of admission:

	Discharge goals *What was the patient like at their best before this illness? What are we trying to achieve?*	*On arrival to 8W* *Date……*		*Week 1* Date……		*Week 2* *Date……*		*Week 3* *Date……*	
		Current description	*Actions until next WR, MDM or discharge*	*Current description*	*Actions until next WR, MDM or discharge*	*Current description*	*Actions until next WR, MDM or discharge*	*Current description*	*Actions until next WR, MDM or discharge*
Mobility									
Function									
Delirium (acute confusion)									
Falls									
Infection									
Fluid management									
Nutrition									
Swallowing									
Continence and catheters									
Bowels									
Pressure areas									
Pain									
Mood									
Ceiling of care decisions									

9.3. Results

9.3.1. Patient characteristics as measured by COMPACT.

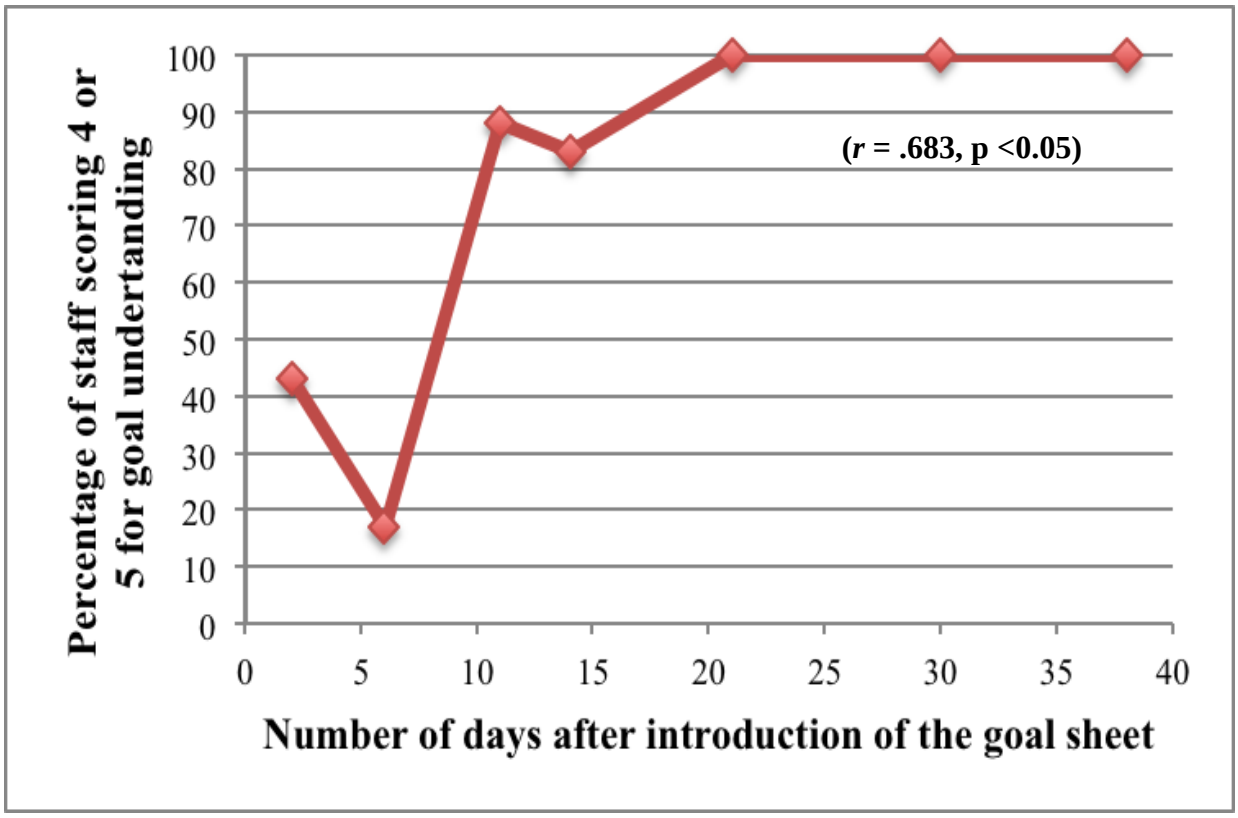
The mean age of all subjects was 84.08 years, none of whom died. 66% were female, and the mean total length of stay was 21.94 days (pre-DOME 4.02 days, on the DOME ward 17.92 days). 69.8% of subjects had evidence of chronic cognitive impairment, 32.1% had evidence of speech and communication problems, and 3.8% were in receipt of formal end of life care during the admission. Analysis showed no significant difference in any of these characteristics in the pre- and post-intervention groups.

9.3.2. Changes in staff understanding of patient goals and required actions to prevent hospital acquired complications.

At the beginning of the study, only 42% of staff responded "mostly" or "completely" (4 or 5 on the Likert scale) when asked about their understanding of goals of care for individual patients. This increased significantly (r = .683, $p < 0.05$) to 100% at 21 days and thereafter during the study period, as shown in Figure 9.2.

There was no significant change ($p > 0.05$) between the percentage scoring 4 or 5 when asked what needed to be done to prevent hospital-acquired complications in individual patients.

Figure 9.2. **Changes in the percentages of staff scoring 4 or 5 when asked about their understanding of goals of care for individual patients during the study period.**



9.3.3. Results of COMPACT review pre- and post- intervention - was there any change in quality and safety?

Process measures.

Table 9.2. illustrates the results of independent t tests indicating that the use of the goal sheet led to several significant improvements in several groups of process measure scores measured using COMPACT. These included process measure scores relating to the management of acute medical problems, those relating to the management of chronic cognitive impairment (both $p<0.001$), process measures relating to discharge planning, the management of new adverse outcomes (specifically functional decline and continence) and the management of end of life care issues (all p's <0.05).

Table 9.2. Significant improvements in process measure scores as measured with COMPACT pre- and post-intervention.

Group of process measures	Mean score (SD)		Independent t test
	Pre-intervention	Post-intervention	
Mean scores for Discharge planning PMs	3.77 (0.47)	4.86 (2.69)	$t(51) = 2.03$*
Mean scores for Management of Acute Medical Problems on the ward	3.97 (0.58)	4.60 (0.47)	$t(51) = 4.37$**
Mean scores for PMs relating to the management of new adverse outcomes on the ward	3.58 (0.93)	4.15 (0.69)	$t(51) = 2.51$*
Mean scores for PMs for managing functional decline on the ward	3.79 (0.86)	4.30 (1.17)	$t(51) = 2.31$*
Mean scores for PMs for continence management on the ward	3.07 (1.15)	3.88 (0.92)	$t(31) = 2.42$*
Mean scores for PMs for the management of chronic cognitive impairment on the ward	3.63 (1.06)	4.57 (0.59)	$t(33) = 3.21$**
Mean scores for PMs for the management of end of life issues on the ward	3.52 (0.92)	4.24 (0.97)	$t(39) = 2.41$*

* $p < 0.05$
** $p < 0.001$

As would be expected, there were in any of the process measures for the admission (pre-DOME) part of the stay – clearly this ward-based intervention could not have an effect on these measures.

The incidence of new adverse outcomes.

The changes in process measure scores represent significant improvements in care which might have been expected to lead to changes in outcomes for patients, however in this small study no significant differences were found in the incidence of new adverse outcomes as measured by COMPACT, nor on the length of stay as described earlier.

Overall, 28.9% experienced functional decline and 17% experienced a decline in mobility during the hospital admission. The prevalence of delirium and urinary incontinence at admission were 33.9% and 37.74% respectively. The incidence of new delirium during the admission was 26.4% and the incidence of new urinary incontinence was 5.7%. There were no significant differences in any of these findings in the pre- or post-intervention groups.

9.3.4. Staff perceptions of team working and the incidence of geriatric syndromes.

In total there were 28 responses to the questionnaire (18 pre-study and 10 post study). The majority (11) of responders were doctors, but 7 nurses, 4 physiotherapist, 3 occupational therapists, 1 dietician and 1 health care assistant took part. 16 had been qualified for less than 5 years and ten participants had qualified 5-30 previously. As the questionnaire was anonymous, and as the study took place over a period of junior doctor and therapist changeover, it is not known how many of the staff participated in both the pre- and post-study questionnaires. No significant changes were found in questionnaire results pre-or post-intervention (presumably because of the small sample size) so the results of both have been combined here to give an overall picture.

Perceptions of teamwork.

Figure 9.3. shows that in response to the questions relating to multidisciplinary team working, the majority of respondents felt that different members of the team have different perceptions of what the main problems are for the patient, have different expectations for the patients recovery or progress during the hospital stay and give different messages to families and carers.

Figure 9.3. Staff perceptions of teamworking.

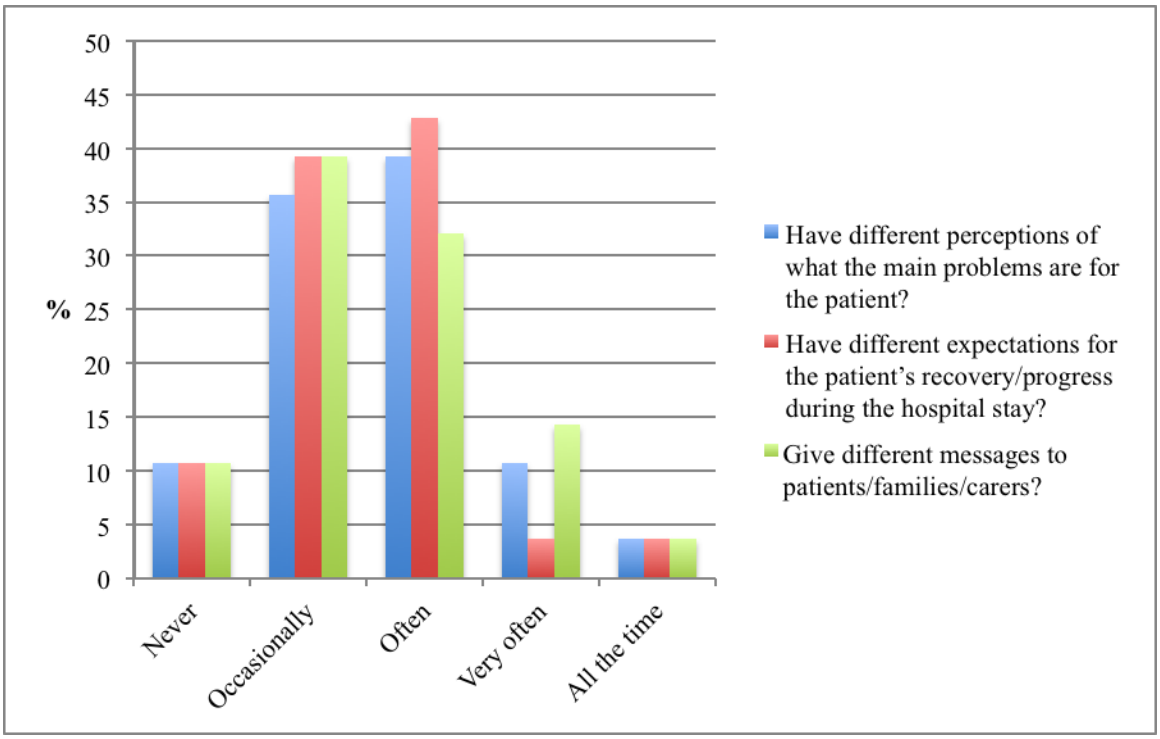
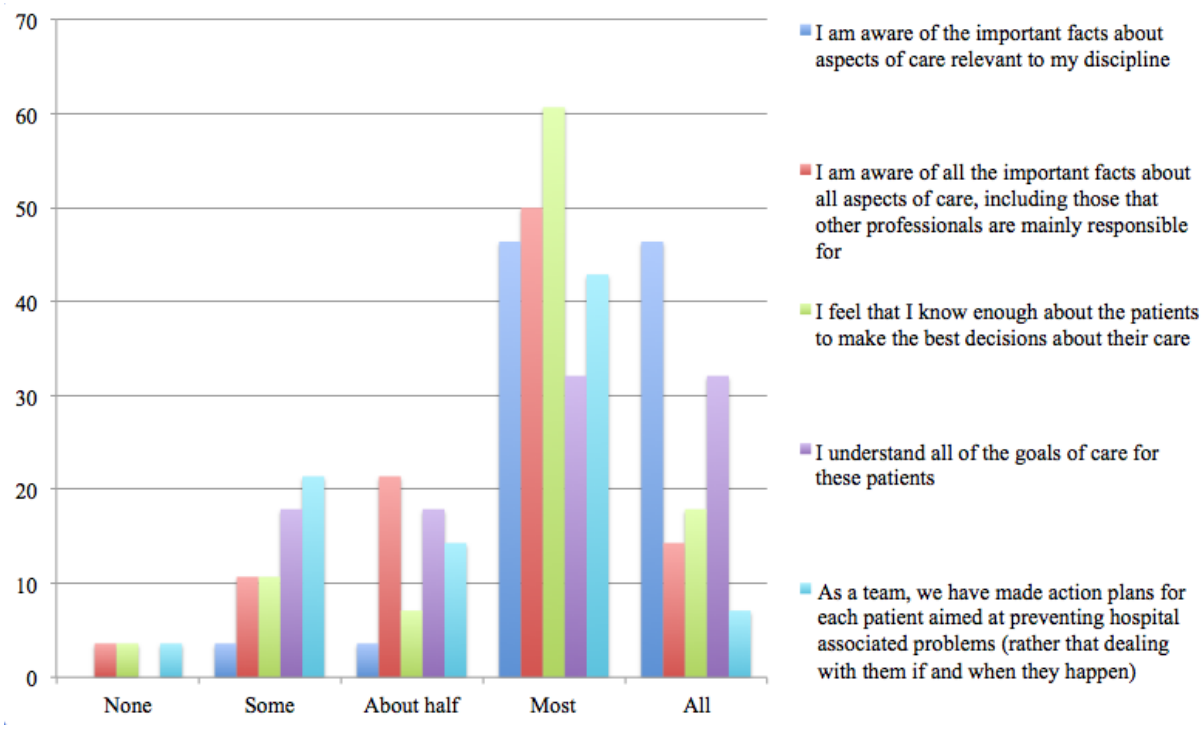


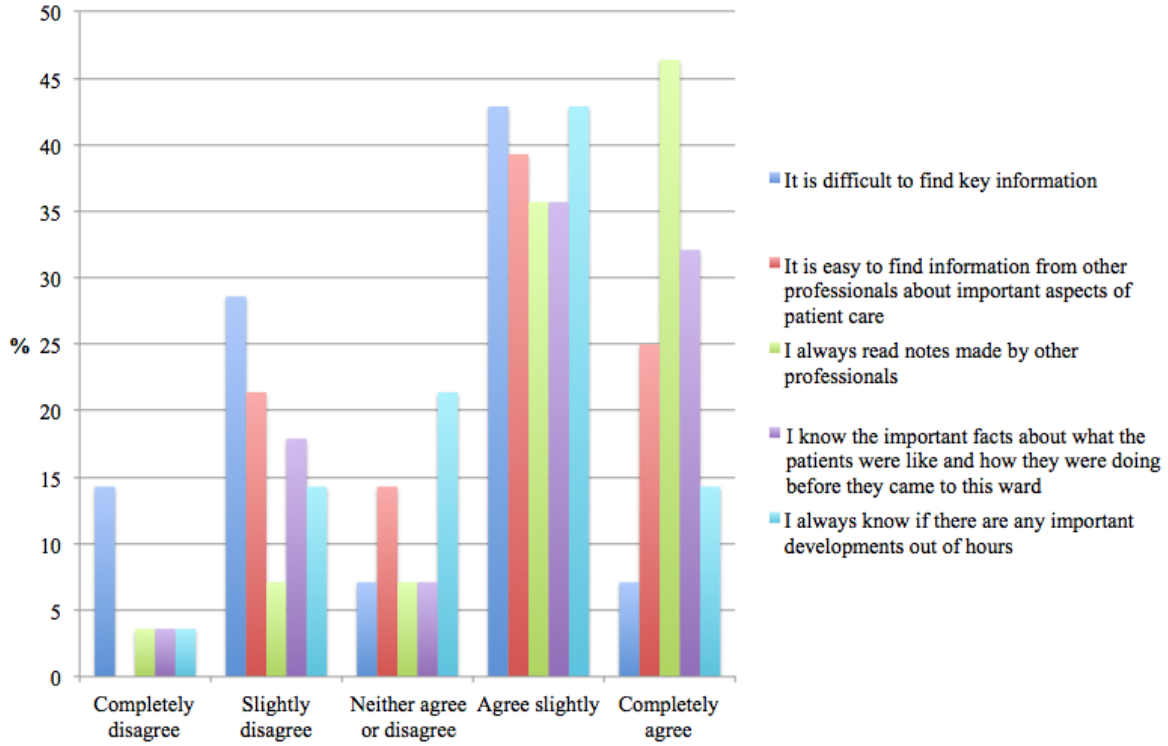
Figure 9.4. shows that when asked about their own awareness of issues around the care of current patients, the majority of respondents felt aware of the important facts about aspects of care relevant to their own discipline, that they knew enough about the patients to make the best decisions for their care and that as a team they had made action plans for each patient aimed at preventing hospital acquired complications. Fewer respondents felt that they were aware of all the important issues for those patients, including issues that other professionals are mainly responsible for, and that they understood all of the goals of care for their current patients.

Figure 9.4. Awareness of issues relevant to the care of current patients.



In response to questions regarding documentation and availability of clinical information, the group were divided over whether it was difficult to find key information, as shown in Figure 9.5. Most respondents felt that it was easy to find information from other professionals about important aspects of care, that they always read notes made by other professionals, that they knew the important facts about what patients were like and how they were doing before their arrival on the ward, and that they always know if there are any significant developments out of hours.

Figure 9.5. Perceptions of multidisciplinary documentation.



Independent samples Mann-Whitney U tests were carried out to look for any differences pre-and post intervention for categorical questionnaire items and independent t tests were used to identify pre-and post-study differences in continuous variables. Differences were also sought between professions and relating to years of clinical experience. The only significant differences found were that nurses' perceptions of the number of medication related problems ($t(5) = -11.659$, $p = < 0.001$) and nutritional problems ($t(5) = -3.173$, $p = 0.025$) were closer to reality after the study period than before it. The overall estimates by staff of the incidences of geriatric syndromes and their perceptions of multidisciplinary team working, problem awareness and documentation were unchanged after the intervention period.

Estimation of the incidence of geriatric syndromes.

Interestingly, when staff were asked to estimate the incidence of the geriatric syndromes, they almost universally overestimated their occurrence, as shown in Table 9.3., compared to incidences detected by the Long tool and COMPACT.

Table 9.3. The perception-reality gap for new adverse outcomes.

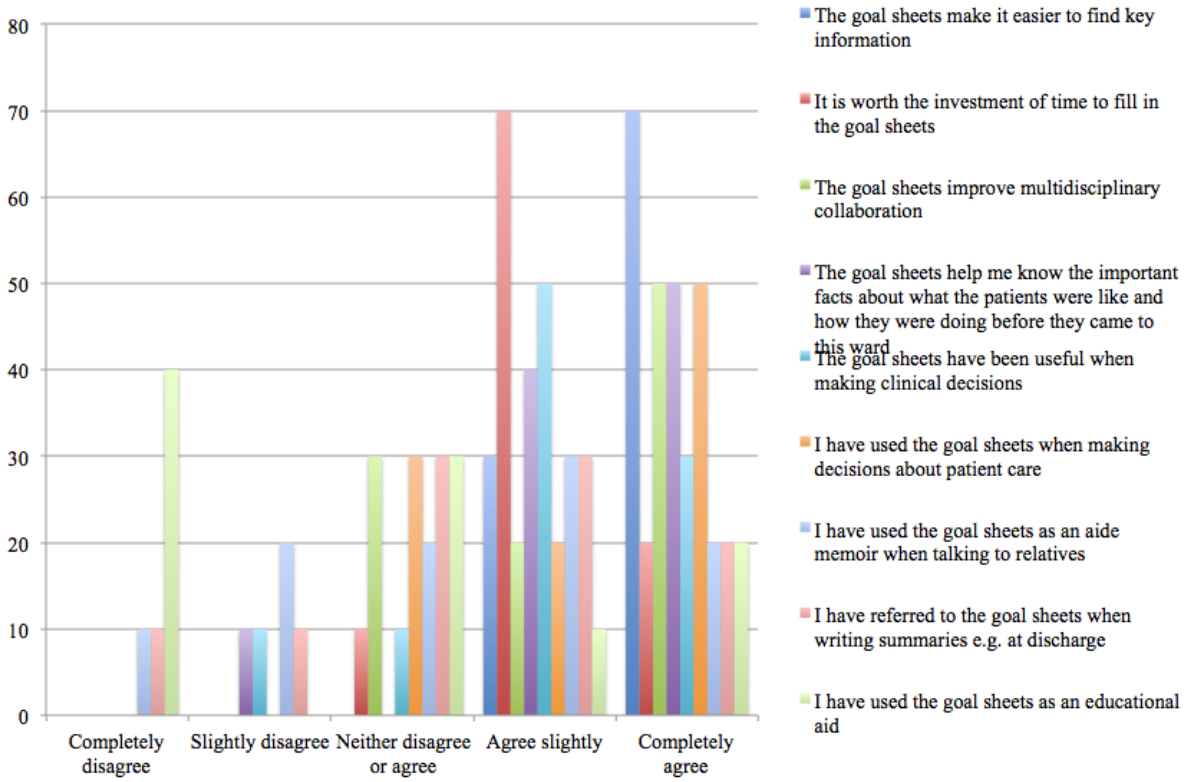
Geriatric syndromes[†]	**% overestimating incidence**	**% underestimating incidence**
Functional decline	92.8	7.2
Decline in mobility	96.4	3.6
Delirium	85.7	14.3
Faecal incontinence	100	0
Urinary incontinence	100	0
Constipation	96.4	3.6
Falls	96.4	3.6
Nutritional decline	100	0
Problems with fluids/electrolytes	100	0
Pressure sores	96.4	3.6
Hospital acquired infection	85.8	14.2
Medication related problems	0	100

[†] The "reality" figure is an overall means of the incidence of new adverse outcomes detected in Chapters 6 and 7.

9.3.5. Feedback from staff after using the goal sheet.

Figure 9.6. shows that in response to the questions relating to the goal sheet that were included in the post-study questionnaire, 100% of respondents felt that the goal sheets made it easier to find key information, that it was worth the investment of time to fill them in, and that they improved multidisciplinary collaboration. 90% felt that the goal sheets helped them understand the important facts about what patients were like and how they were doing before admission to the ward, and that the goal sheets had been useful when making clinical decisions. 70% said that they had actually referred to the goal sheets when making decisions about patient care. 50% had used the goal sheets as an aide memoire when talking to patients' families, and 50% had used them when writing patient summaries, e.g. at discharge. 30% had used the goal sheet as an educational aid during the study period.

Figure 9.6. Staff feedback after using the goal sheet.



Informal feedback was also obtained from staff, who felt that the goal sheet was particularly useful in patients who are complex, with long lengths of stay. The junior doctors felt that completing the sheet improved their rapport with patients and their families, because they had to sit down and go through the items on the sheet with them. Junior doctors found that they discovered relevant problems that they would never have normally asked about, and some patients and their relatives reportedly remarked that no-one else had enquired about these issues until this stage in the admission.

Reviewing the goal sheet regularly in the MDMs was also felt to be useful, as the team were able to readily identify areas of decreased function from baseline. There was an impression that all members of the team got to know the patients more thoroughly than just their own area of expertise. It was felt that the sheets provided an easy snapshot or overall view of the patients current function compared to their baseline. Team members were also reminded to make precise decisions at the MDMs, for example setting the ceiling of care, rather than just more basic resuscitation decisions.

Another positive outcome of using the goal sheet was that the team were able to track changes in function and monitor responses to multidisciplinary interventions. For example, one patient became newly faecally incontinent during the admission. This was picked up by the goal sheet, and improved with regular toileting, changing medications and altering the timing of the patient's physiotherapy regime. The team were then able to see from the sheet that the patient became continent again after these interventions had taken place. This also provided some positive feedback to the team.

The team felt that completion of the forms forced more complete discussion of the patients which was clinically useful but time consuming. The MDMs were significantly longer (30-45mins longer), but the team felt that the benefits were clear.

9.4. Discussion and conclusions.

9.4.1. Overall findings.

This study assessed the effects of the multidisciplinary goal sheet, a complex intervention, on a medicine for the elderly ward. Despite the fact that this was a preliminary study with small sample sizes and a short intervention period, significant changes were seen in a wide range of process of care measures as measured by COMPACT. COMPACT appears to be an adequate tool to detect these differences. In this study, no significant changes were seen in the number of new adverse outcomes as measured by COMPACT, nor in the length of stay, but it is anticipated that a larger study would allow these changes to become manifest. It makes sense that changes in process measures should occur before changes in patient outcomes are seen, as described in the Donabedian model depicted in Chapter 2. The intervention was purely based at the DOME ward stage of the admission, and it may be argued that changes in outcomes require interventions earlier on in the healthcare process.

In addition, a significant continuous improvement in goal understanding amongst staff for specific patients was observed during the study period. This implies that as the goal sheet was introduced, staff became more aware of problems that had already occurred, so dealt with them reactively rather than pro-actively preventing them. Figure 9.2. shows that here appears to be a dip in goal understanding shortly after commencement of the study, perhaps as staff using the goal sheet began to realise what was meant by "goals of care". The fact that no significant change in perceived understanding of required actions to prevent hospital acquired complications was seen may have been because the concept of "goals of care" is simpler than "what needs to be done to prevent hospital acquired complications", as often staff may not realise that the geriatric syndromes can be in fact hospital acquired complications.

There were no significant changes in staff perception of the incidence of hospital acquired complications and geriatric syndromes before or after the study - staff consistently overestimated their occurrence throughout. This is an interesting finding which requires further investigation. It might have been expected that the use of the goal sheet would improve the "perception-reality" gap here as staff became more aware of the occurrence of these problems.

There were also no significant changes in staff attitudes towards team working as assessed by the questionnaire before or after the intervention. This was probably because the sample size was too small to detect a difference - this was a practical problem associated with carrying out the study on only one ward with a small cohort of staff. However, overall, results confirmed that staff agreed there are problems with team working and multidisciplinary information sharing.

Overall though, staff felt that the goal sheet was useful and worth the investment of time taken to use it, and there was anecdotal evidence of direct benefits for patient care, multidisciplinary collaboration and team morale.

9.4.2. Strengths and limitations of the study.

The main strength of the study lay in its wholehearted "buy-in" by the staff working on the ward. They were interested, felt the aims of the study were worthwhile, could see that direct benefits to patients might ensue, and made a huge effort to complete the goal sheets, which was time consuming for them. I think the reason why this was achieved was because of the enthusiastic leadership of the consultant physician and ward manager involved.

The study used a wide range of measures, both pre and post intervention and during the study period itself. This allowed for more subtle effects to be assessed.

The limitations of the study relate to its small sample sizes, both in terms of the number of staff involved and therefore who could complete the questionnaire, and in terms of

the number of patients in whom the goal sheet was used (around 100). However, it was appropriate that the study take place initially only on one ward, to test the goal sheet for usability and practicality, and to avoid other confounders such as different systems of care on other wards.

It would have been interesting to feed back to staff continuously during the study period about their improvements in goal understanding, as done in other studies (Pronovost, 2003). However, at the time it was felt that we were bombarding them with a great deal of information and change, and this may have confused things.

The timing of the study was hampered slightly by the fact that junior medical staff and therapy staff changed over halfway through the study period, so a second wave of training for the use of goal sheet was required. It is encouraging though, that despite this, the process measures and goal understanding significantly improved. Ideally it would have been better for the intervention to have carried on for a longer period of time than ten weeks.

9.4.3. Clinical implications and implications for further work.

The use of a multidisciplinary goal sheet was felt to be useful clinically, as an easily accessible place for the multidisciplinary team to keep important information about the fluctuating geriatric syndromes and other aspects of care. It allowed the team to jointly make practical management plans for each clinical domain. Although there were no observed significant difference in patient outcomes during this study, many process of care measures did improve, so we may assume that with more time for the intervention to have effect, changes in outcomes might follow. The study highlights the potential for improvements in which the multidisciplinary team organise care and share information regarding the older medical inpatient.

Feedback from the team suggested that the goal sheets were most useful for complex patients with multiple problems and long lengths of stay. It was suggested that in

future work it may be beneficial to test their use selectively in this group of patients to avoid spending unnecessary time completing them in more straightforward, less complex patients with shorter lengths of stay. This would require us to be able to identify complex patients on arrival to the ward - perhaps by looking for the geriatric syndromes and complexity markers described in the Long tool and COMPACT.

During the study period the MDMs changed focus, from being very much discharge planning orientated to looking at comprehensive detail about the current clinical states of patients across a variety of domains and what needed to be done to prevent hospital acquired complications. If an intervention like this is to be used on a larger scale, pressures on the system and on nursing staff time in particular may need to be addressed, to allow this shift in focus to occur.

In conclusion, this study shows some promising benefits of this type of intervention. There are grounds to trial it on a larger scale. COMPACT appears to be a suitable measurement tool for the effects of such an intervention.

Section 5.

Chapter 10. Discussion and Conclusions.

10.1. Summary of findings.

This thesis reports a series of studies exploring the measurement and improvement of safety and quality of care in older medical inpatients. After introducing relevant concepts and definitions in Section 1 (Chapters 1 and 2), in Section 2 I have reported three studies designed to further explore pertinent issues: a re-analysis of the international adverse event studies and a systematic review of the literature (Chapter 3), a semi-structured interview study (Chapter 4) and an exploration of problems that occur in this patient group using a new detailed retrospective case record review approach (Chapter 5). In Section 3 of the thesis I have presented studies in which two novel case record review tools to measure the safety and quality of care in older medical inpatients were developed and tested (The Long tool, Chapter 6 and COMPACT, Chapter 7). Finally, in Section 4, I have turned to improvement of care, firstly by exploring trainable and important safety skills in healthcare (Chapter 8) and secondly by testing the use of a multidisciplinary goal sheet on a medicine for the elderly ward (Chapter 9). Here I will outline the main findings of these studies in relation to the three main aims set out at the beginning of the thesis (p.61).

10.1.1. Aim 1: To explore what is known about the types, incidences and causes of safety and quality issues in older medical inpatients.

The re-analysis of the major international adverse event studies (Chapter 3) showed that older people in hospital consistently experience more adverse events than their younger counterparts, and that this association seems to be related to complexity, comorbidity and frailty rather than age alone. Many of these studies excluded important care areas for older people, such as those receiving palliative or psychiatric care. The systematic literature

review, which was focussed specifically on the care of elderly medical inpatients, found only a small number of studies examining adverse events in this population, many of which were published many years ago, and few in the UK. Overall conclusions from the review were also limited because of the methodological heterogeneity of the studies, which had different aims and used different definitions. However, some of the studies provided useful data regarding the development of geriatric syndromes such as functional decline or delirium in older populations, recognising that these are important adverse events for older people.

The next step towards achieving the aim of producing a more complete picture of safety and quality issues in older people was to add to the rather limited information obtained from the literature by using a qualitative approach (Chapter 4). The interview study yielded a wealth of information about the types, contributory factors and outcomes of safety and quality issues in older inpatients, as well as suggested interventions, as perceived by multidisciplinary staff working in a variety of settings within the hospital.

The risks to older people during a hospital stay described by participants included all of those also found in the literature, namely the geriatric syndromes and other well-recognised clinical hospital-acquired complications, but these comprised only just over a quarter of the total number of problems described. The majority of issues raised were problems that are perhaps less easy to define and measure, such as threats to psychological and emotional well-being, and problems with processes of care, systems, attitudes and cultures within the hospital and the wider healthcare system.

A wide range of contributory factors for these risks were identified, relating to broadly to characteristics of staff, patients and systems of care. Staff-related contributory factors mostly centred around deficiencies in knowledge and skills, together with negative behaviours and attitudes. Patient related factors were comorbidity, difficulties in communicating needs and sensory and cognitive impairment. System related factors cited by

interviewees included staffing and resource pressures, restrictive ward routines, problems with multidisciplinary team working and communication, and problems with ward design and layout.

Interviewees described the cascade of interacting problems that can occur as a result of the risks, together with adverse outcomes for patients such as institutionalisation, prolonged length of stay, inappropriate restraint and isolation. They also reported other outcomes such as communication breakdowns with families, and financial costs to the organisation.

They described many positive initiatives which had been introduced prior to the study, such as the OASIS team, the red tray scheme, the employment of a dementia specialist nurse and the institution of a dementia friendly cubicle in A&E. When asked for suggestions for future interventions, they called for improvements in staff training and education, in many different ways, including knowledge and assessment skills, empathy and communication with older people and decision making. They suggested several improvements to hospital systems, such as the mechanisms of patient assessment and documentation, enhancing shared decision making and empowerment of patients and their families and finding ways to make better use and improving sharing of information collected by the multidisciplinary team. In addition, they felt that increased staffing and resource levels and improvements to the ward environments and equipment would help. On a wider level, they felt that improving public awareness and patient expectations of hospitalisation would also help. Finally, an over-arching theme was that interviewees felt that general attitudes towards older people amongst staff, the organisation and society as a whole should be improved.

The first case record review study (Chapter 5) found problems with care which overlap with those found in the literature and interview study. Problems at admission tended to centre on inadequate assessment, communication and diagnostic errors. During the ward

stay, problems included the development of recognized hospital-acquired complications, including the geriatric syndromes, complications of treatment, delays in receiving treatment and making diagnoses, difficulties with decision making, unnecessary interventions and again, poor communication between professionals. Many specific medication-related problems were also identified. Once again, multidisciplinary communication was found to be a problem at the time of discharge from hospital.

10.1.2. Aim 2: To develop and test novel, valid and reliable measurement tools for use in the assessment of safety and quality of care in older medical inpatients

The study presented in Chapter 5 not only served to augment the information already obtained about safety and quality in older patients, but also as a pilot of a new approach to case record review. This detailed, exploratory approach, in which patient characteristics were assessed, a timeline of events and problems throughout the whole admission created and specific groups of problems sought, was compared and contrasted with the standard adverse event detection method that has informed so much of the patient safety literature. Numerous problems were found when applying the adverse event detection method to complex elderly medical patients, including difficulties with relevance of standard definitions of adverse events to older people, difficulties in defining and identifying adverse events in this population (because of the effects of complexity and co-morbidity, the presence of multiple adverse events, and non-specific outcomes). In this pilot study, 20 cases were analysed using both methods; five adverse events were found with latter approach and 103 problems were found with the more detailed exploratory approach. The general conclusion was that the standard adverse event detection method does not provide a very useful way of measuring quality as well as safety, particularly if we wish to learn from measurement – to my mind it is like learning about the quality of a football match by looking solely at the red cards given.

During this first case record review, observations were made about the processes and challenges of case record review itself, which helped in the design of later tools. These included the potential for biases on the part of the reviewer, difficulties in disentangling problems present on admission from those that arose newly during the admission, and problems with varying quality of documentation.

The next step, as described in Chapter 6, was to combine all of the findings so far, to create a structured quality and safety measurement tool designed for use in older people, the Long tool. The general aims here were to create a valid and reliable tool that could be used by local clinical teams to produce an overview of safety and quality of care, using all available documented information and Donabedian principles.

The tool allows us to assess all of the complexity markers (or patient characteristics that are felt to affect safety and quality), together with all of the outcome and process measures identified in the second section of the thesis that are amenable to assessment through case record review. The outcome measures are the new adverse outcomes (geriatric syndromes and hospital acquired complications) – the mechanism used in the tool for mapping out these problems throughout the admission allows us to distinguish the incidence and the prevalence of these. The process measures used require the reviewer to make a series of judgements about a series of care processes relating to the management of applicable complexity markers, new adverse outcomes and generic issues.

The tool was tested in 100 completed admissions from the Department of Medicine for the Elderly (DOME) wards of one hospital. Relatively high incidences of complexity markers were found in this sample, as might be expected. Useful insights were gained about the ease of detection of these from retrospective case record review. The incidence of new adverse outcomes during the admissions were estimated using cross-tabulations of data, and these compare well with findings of other available studies, implying reasonable construct

validity. A significant proportion of patients (47%) developed two or more new adverse outcomes. Process measure scores were assessed by calculating the interquartile range, which allowed the identification of outlying items. These point to areas where care improvement efforts could be focussed.

Next, data were analysed to look for relationships between the different components of the tool. Here, significant negative correlations were found between the number of new adverse outcomes and the following groups of process measure scores: management of acute medical problems, medication management, and the management of generic issues. This suggests that lower scores in these items were associated with higher numbers of new adverse outcomes during the admission, which fits with the Donabedian model that lower process scores. Between the groups of process measures themselves, significant positive correlations were found between scores for the management of acute medical problems, medication management and the management of generic issues (all ps $\leq$ 0.001). Scores for the management of adverse outcomes correlated significantly with scores for medication management and management of generic issues.

Groups of patients that had significantly higher numbers of new adverse outcomes than others included those who died, those with longer lengths of stay, those with dysphagia and those requiring greater levels of care on discharge from hospital. Process measure scores were significantly lower in the following groups: those who were female, those who were older, those with evidence of delirium at admission, those with evidence of dementia and those who were functionally less able before admission.

Inter-rater reliability for the Long tool was tested with the help of a co-reviewer of similar clinical experience and was found to be very good for all aspects of the tool apart from assessment of medication management process measures.

The Long tool was therefore found to be a valid, reliable and clinically useful tool, but it had limitations, notable the amount of detail contained within it and the time taken to complete reviews and analyse data. The next step was to produce a shorter version of the tool (COMPACT), by taking a subset of items from the Long tool (Chapter 7). These items were chosen using a criterion-led systematic process.

COMPACT was tested at three sites, with multiple reviewers. Data from the first site showed that the groups of scores obtained in COMPACT correlated significantly with those from the Long tool, allowing us to be confident that COMPACT is a good representation of the Long tool.

On comparison across the three sites, COMPACT was able to detect significant differences in the demographic characteristics of the patients, and the presence of complexity markers. However, no significant differences were found between the incidence of new adverse outcomes in the samples. Examination of process measure scores falling outside the interquartile range showed that several items scored particularly poorly or well in all three different hospitals, but also that each hospital had a different profile of process measure scores. This indicates that COMPACT could be used as a "diagnostic tool" for individual departments of medicine for the elderly to focus their improvement efforts.

Again, excellent inter-rater reliability was found for COMPACT at each of the three sites, for the detection of new adverse outcomes and complexity markers, between reviewers of different levels of clinical experience. Excellent reliability was also found for process measure scores between reviewers of registrar grade or above, but less so when comparisons were made between a SHO and a registrar, reflecting the degree of judgement and clinical experience needed to assess these items.

10.1.3. Aim 3: To develop and test interventions designed to improve overall safety and quality of care in older medical inpatients.

The final pair of studies in the thesis were preliminary investigations of different ways of improving safety and quality of care in older people. First, in Chapter 8, an exploration of "safety skills" or attributes of a safe practitioner were identified, which could be incorporated into generic patient safety curricula. 78 individual skills in 18 distinct categories were identified from a survey and focus group of patient safety experts. Many of these overlap with the skills described in the interview study and therefore included in the Long tool and COMPACT. The majority were felt to be important and trainable by a series of experienced clinicians.

The next intervention was more specifically focussed on improving teamwork and collaboration on a medicine for the elderly ward using a combined multidisciplinary goal sheet for assessment and planning of care, inspired by Pronovosts daily goal sheets in an intensive care unit. A significant improvement was found in goal understanding amongst staff during the intervention period, and significant improvements were found in process measure scores using COMPACT in cases in which the goal sheet had been used in addition to usual care. These improvements in processes of care did not translate into improvements in outcomes for patients in this small study. Staff questionnaires confirmed suspected problems with multidisciplinary teamwork, documentation and collaboration, but there was no difference in these perceptions after the use of the intervention, again possibly because of the small sample size. Feedback from participating staff indicated that although the goal sheet added to their work, they could see real clinical benefits from its use, and on the whole was extremely positive.

10.2. Methodological issues – strengths and limitations of the research.

I have used a wide range of research methods in order to try to fulfil the aims of the thesis. Here I would like to discuss some of the strengths and limitations of the approaches used, and how these impact on the conclusions reached.

The use of different broad approaches in the exploratory phase.

The use of a combination of research methods (literature reviewing, qualitative interviews and exploratory case record review) in the second section of the thesis allowed me to achieve a detailed, comprehensive and I hope near-complete overall picture of safety and quality issues in older inpatients. The questions that were asked, however were very broad, leading to difficulties with data analysis and interpretation. Although this might be regarded as a strength of the work, a different approach might have been to focus on more specific clinical problems in order to assess overall quality of care, as suggested by Inouye, who has proposed that delirium could be used as a barometer of care (Inouye, 2001). None of the approaches used here directly involved the views of patients and their families, essential to assessments of quality of care – this may have added a different dimension to the findings.

Sample sizes.

Many of the results and conclusions presented here are limited by the small sample sizes used, due to time and resource constraints. I tried to address this when testing COMPACT by comparing its use at three different sites, and using multiple reviewers. The intervention studies are also limited by small sampling frames within single hospitals – but for preliminary studies they indicate great promise for future work.

Limitations of retrospective case record review.

I was aware throughout the case record review studies of the limitations of retrospective case record review, in particular the potential for hindsight and outcome bias, and difficulties with the quality of documentation – in that not all clinical actions which might provide insights into safety and quality are documented. This is further complicated by the possibility that teams who provide higher quality of care are more likely to document things that have gone wrong, which may have been misleading. I tried to address these limitations by being as thorough as possible, using all multidisciplinary notes to assess care and asking very specific questions where possible.

As alluded to in earlier chapters, case record review can only assess certain types of quality (and therefore safety). There are many more aspects of quality of care, in particular the more "qualitative" ones identified in the interview study, the assessment of which would require a completely different approach, such as care mapping (Woolley et al., 2008) or patient satisfaction surveys. Future overall assessments of quality might therefore include the use of case record review tools such as The Long tool or COMPACT, but they should probably only be used in conjunction with these other methods if one seeks a complete picture.

Difficulties in making judgements about care from retrospective case record review.

All reviewers had worked in the clinical departments where the reviews were carried out, which may have given them insight into the care processes involved at each hospital, allowing them to "read between the lines", particularly when making judgements about care. This also may have led to biases if they personally knew the people documenting in the notes. It would have been interesting to compare their findings with those of independent reviewers unfamiliar with practices in the hospitals.

The process measure sections of COMPACT and the Long tool ask the reviewer to rate care on a Likert scale. This is difficult, due to the variety of items involved and the different scales of possible problems. I tried to address this by giving some examples in the manual, but by stressing during reviewer training that the important thing was a "general impression" of care in respect to each item. This seems to have worked, as demonstrated by the excellent inter-rater reliability found in the Long tool and COMPACT. However, this reliability declined when a more clinically junior reviewer was involved, indicating that such "gut feelings" are more accurate with increasing levels of clinical experience.

10.3. Directions for further research.

The work in the first exploratory part of the thesis i.e. the findings about the types, causes, outcomes and interventions for safety and quality of care issues in older medical patients could be developed and validated further, by seeking the views of patients and their families or gaining clinical expert consensus. Because this section of the thesis produced such a broad range of findings, many potential future research projects were suggested, including more large scale studies to examine adverse events in older people (and in particular those groups excluded from other studies, such as patients receiving palliative care), and implementation and testing of all of the practical interventions suggested by participants in the interview study.

The Long tool and COMPACT studies represent the first steps in creating novel quality and safety measurement tools specifically designed for use by local clinical teams in older medical patients. Further work may focus on testing these in larger samples, or adapting them for use in other settings. Perhaps, for example, versions could be created for use on surgical wards or for use in rehabilitation units or other intermediate care settings. Also,

future work could be done to use a combined approach of retrospective case record review using tools such as these with qualitative assessment of care provision, using techniques such as care mapping (Woolley et.al., 2008). It would be interesting to compare the results of these two approaches in the same group of patients.

This work also indicates that specific groups of elderly patients are more at risk of developing new adverse outcomes and receiving poorer care than others – this could be investigated further and quality improvement work may focus on these groups.

Both intervention studies warrant further work. Work needs to be done to establish how best to train the safety skills identified in Chapter 8, to assess the effect of this on care. It would be interesting to determine whether such training could be combined with other educational initiatives as suggested in Chapter 4 to improve the care of older people in particular.

The multi-disciplinary goal sheet should be tested on a wider scale, both in larger populations and for longer study periods. It would be interesting to see whether this led to changes in outcome measures and staff perceptions of team working. The main challenge here would be that use of the goal sheet requires dedication and enthusiasm from all participating staff – using a continuous feedback approach during the intervention period may encourage this. In order to reduce the burden on staff, it may be better to use the sheet in complex patients, as suggested as part of the feedback received in this preliminary study, but here difficulties would lie in the prospective identification of such cases. Also the goal sheet could be modified to a tick-box format to make it easier to complete, however this may prove unnecessarily complicated.

One possible future research approach which might circumvent the problems with using retrospective case record review to assess quality in older medical patients might be to

use data from the goal sheets themselves, filled in prospectively during the admission, to make similar assessments as those obtained in the Long tool and COMPACT. The incidence of new adverse outcomes should be easily detectable, and process measure scores could be derived from the multidisciplinary actions documented. However, a problem with this might be that the documentation of actions to be done will not necessarily signify that they have actually been done, thus perhaps leading to misjudgements of care.

10.4. Implications for clinical practice.

The work presented in this thesis emphasises the fact that clinical teams caring for older patients need to be mindful of their vulnerabilities in terms of developing new geriatric syndromes and hospital-acquired complications, particularly those who are frail, with complexity markers and complex medical problems requiring complex treatments. Ideally, these patients should be identified on admission to hospital so that we can ensure that they receive safe and high quality care throughout, and efforts can be made to proactively prevent these new adverse outcomes.

I have been able to use all of the findings of the first part of the thesis to start to develop and test new, valid and reliable tools which might be used local clinical teams to develop their own improvement work, and to assess the impact of interventions on a wider scale. However, data suggests that these tools need to be used by doctors with experience in geriatric medicine – time pressures on senior staff may be a challenge here.

The findings of the interview study in particular suggest that we may need to re-design some processes of care, in order to enhance inter-professional communication, make ward environments more suited to the needs of frail older people, empower patients and their families and avoid problems associated with restrictive ward routines. Of course this will require judicious use of limited financial resources.

10.5. Wider implications.

Wider implications of this work include the suggestion that there is a need to further develop the training curricula of all professionals caring for older people. Medical and nursing curricula should teach the recognition of frail and complex patients, so that interventions for frailty and to prevent the occurrence of the geriatric syndromes can be implemented early. Undergraduate medical education should be emphasise the physiological differences associated with age, informing safe prescribing for older people. There is increasing attention paid to the teaching of communication skills - these need to be designed with the specific skills required of all healthcare professionals to communicate effectively with older people, such as those with cognitive or sensory impairment. In addition, as already mentioned, training of the safety skills could to be combined with this so that healthcare professionals in all hospital specialities who work with older people can maximise their own abilities to provide safe care.

The use of measurement tools based on a similar approach to mine, on a wider scale than within local clinical teams could also be considered. These may be used to complement the other existing ways in which the quality of healthcare in older people is assessed, described in Chapter 2. Common problems across multiple hospitals could be the focus of large-scale improvement work.

Perhaps the most difficult wider issue raised in the thesis is that of how to improve attitudes and overcome cultural barriers to improve behaviours towards older people. This is a complex question, but if it could be achieved, undoubtedly improvements in safety and quality in their healthcare would ensue.

10.6. Concluding remarks.

The research presented here has employed a range of methods to explore some of the intricacies of safety and quality measurement and improvement in older inpatients, who constitute the largest, but perhaps the most complex population in modern hospitals.

I have produced a detailed picture of safety and quality issues in these patients, and used these to create two new, valid and reliable measurement tools which are unique because they are designed with the issues facing older medical inpatients in mind. My work has shown that the combined use of outcome and process measures in these measurement tools is useful, and that there are clear relationships between these measures. I have been able to identify groups of older patients who seem to be more vulnerable than others to developing new adverse outcomes during the hospital admission and who appear to receive poorer care as assessed by a wide range of process measures.

In addition, I have begun to develop two approaches to improving care for these patients – one at a generic educational level, and the other at a more specific clinical process level. The preliminary data here are encouraging and suggest that these approaches to improvement warrant further investigation.

This work was inevitably not without methodological limitations, but I have gained a great deal in terms of knowledge and skills in carrying it out. I hope that it will contribute to the enhancement of the care of older people in the future.

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Appendices

Appendix 1. Development of initial search terms for systematic review.

#	Search term	1.	#	Modified to	2.
1	adverse$.mp	2511577			
2	error$.mp	191816			
3	exp MEDICAL ERROR/ or exp DIAGNOSTIC ERROR/ or exp MEDICATION ERROR/ or exp THERAPEUTIC ERROR/ or exp SYSTEMATIC ERROR	26758			
4	clinical incident$.mp	50			
5	undesirable outcome$.mp	108			
6	critical incident$.mp	636			
7	exp Patient Safety/ (from mapping critical incident	8216			
8	iatrogenic$.mp	17643			
9	exp IATROGENIC DISEASE/co, et, pc, di, rt, dm, rh, dr, si, dt, ep, th (excluded congenital and surgery in subheadings)	647956			
10	injuri$.mp	71805			
11	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10	647956	39	(adverse$ or error$ or (MEDICAL ERROR or DIAGNOSTIC ERROR or MEDICATION ERROR or THERAPEUTIC ERROR or SYSTEMATIC ERROR) or clinical incident$ or undesirable outcome$ or critical incident$ or Patient Safety or iatrogenic$ or IATROGENIC DISEASE or injuri$).ab,ti.	333357
12	elder$.mp	111234			
13	exp Aging/ or exp Elderly Care/ (elder mapped to aged excluding aged alone (as otherwise get aged 40 etc))	99902			
14	geriatric$.mp	32530			
15	exp geriatrics/	8783			
16	frail$.mp	3810			
17	exp Elderly Care/ or exp Falling/ or exp FRAIL ELDERLY/ or exp Health Program/ or exp Geriatric Disorder/ or exp Geriatric Care/ (frail mapped)	95617			
18	older$.mp	129474			
19	12 or 13 or 14 or 15 or 16 or 17 or 18	346610	40	(elder$ or (Aging or Elderly Care) or geriatric$ or geriatrics or frail$ or (Elderly Care or Falling or FRAIL ELDERLY or Health Program or Geriatric Disorder or Geriatric Care) or older$).ab,ti.	275185
20	inpatient$.mp.	34859			
21	patient$.mp.	2752213			
22	hospital$.mp.	490557			
23	ward$.mp.	41394			
24	exp hospital patient/ or exp aged hospital patient/ (inpatient mapped, adolescent and child not ticked in subheadings)	18282			
25	exp Hospitalization/ (hospitalisation mapped)	60602			
26	PATIENT/ or exp GERIATRIC PATIENT/ or exp HIGH RISK PATIENT/ (patient mapped – only the above subheadings ticked out of many)	52902			
27	20 or 21 or 22 or 23 or 24 or 25 or 26	2923784	41	(inpatient$ or patient$ or hospital$ or ward$ or (hospital patient or aged hospital patient) or Hospitalization or (PATIENT or GERIATRIC PATIENT or HIGH RISK PATIENT)).ab,ti.	2713106
28	**11 and 19 and 27**	**20885**	42	39 and 40 and 41	**11246**
29-38	**Sensitivity check using Thomas, Gillick, Kapp, Lefevre, Rothschild**	**PASSED**	43-47	**Sensitivity check using Thomas, Gillick, Kapp, Lefevre, Rothschild**	**PASSED**

Appendix 2. Final search strategy for systematic review using abstract and title.

Databases searched:

- Medline 1980 – April Week 3 2008
- Medline in process and other non-indexed citations April 29th, 2008
- Embase 1980-2008 Week 17
- PsycINFO 1985-Week 4 2008

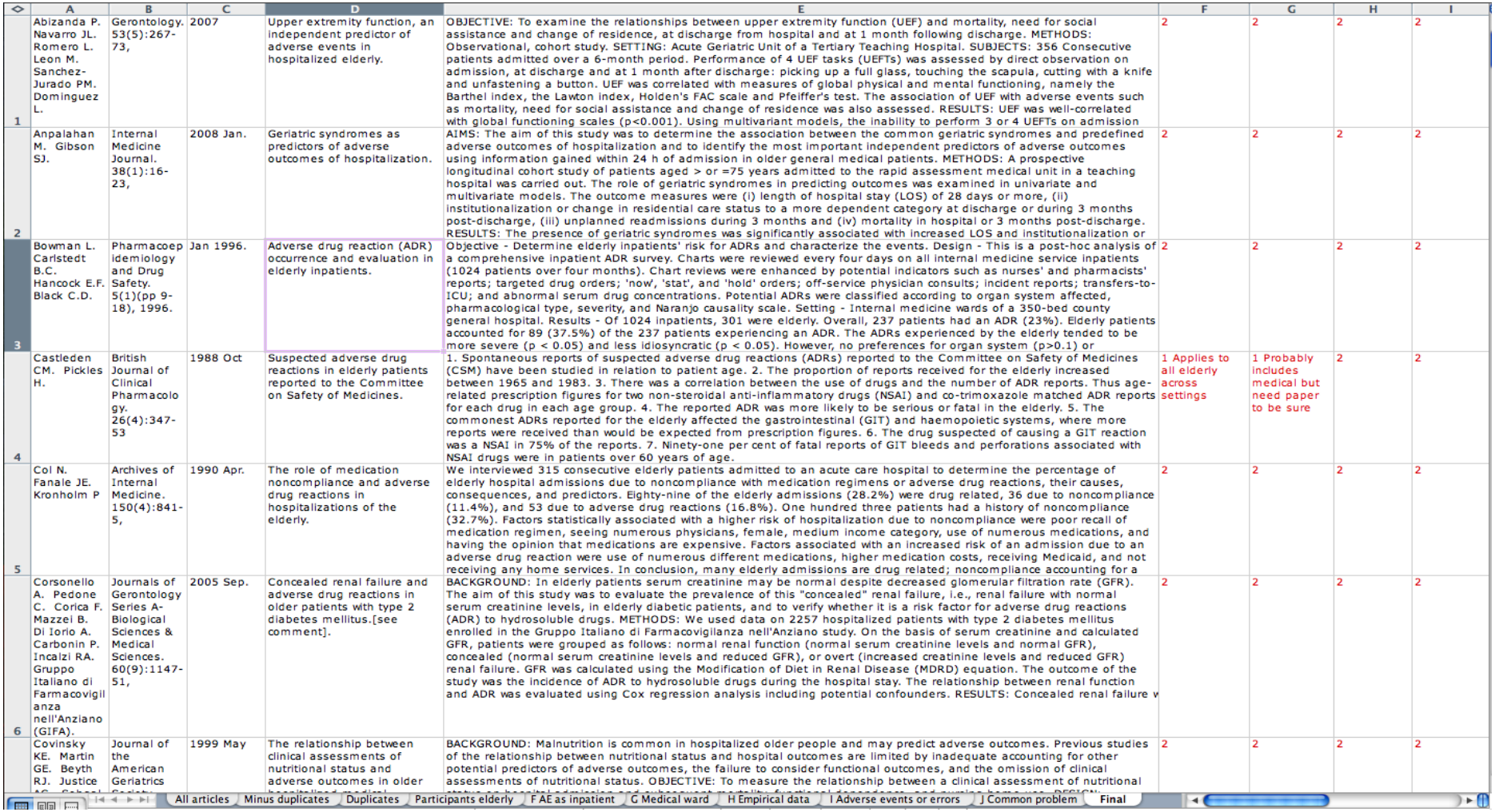
Abstract and title.

#	SEARCH STRATEGY	
1	(adverse$ or error$ or (MEDICAL ERROR or DIAGNOSTIC ERROR or MEDICATION ERROR or THERAPEUTIC ERROR or SYSTEMATIC ERROR) or clinical incident$ or undesirable outcome$ or critical incident$ or Patient Safety or iatrogenic$ or IATROGENIC DISEASE or injuri$).ab,ti.	776648
2	(elder$ or (Aging or Elderly Care) or geriatric$ or geriatrics or frail$ or (Elderly Care or Falling or FRAIL ELDERLY or Health Program or Geriatric Disorder or Geriatric Care) or older$).ab,ti.	684059
3	(inpatient$ or patient$ or hospital$ or ward$ or (hospital patient or aged hospital patient) or Hospitalization or (PATIENT or GERIATRIC PATIENT or HIGH RISK PATIENT)).ab,ti.	6058824
4	1 AND 2 AND 3	24274
5	Remove duplicates from 4	TOO MANY
6	Limit 4 to abstracts	24178
7	Limit 5 to English language	21556
8	Limit 6 to humans (not valid in psych info so records retained)	**20576**
9-18	Sensitivity check with Thomas, Lefevre, Rothschild, Gillick, Kapp	**PASSED**

Title only.

1	(adverse$ or error$ or (MEDICAL ERROR or DIAGNOSTIC ERROR or MEDICATION ERROR or THERAPEUTIC ERROR or SYSTEMATIC ERROR) or clinical incident$ or undesirable outcome$ or critical incident$ or Patient Safety or iatrogenic$ or IATROGENIC DISEASE or injuri$).ti.	122585
2	(elder$ or (Aging or Elderly Care) or geriatric$ or geriatrics or frail$ or (Elderly Care or Falling or FRAIL ELDERLY or Health Program or Geriatric Disorder or Geriatric Care) or older$)ti.	252491
3	(inpatient$ or patient$ or hospital$ or ward$ or (hospital patient or aged hospital patient) or Hospitalization or (PATIENT or GERIATRIC PATIENT or HIGH RISK PATIENT)).ti.	1610509
4	1 and 2 and 3	455
5	Remove duplicates from 4	277
6	Limit 5 to abstracts	202
7	Limit 6 to English language	167
8	Limit 7 to humans (not valid in psych info so records retained)	**167**

Appendix 3. Screenshot of Excel document used to apply selection criteria for final articles in systematic review.



	A	B	C	D	E	F	G	H	I
1	Abizanda P. Navarro JL. Romero L. Leon M. Sanchez-Jurado PM. Dominguez L.	Gerontology. 53(5):267-73,	2007	Upper extremity function, an independent predictor of adverse events in hospitalized elderly.	OBJECTIVE: To examine the relationships between upper extremity function (UEF) and mortality, need for social assistance and change of residence, at discharge from hospital and at 1 month following discharge. METHODS: Observational, cohort study. SETTING: Acute Geriatric Unit of a Tertiary Teaching Hospital. SUBJECTS: 356 Consecutive patients admitted over a 6-month period. Performance of 4 UEF tasks (UEFTs) was assessed by direct observation on admission, at discharge and at 1 month after discharge: picking up a full glass, touching the scapula, cutting with a knife and unfastening a button. UEF was correlated with measures of global physical and mental functioning, namely the Barthel index, the Lawton index, Holden's FAC scale and Pfeiffer's test. The association of UEF with adverse events such as mortality, need for social assistance and change of residence was also assessed. RESULTS: UEF was well-correlated with global functioning scales (p<0.001). Using multivariant models, the inability to perform 3 or 4 UEFTs on admission	2	2	2	2
2	Anpalahan M. Gibson SJ.	Internal Medicine Journal. 38(1):16-23,	2008 Jan.	Geriatric syndromes as predictors of adverse outcomes of hospitalization.	AIMS: The aim of this study was to determine the association between the common geriatric syndromes and predefined adverse outcomes of hospitalization and to identify the most important independent predictors of adverse outcomes using information gained within 24 h of admission in older general medical patients. METHODS: A prospective longitudinal cohort study of patients aged > or =75 years admitted to the rapid assessment medical unit in a teaching hospital was carried out. The role of geriatric syndromes in predicting outcomes was examined in univariate and multivariate models. The outcome measures were (i) length of hospital stay (LOS) of 28 days or more, (ii) institutionalization or change in residential care status to a more dependent category at discharge or during 3 months post-discharge, (iii) unplanned readmissions during 3 months and (iv) mortality in hospital or 3 months post-discharge. RESULTS: The presence of geriatric syndromes was significantly associated with increased LOS and institutionalization or	2	2	2	2
3	Bowman L. Carlstedt B.C. Hancock E.F. Black C.D.	Pharmacoepidemiology and Drug Safety. 5(1)(pp 9-18), 1996.	Jan 1996.	Adverse drug reaction (ADR) occurrence and evaluation in elderly inpatients.	Objective - Determine elderly inpatients' risk for ADRs and characterize the events. Design - This is a post-hoc analysis of a comprehensive inpatient ADR survey. Charts were reviewed every four days on all internal medicine service inpatients (1024 patients over four months). Chart reviews were enhanced by potential indicators such as nurses' and pharmacists' reports; targeted drug orders; 'now', 'stat', and 'hold' orders; off-service physician consults; incident reports; transfers-to-ICU; and abnormal serum drug concentrations. Potential ADRs were classified according to organ system affected, pharmacological type, severity, and Naranjo causality scale. Setting - Internal medicine wards of a 350-bed county general hospital. Results - Of 1024 inpatients, 301 were elderly. Overall, 237 patients had an ADR (23%). Elderly patients accounted for 89 (37.5%) of the 237 patients experiencing an ADR. The ADRs experienced by the elderly tended to be more severe (p < 0.05) and less idiosyncratic (p < 0.05). However, no preferences for organ system (p>0.1) or	2	2	2	2
4	Castleden CM. Pickles H.	British Journal of Clinical Pharmacology. 26(4):347-53	1988 Oct	Suspected adverse drug reactions in elderly patients reported to the Committee on Safety of Medicines.	1. Spontaneous reports of suspected adverse drug reactions (ADRs) reported to the Committee on Safety of Medicines (CSM) have been studied in relation to patient age. 2. The proportion of reports received for the elderly increased between 1965 and 1983. 3. There was a correlation between the use of drugs and the number of ADR reports. Thus age-related prescription figures for two non-steroidal anti-inflammatory drugs (NSAI) and co-trimoxazole matched ADR reports for each drug in each age group. 4. The reported ADR was more likely to be serious or fatal in the elderly. 5. The commonest ADRs reported for the elderly affected the gastrointestinal (GIT) and haemopoietic systems, where more reports were received than would be expected from prescription figures. 6. The drug suspected of causing a GIT reaction was a NSAI in 75% of the reports. 7. Ninety-one per cent of fatal reports of GIT bleeds and perforations associated with NSAI drugs were in patients over 60 years of age.	1 Applies to all elderly across settings	1 Probably includes medical but need paper to be sure	2	2
5	Col N. Fanale JE. Kronholm P	Archives of Internal Medicine. 150(4):841-5,	1990 Apr.	The role of medication noncompliance and adverse drug reactions in hospitalizations of the elderly.	We interviewed 315 consecutive elderly patients admitted to an acute care hospital to determine the percentage of elderly hospital admissions due to noncompliance with medication regimens or adverse drug reactions, their causes, consequences, and predictors. Eighty-nine of the elderly admissions (28.2%) were drug related, 36 due to noncompliance (11.4%), and 53 due to adverse drug reactions (16.8%). One hundred three patients had a history of noncompliance (32.7%). Factors statistically associated with a higher risk of hospitalization due to noncompliance were poor recall of medication regimen, seeing numerous physicians, female, medium income category, use of numerous medications, and having the opinion that medications are expensive. Factors associated with an increased risk of an admission due to an adverse drug reaction were use of numerous different medications, higher medication costs, receiving Medicaid, and not receiving any home services. In conclusion, many elderly admissions are drug related; noncompliance accounting for a	2	2	2	2
6	Corsonello A. Pedone C. Corica F. Mazzei B. Di Iorio A. Carbonin P. Incalzi RA. Gruppo Italiano di Farmacovigilanza nell'Anziano (GIFA).	Journals of Gerontology Series A-Biological Sciences & Medical Sciences. 60(9):1147-51,	2005 Sep.	Concealed renal failure and adverse drug reactions in older patients with type 2 diabetes mellitus.[see comment].	BACKGROUND: In elderly patients serum creatinine may be normal despite decreased glomerular filtration rate (GFR). The aim of this study was to evaluate the prevalence of this "concealed" renal failure, i.e., renal failure with normal serum creatinine levels, in elderly diabetic patients, and to verify whether it is a risk factor for adverse drug reactions (ADR) to hydrosoluble drugs. METHODS: We used data on 2257 hospitalized patients with type 2 diabetes mellitus enrolled in the Gruppo Italiano di Farmacovigilanza nell'Anziano study. On the basis of serum creatinine and calculated GFR, patients were grouped as follows: normal renal function (normal serum creatinine levels and normal GFR), concealed (normal serum creatinine levels and reduced GFR), or overt (increased creatinine levels and reduced GFR) renal failure. GFR was calculated using the Modification of Diet in Renal Disease (MDRD) equation. The outcome of the study was the incidence of ADR to hydrosoluble drugs during the hospital stay. The relationship between renal function and ADR was evaluated using Cox regression analysis including potential confounders. RESULTS: Concealed renal failure v	2	2	2	2
	Covinsky KE. Martin GE. Beyth RJ. Justice	Journal of the American Geriatrics	1999 May	The relationship between clinical assessments of nutritional status and adverse outcomes in older	BACKGROUND: Malnutrition is common in hospitalized older people and may predict adverse outcomes. Previous studies of the relationship between nutritional status and hospital outcomes are limited by inadequate accounting for other potential predictors of adverse outcomes, the failure to consider functional outcomes, and the omission of clinical assessments of nutritional status. OBJECTIVE: To measure the relationship between a clinical assessment of nutritional	2	2	2	2

All articles | Minus duplicates | Duplicates | Participants elderly | F AE as inpatient | G Medical ward | H Empirical data | I Adverse events or errors | J Common problem | Final

Appendix 4. Pre-interview sheet sent to interview study participants.

Identifying and Reducing Healthcare Risks for Older Patients:
A Scoping Exercise

Please Read Prior to Interview

Dear Participant,

We are very grateful to you for agreeing to be interviewed for this project.

Our aim is to find out from you what you consider to be risks or dangers to the elderly in hospital, and what improvements you suggest (if any) could be implemented to deal with these.

To help the interview, we would like you to picture the following (imaginary) patients in the hospital:

A. An 85 year old lady who lives at home alone is admitted to hospital after a fall.

B. An 85 year old gentleman with advanced Parkinson's disease, who is immobile and lives in a nursing home, is admitted to hospital because he is more confused than usual.

It may help for you to think about real patients similar to these that you may have seen recently.

In both of these cases, please think about the following:

- What could go wrong during the hospital stay, or in other words, what risks may come from being in hospital for these patients?

- Why might these things happen?

We are interested in any risks that you can think of, but it may be helpful to think of the following broad areas which may contribute:

  - Patient factors
  - Staff factors
  - Ward/environment factors

- Also, what could we do differently to avoid these risks?

- Are there any measures locally that have been tried or implemented to prevent these things from occurring?

We will explore your thoughts about these questions during the interview.

If you have any questions, please contact us via r.shanley@imperial.ac.uk.

Once again, many thanks for your time,

Susy Long, Ruth Shanley, Sarah Brice, Maria Woloshynowych.

Appendix 5. Consent form for interview study participants.

CONSENT FORM

Title of Project:
Identifying and Reducing Risk to Older Patients: A Scoping Exercise
Names of Researchers: Dr. Susy Long, Dr Maria Woloshynowych, Dr Sarah Brice, Ruth Shanley

1 I confirm that I have read and understood the Participant Information Sheet dated 27th November 2007 (Staff Version) for the above study and have had the opportunity to ask questions ☐

2 I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my future healthcare or legal rights, or those of the person I care for, being negatively affected. ☐

3 I understand that the information I give will be anonymised and merged with data from other participants so that I cannot be identified individually. The data may be looked at by responsible individuals from Imperial College ☐

4 I understand that the interviews will be audio recorded to ensure accuracy of data. ☐

5 I understand that quotations may be used in the final report but these will be anonymous ☐

6 I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	Date	Signature
Ruth Shanley Research Assistant	_____ Date	_____ Signature

Appendix 6. All risks identified in interview study, with sources.

Safety and quality issues.			Source(s).
Geriatric giants/Clinical Syndromes			
	Mobility and functional decline	Decline in mobility, being left in bed	Consultant, SpR, Pall Care CNS, OASIS nurse
		Loss of independence or the ability to perform ADL's	Ward Manager (geriatric med) A, Physio B, Consultant, FY1, SpR, Pall Care CNS, OASIS nurse, Ward Sister (geriatric med) B, Ward Sister (ortho)
	Delirium	Inappropriate management of delirium	Consultant, Ward Sister (ortho)
		Not risk stratifying patients or recognising those at risk of delirium	Consultant, OASIS nurse
		Acute confusion being misdiagnosed as dementia	Ward Sister (geriatric med) B
		Incorrectly assuming confusion is acute in patients with chronic cognitive impairment	Consultant
		Failure to recognise delirium	Consultant, SpR
	Pressure sores		OT, Ward Manager (geriatric med) A, Consultant, FY1, SpR, Pall Care CNS, Ward Sister (geriatric med) B
	Continence and bowel care	Not being encouraged to be continent, becoming newly incontinent, or if already incontinent not being assessed or treated	OT, Ward Manager (geriatric med) A, Consultant, SpR, Ward Sister (geriatric med) B
		Inadequate bowel care	Ward Manager (geriatric med) A, Pall Care CNS, Ward Sister (ortho)
	Falls		OT, Ward Manager (geriatric med) A, Physio B, A&E nurse consultant, Discharge nurse, Consultant, Ward administrator, Physio A, FY1, SpR, Pall Care CNS, Lead pharmacist, OASIS nurse, Ward Sister (geriatric med) B, Ward Sister (ortho)
	Hospital acquired infection		Ward Manager (geriatric med) A, Physio B, Discharge nurse, Physio A, FY1, SpR, Pall Care CNS, SALT, OASIS nurse, Ward Sister (geriatric med) B
	Nutrition	Swallowing managed poorly	SpR, SALT
		Poor nutrition in general	OT, Ward Manager (geriatric med) A, SpR, SALT, Ward Sister (geriatric med) B
		Being fed in inappropriate positions in bed, or not being sat out for meals	OT, SALT
		Poor nutrition at the end of life	Pall Care CNS
The admission process/A&E		Unnecessary hospital admissions	Physio B, A&E nurse consultant, Consultant, SpR, Pall Care CNS, OASIS nurse

	Inadequate initial assessment	A&E nurse consultant, FY1, SpR, SALT, OASIS nurse
	Inadequate care for patients with minor injuries	A&E nurse consultant
	Missing those that need extra help at home- social problems not picked up/addressed in A&E	A&E nurse consultant, Discharge nurse
	Being admitted to hospital through a system not designed with the complex elderly in mind	Consultant
	Receiving inappropriate/unnecessary treatment/interventions in A&E	A&E nurse consultant, Consultant
	Not having direct access to outpatient services such as falls clinic from A&E	A&E nurse consultant
	Being overlooked in A&E	A&E nurse consultant
	Feeling that the emergency department is unwelcoming/forbidding/difficult to find and get to	A&E nurse consultant
	Recurrent admissions	OASIS nurse
Investigation, diagnosis, treatment	Inadequate assessment on the ward	Physio A, FY1
	Delay in carrying out investigations	Ward administrator, FY1
	Over investigating and treating	FY1, Pall Care CNS
	Under investigating and treating	FY1
	Incomplete and inaccurate assessments leading to incorrect diagnoses e.g. "UTI"	Consultant
	Delay in performing interventions/procedures (for palliative patients)	Pall Care CNS
	Interventions unnecessarily painful or distressing	A&E nurse consultant
Risks if cared for in non-geriatric settings such as surgical wards:	Operative risks	Consultant, SpR
	Drugs not reviewed	SpR
	Being treated inappropriately the same way as younger patients e.g. with fluids and analgesia	SpR
	Not receiving early specialist geriatric input	SpR
	Poor functional status immediately post-operatively	Consultant
	Prolonged wait for surgery	Ward Sister (ortho)
	Post-operative infections	SpR
	Poor discharge planning/prolonged length of stay	SpR
	Poor future care planning (contingency planning for patient after discharge)	SpR
	Not receiving appropriate investigations (e.g. for falls if admitted with fracture)	SpR

	Side effects of drugs not anticipated (e.g. constipation due to opiates)	SpR
	Delay in investigating causes of delirium	SpR
	Slow progress mobilising post-operation	Ward Sister (ortho)
	Prolonged fasting pre-operatively in acute trauma	Ward Sister (ortho)
	Surgical or peri-operative death	Consultant
	Never getting back to pre-operative functional level	SpR
	Poor mental capacity assessments	SpR
	Poor communication with families	SpR
Medication management	Inappropriate or inaccurate prescribing	Consultant, Pall Care CNS
	Prescription or administration errors	Ward Manager (geriatric med) A, Consultant, Ward administrator, FY1, SpR, Lead pharmacist
	Medications not reviewed and adjusted according to clinical need	Consultant, FY1, Lead pharmacist
	Receiving incorrect formulations of drugs	Lead pharmacist
	Side effects of medications	Pall Care CNS, Lead pharmacist
	Not receiving prescribed medication	SALT
	Being overmedicated	Ward Manager (geriatric med) A, Consultant, SpR
	Inappropriate prescribing for the individual patient	Lead pharmacist
	Receiving inadequate analgesia	Consultant, SpR, Ward Sister (ortho)
Decision making	Inconsistencies in end of life decision making, or lack of end of life decision making	SALT
	Delays in making decisions e.g. about palliative feeding, long term enteral feeding, whether pneumonias should be treated	SALT
	Incorrect decisions made around mental capacity	SALT
Basic and holistic care	Not being given enough time for proper assistance	SALT, OASIS nurse
	Inadequate management of underlying social problems	Discharge nurse
	Hearing not optimised	SALT
	Poor communication with patients and relatives	SpR, SALT, OASIS nurse
	Not addressing sub-acute or subtle problems e.g. with swallowing or communication	SALT
	Being cared for by staff who have inadequate knowledge of the patient or who make assumptions	Ward Manager (geriatric med) A, SALT
	Not looking at the patient as a	OT, Consultant, OASIS nurse

	whole, focusing on single problems	
	Poor or inappropriate general care if patient is not for resuscitation	SpR
	Being perceived as less important than younger patients	SpR
	Poor hand hygiene (patients)	SALT
	Poor management of oral/ dental hygiene	Pall Care CNS, SALT, OASIS nurse
	Not receiving adequate attention from staff on the ward	Physio B
Multidisciplinary team working	Decisions made without consulting other members of the team	SALT
	SALT recommendations not followed	SALT
	Unclear roles/responsibilities within the MDT	SALT
	Staff don't read each others entries in the notes	Physio B
	Poor nursing handover	FY1
	Poor handover between medical teams	FY1
	Poor communication between doctors and nurses	Physio B
	Information not handed over between staff	SpR, OASIS nurse
	Inadequate handover to out of hours team	SpR
	Not being referred to members of MDT	SpR
	Lack of communication between MDT on wards without MDM's	SALT
	Not receiving timely SALT assessments	SALT
Psychological or emotional wellbeing	Being cared for by staff who don't go out of their way to help, or who don't act in a professional, courteous or compassionate manner	OASIS nurse
	Dehumanisation/depersonalisation	SALT, OASIS nurse
	Institutionalisation	Discharge nurse, FY1, SALT, OASIS nurse
	Loss of dignity	Physio B, A&E nurse consultant, SALT, OASIS nurse
	Facing prejudice	OASIS nurse
	Sensory deprivation	OT
	Sleep deprivation	Ward Manager (geriatric med) A
	Boredom, isolation or understimulation on the ward	OT, Physio B, Discharge nurse, Ward Sister (geriatric med) B
	Patients losing their identity, being mislabelled or misjudged, having incorrect assumptions made about them, not receiving individualised care	Pall Care CNS, OASIS nurse

	Depression	Pall Care CNS, Ward Sister (geriatric med) B
	Stopping people from taking managed risks	Physio B
	Becoming muddled or disorientated (NB different from delirium)	Ward Manager (geriatric med) A, A&E nurse consultant, Discharge nurse, Consultant, Physio A, OASIS nurse, Ward Sister (geriatric med) B
	Misinterpreting behaviours in patients with dementia or delirium	A&E nurse consultant, Consultant, SpR, OASIS nurse
	Not being empowered to take part in decisions relating to care	Ward Manager (geriatric med) A, SALT, OASIS nurse
	Loneliness due to difficulties for relatives coming to visit patients in hospital	OASIS nurse
	Wishes or needs not being advocated or respected	OT, Consultant, SALT
	Infantilisation or being spoken to like a child (elderspeak)	Ward Manager (geriatric med) A, Physio A
	Being made to feel insecure or frightened	A&E nurse consultant, FY1, OASIS nurse
	Inadequate communication between staff and patients in A&E	OT, A&E nurse consultant, OASIS nurse
	Inadequate or delayed assessment of psychiatric issues	SALT
	Becoming distressed or agitated	Ward Manager (geriatric med) A, FY1
Abuse	Financial	Ward Manager (geriatric med) A
	Psychological	Ward Manager (geriatric med) A
	Physical	Ward Manager (geriatric med) A
	Neglect	Ward Sister (geriatric med) B
Problems associated with care settings	Being cared for in Care of the Elderly Wards with remote locations within the hospital	SpR, SALT
	Inappropriate ward transfers	Ward administrator, FY1, OASIS nurse
	Not having access to appropriate care when acute deterioration occurs	Ward Manager (geriatric med) A, SpR
Practical problems	Getting lost	Consultant
	Wandering within the ward	Ward Manager (geriatric med) A, A&E nurse consultant
	Losing personal possessions	OASIS nurse
	Injuries e.g. burning from tea	OASIS nurse
	Being transferred to wards without notes	Ward administrator
	Wandering off ward	Ward Manager (geriatric med) A, A&E nurse consultant, Ward administrator, SpR
Discharge and post-hospital	Lack of access to services after discharge	SALT
	Readmission to hospital	FY1
	Unnecessary prolonged stays in hospital	Physio B, Pall Care CNS, Lead pharmacist, OASIS nurse, Ward Sister (geriatric med) B
	Unsafe/unprepared/incoherent discharges	OT, Discharge nurse, Ward administrator, Physio A, SALT, OASIS

		nurse, Ward Sister (ortho)
	Medication errors after discharge from hospital	Lead pharmacist
	Inappropriate discharge destinations	FY1

Appendix 7. Excerpt of long-list of risks, identifying which are obtainable from case record review

Complete list of risks to an elderly medical inpatient obtainable from notes. Yellow = can look at using notes, Green = both or not entirely from notes

Location or part of admission	Problem	Notes	Observation of events, behaviour, interaction	Patient interview or clinical assessment	Staff interview	Carer interview	Incident reporting	Drug chart e.g. new prescription	Associated outcome measures
1. A&E/MAU	Inadequate/delayed initial assessment/diagnosis	✓ (with retrospective analysis)			✓				
2. A&E/MAU	Receiving inappropriate/unnecessary treatment	✓ (with retrospective analysis)			✓				
3. A&E/MAU	Receiving unnecessary investigations	✓ (with retrospective analysis)			✓				
4. A&E/MAU	Falling off trolley	✓					✓		
5. A&E/MAU	Inadequate communication between staff and patients	✓	✓						
6. A&E/MAU	Being perceived by staff to be aggressive, when actually the patient is very frightened and doesn't know what they are doing.	✓	✓			✓			
7. A&E/MAU	Interventions painful	✓	✓	✓					
8. A&E/MAU	Wandering/getting lost	✓	✓						
9. A&E/MAU	Unnecessary admission/inadequate previous discharge from last admission	✓		✓	✓	✓			Complaints
10. A&E/MAU	Diagnostic errors	✓	✓		✓		✓	✓	
11. A&E/MAU	Results of investigations not checked or not available	✓	✓						
12. A&E/MAU	Vital equipment for patient left at home	✓	✓	✓					
13. DNAR	Lack of decision making about resuscitation or ceiling of care	✓		✓	✓		✓		
14. DNAR	Inappropriate resuscitation attempt	✓	✓		✓		✓		
15. DNAR	Lack of appropriate resuscitation	✓	✓		✓		✓		

Appendix 8. Screenshots of Section 2b of the Long tool showing two contrasting examples

Appendix 8.1. A case in which numerous geriatric syndromes were an issue.

b) Geriatric syndromes		Pre - admission and on arrival	During first part of admission (up to transfer to DOME ward)	An issue for this pt so far?	During stay on DOME ward	At time of discharge	An issue for this pt?
Functional impairment and mobility	Care requirements at home or Barthel index in hospital	Help with DADL's and PADLS	Not done	Yes	1	Fully dependent for PADL's	Yes
		EMI RH			2	Nursing home	
	Mobility	Unaided but housebound	Needs supervision or help to tran		Needs supervision or help to trans	Needs help to transfer	
Delirium (might be called acute confusion, agitation etc)		Unclear	Likely hyperactive/mixed delirium	Yes	Likely hyperactive/mixed delirium	Unclear	Yes
Depression/anxiety		No documented evidence	No documented evidence	No	Low mood noted by somebody - not assessed further	Unclear	Yes
Continence	Bladder	Not documented	Catheter (short term)	Yes	Incontinent	Likely to be an ongoing problem	Yes
		Catheter inserted at	Catheter (this admission)		Pads		
	Bowels	Not documented	Not documented		Faecally incontinent	Likely to be an ongoing problem	
		Not documented	Not documented		Pads		
Constipation/bowel care		No documented evidence that this was assessed	No documented evidence that this was assessed	No	Yes - this was an active problem and treatment was initiated	Likely to be an ongoing problem	Yes
Falls/injury		Not documented	No documented falls during this time	No	No documented falls during this time	Unclear	No
Swallowing and mouth care	Swallowing	Dysphagia suspected - duration unclear	SALT deemed pt to be high risk	Yes	Documented not to be a problem	Not a problem	No
			NG tube		None		
	Mouthcare/dentition	Not documented	Not documented		Not documented	Unclear	
Under-nutrition		Not documented	Score 3 or less on nutritional	No	Other nutritional concerns	Likely to be an ongoing problem	Yes
			None required		Supplements		
Iatrogenic problems with fluid balance or sodium		None	None	No	None	Unclear	No
Pressure Sores		No documented assessment of risk or pressure areas	No documented assessment of	No	At risk, Waterlow score 10+, but	Likely to be an ongoing problem	Yes
			Not documented		Mattress		
Hospital Acquired Infection		Unclear	No evidence HAI during this time	No	No evidence HAI during this time	Unlikely to be an ongoing problem	No
Venous Thromboembolism (DVT or PE)		No	No	No	No	Not a problem	No
Pain/distress		Pain/distress noted but undertreated	Pain/distress noted but undertreated		Pain/distress noted but undertreated	Likely to be an ongoing problem	

c) Other frailty markers	At admission	Before DOME ward		On DOME ward	At time of discharge	
Cognitive impairment	Dementia/chronic confusion mentioned: but	Dementia/chronic confusion mentioned: but no assessment	Yes	Dementia/chronic confusion mentioned: but no assessment	Dementia/chronic confusion mentioned: but no further	Yes
Visual impairment	Not documented	Not documented	Yes	Not documented	Not documented	No
Hearing impairment	Not documented	Not documented		Not documented	Not documented	
Speech and communication	Non - communicative (dementia/ delirium)	Non - communicative (dementia/ delirium)		Non - communicative (dementia/ delirium)	Non - communicative (dementia/ delirium)	
Receiving end of life care	Not documented to be receiving end of life care	Not documented to be receiving end of life care	No	Not documented to be receiving end of life care	Not documented to be receiving end of life care	No

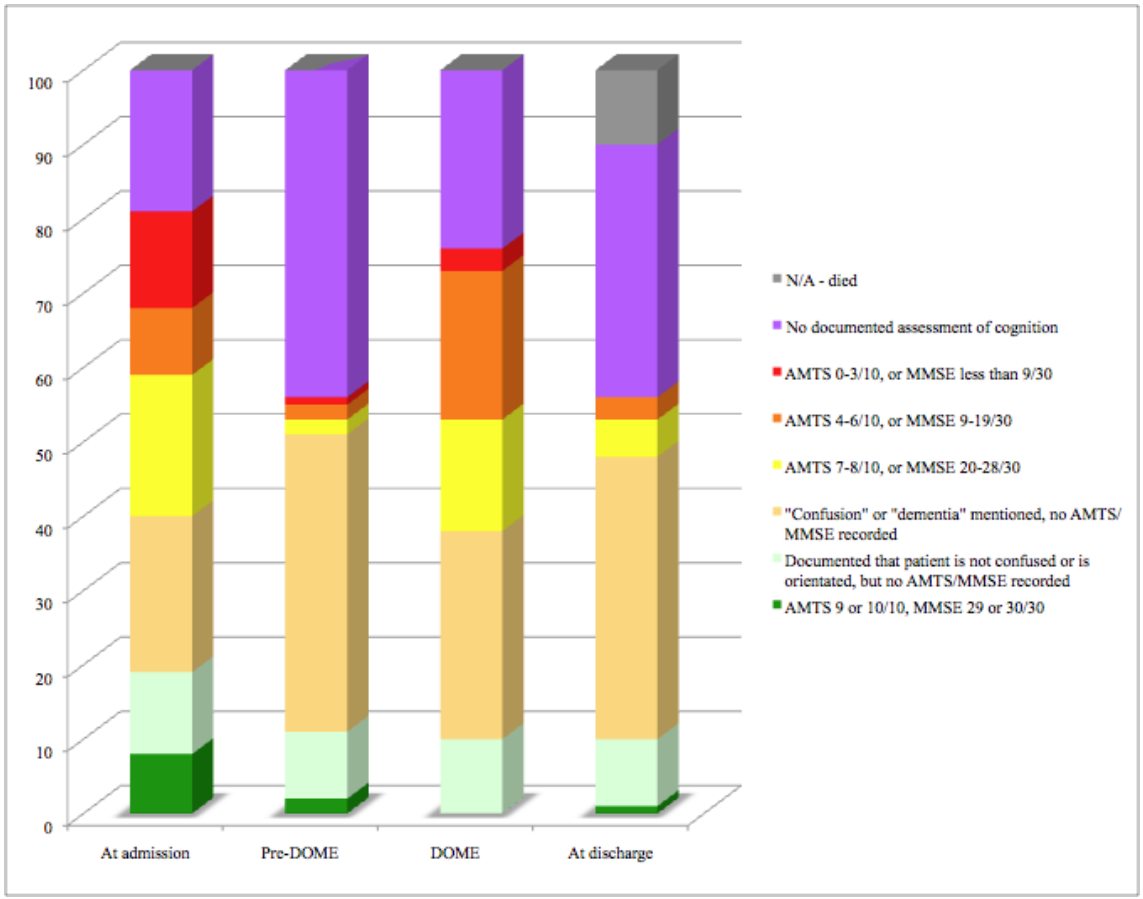
Appendix 8.2. An excerpt from a case with very few geriatric syndromes.

b) Geriatric syndromes		Pre - admission and on arrival	During first part of admission (up to transfer to DOME ward)	An issue for this pt so far?	During stay on DOME ward	At time of discharge	An issue for this pt?
Functional impairment and mobility	Care requirements at home or Barthel index in hospital	Independent	Not done	No	20	Independent	No
		Own or relatives' home			20	Own or relatives' home	
	Mobility	Independent	Independent in transfers and mo		Independent in transfers and mob	Independent	
Delirium (might be called acute confusion, agitation etc)		No	No	No	No	Not a problem	No
Depression/anxiety		No documented evidence	No documented evidence	No	No documented evidence	Not a problem	No
Continence	Bladder	Continent	Continent	No	Continent	Not a problem	No
		None	None		None		
	Bowels	Usually faecally continent	Faecally continent		Faecally continent	Not a problem	
		None required	None required		None required		
Constipation/bowel care		No documented evidence that this was assessed	Diarrhoea, may have been overflow	Yes	Not on treatment, assessed and not a problem	Not a problem	No
Falls/injury		Not documented	No documented falls during this time	No	No documented falls during this time	Not a problem	No
Swallowing and mouth care	Swallowing	Swallowing documented not to be a problem	Not documented	No	Documented not to be a problem	Not a problem	No
			None		None		
	Mouthcare/dentition	Not documented	Not documented		Not documented	Unclear	
Under-nutrition		Documented not to be a problem	No nutrtional assessment (of	No	Score 3 or less on nutritional	Not a problem	No
			None documented		None required		
Iatrogenic problems with fluid balance or sodium		None	Blood results not documented	No	None	Not a problem	No
Pressure Sores		Waterlow not done but pressure areas stated to be intact	No documented assessment of	No	At risk, Waterlow score 10+, but	Unclear	No
			Not documented		Mattress		
Hospital Acquired Infection		Not admitted with HAI	No evidence HAI during this time	No	No evidence HAI during this time	Not a problem	No
Venous Thromboembolism (DVT or PE)		No	No	No	No	Not a problem	No
Pain/distress		No pain/distress	Not documented		Not documented	Not a problem	

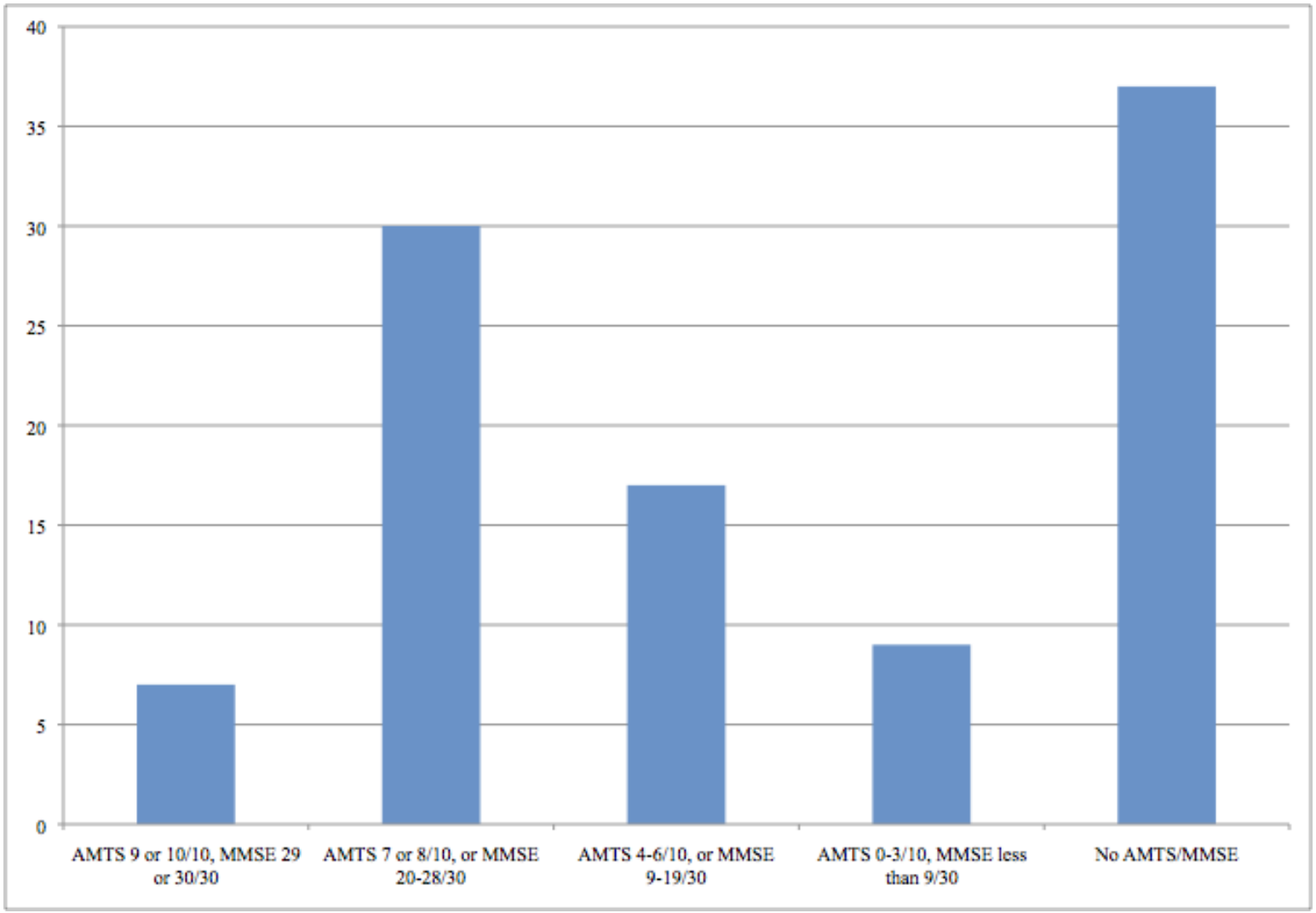
c) Other frailty markers	At admission	Before DOME ward		On DOME ward	At time of discharge	
Cognitive impairment	Documented to be not confused or orientated:	Not documented:	No	Not documented:	Not documented:	No
Visual impairment	Not documented	Not documented	No	Not documented	Not documented	No
Hearing impairment	Not documented	Not documented		Not documented	Not documented	
Speech and communication	No problems documented	No problems documented		No problems documented	No problems documented	
Receiving end of life care	Not documented to be receiving end of life care	Not documented to be receiving end of life care	No	Not documented to be receiving end of life care	Not documented to be receiving end of life care	No

Appendix 9. Detailed information available from the long tool for the complexity markers.

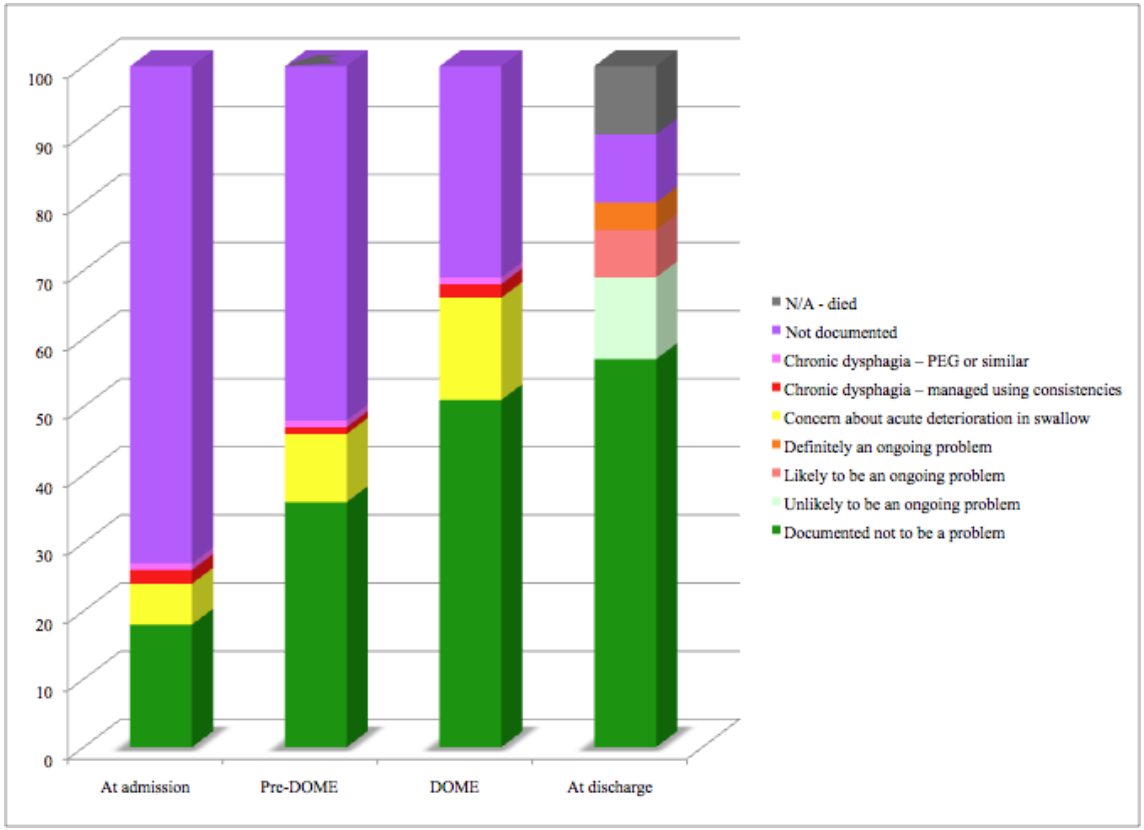
Appendix 9.1. Documentation of cognitive assessment across the admission.



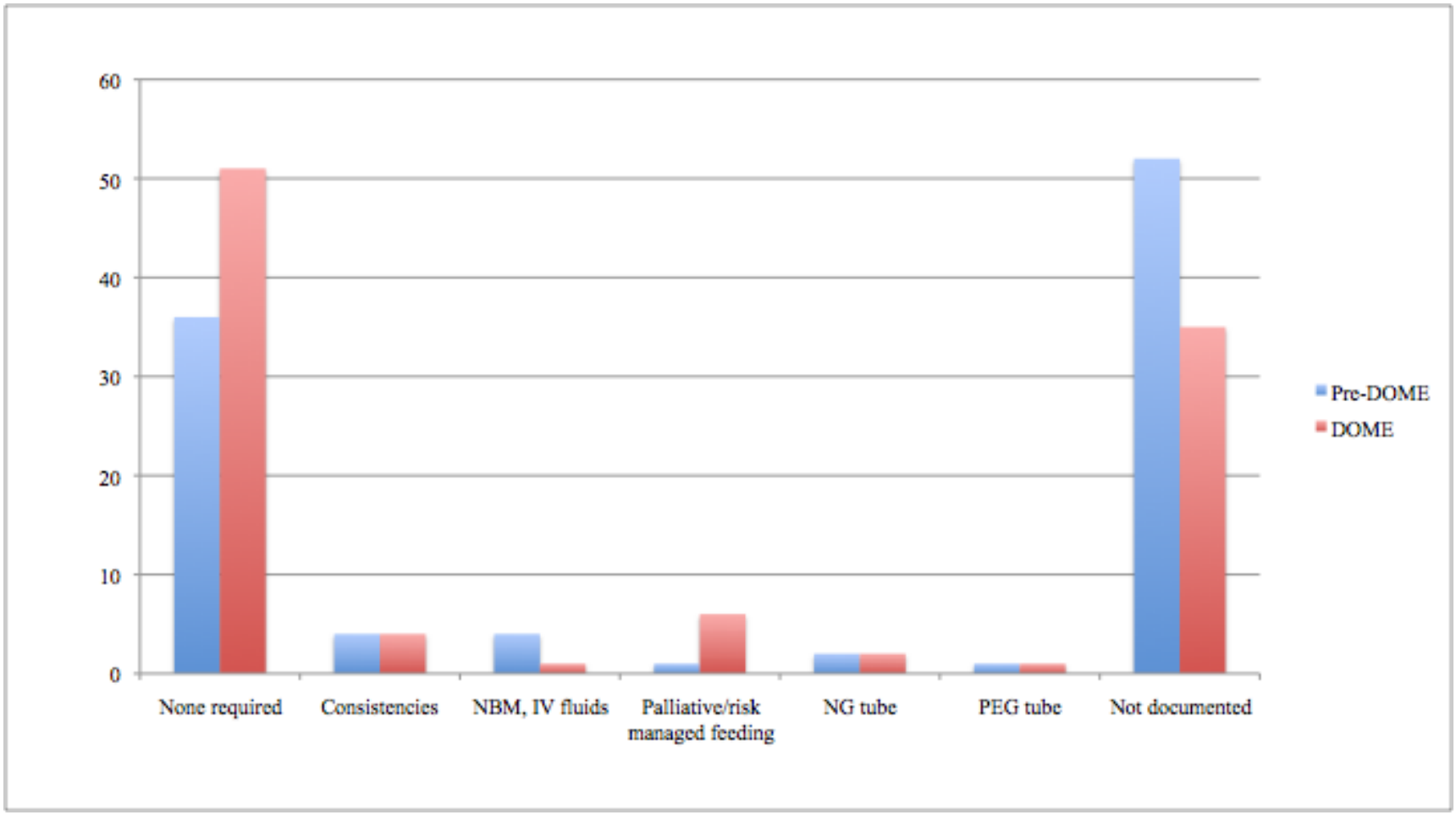
Best AMTS/MMSE (when not delirious).



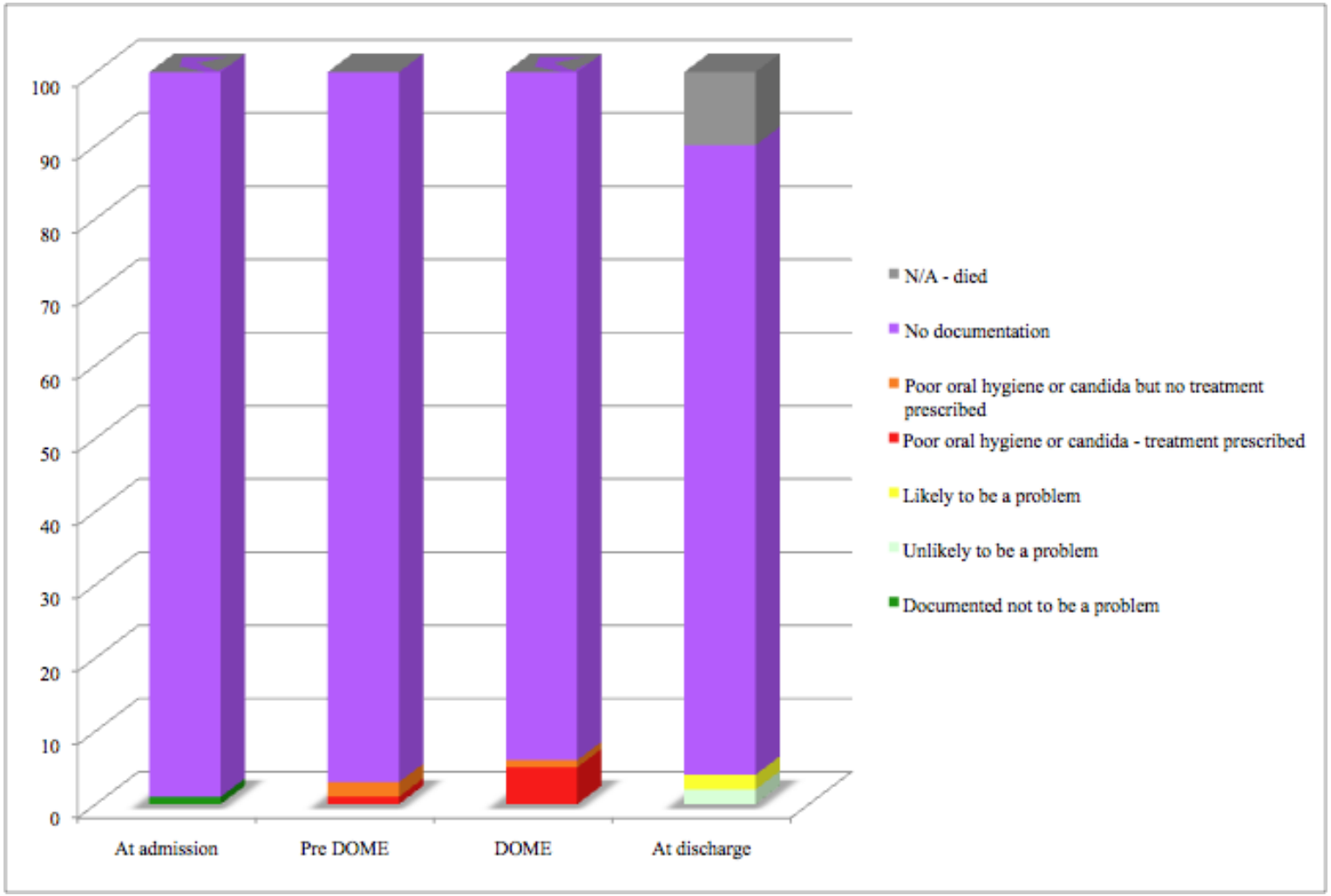
Appendix 9.2. Documentation of swallowing ability across the admission.



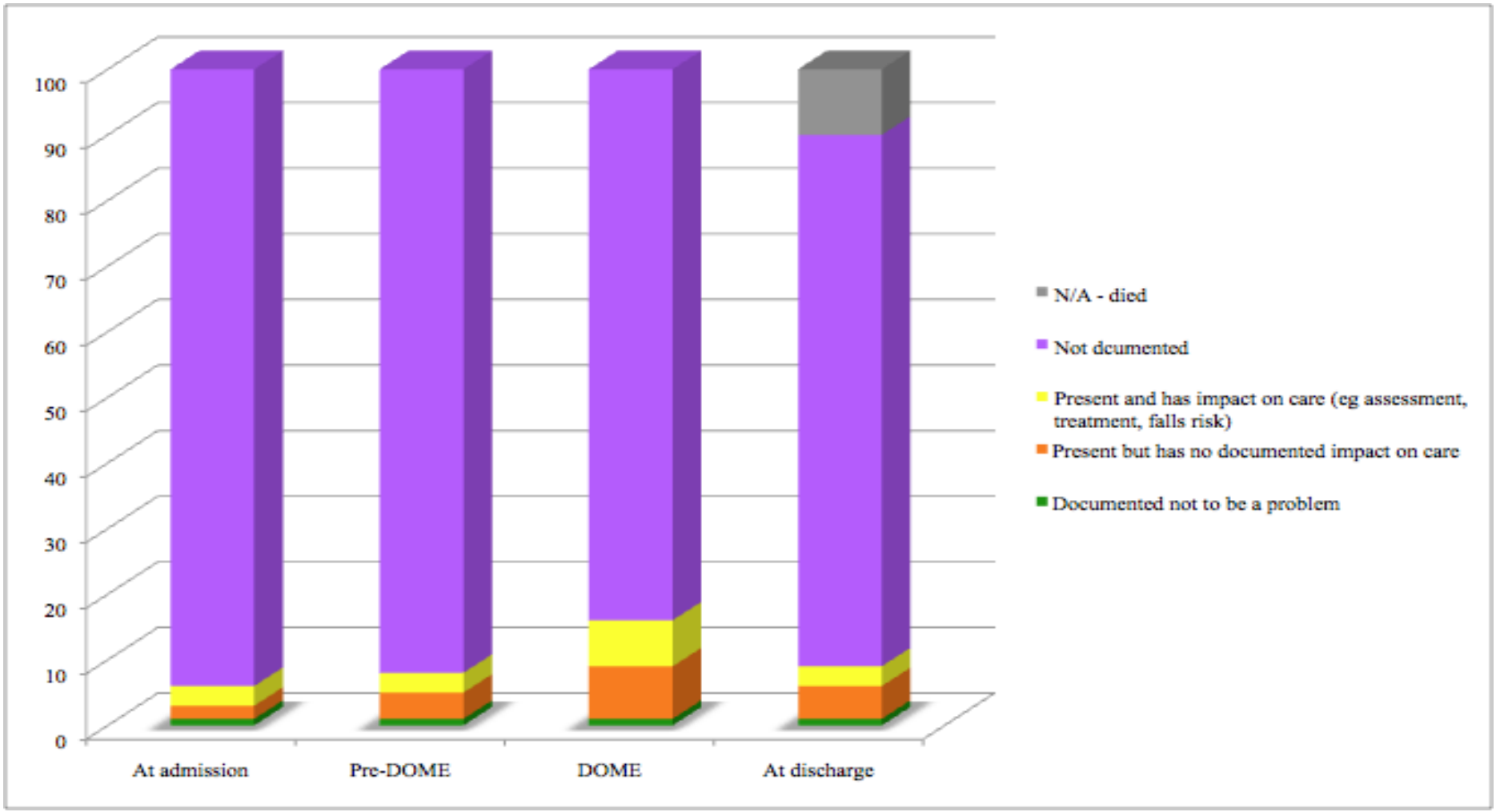
Appendix 9.3. Management of swallowing problems across the admission



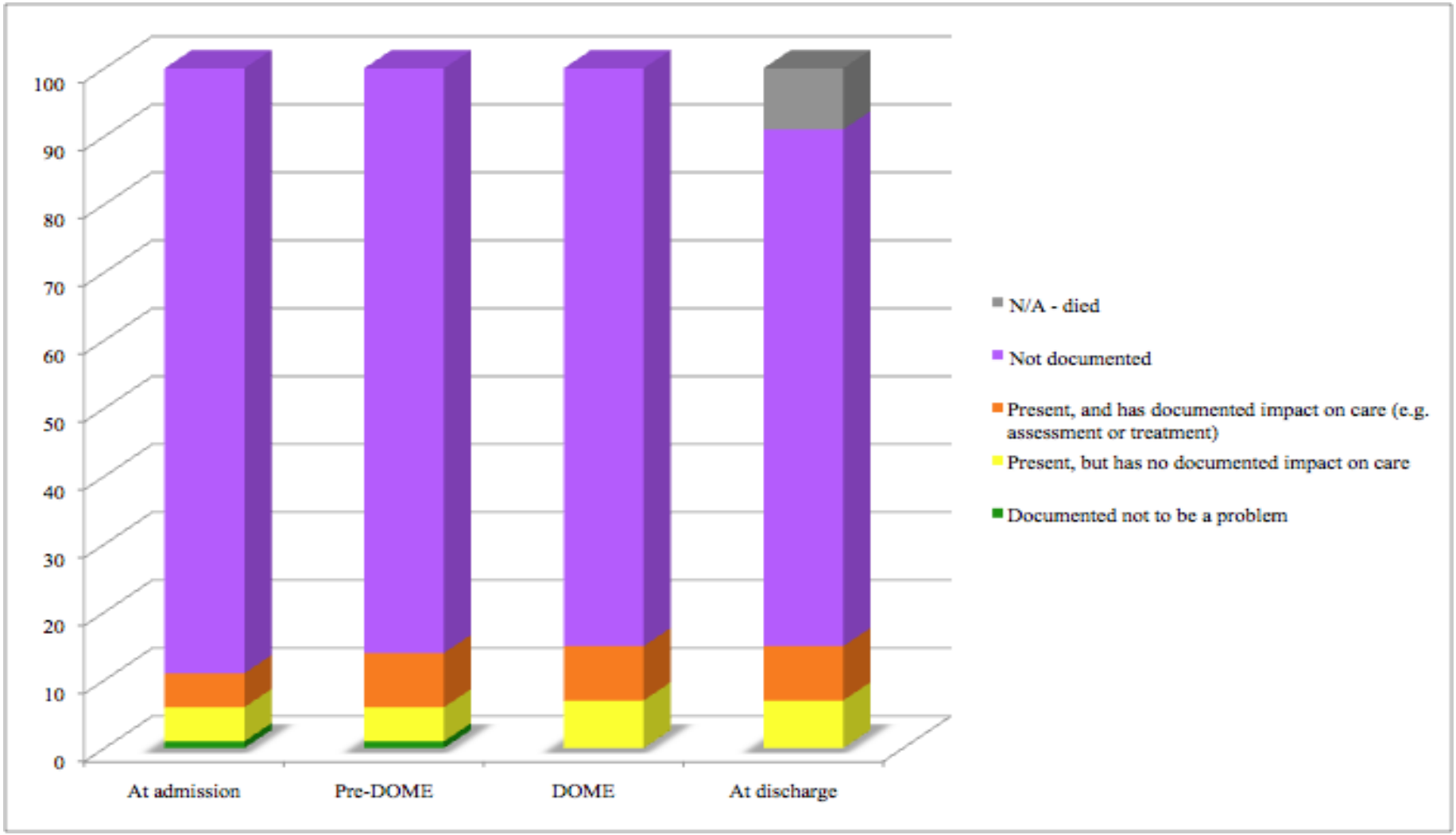
Appendix 9.4. Documentation of mouthcare and oral hygiene across the admission.



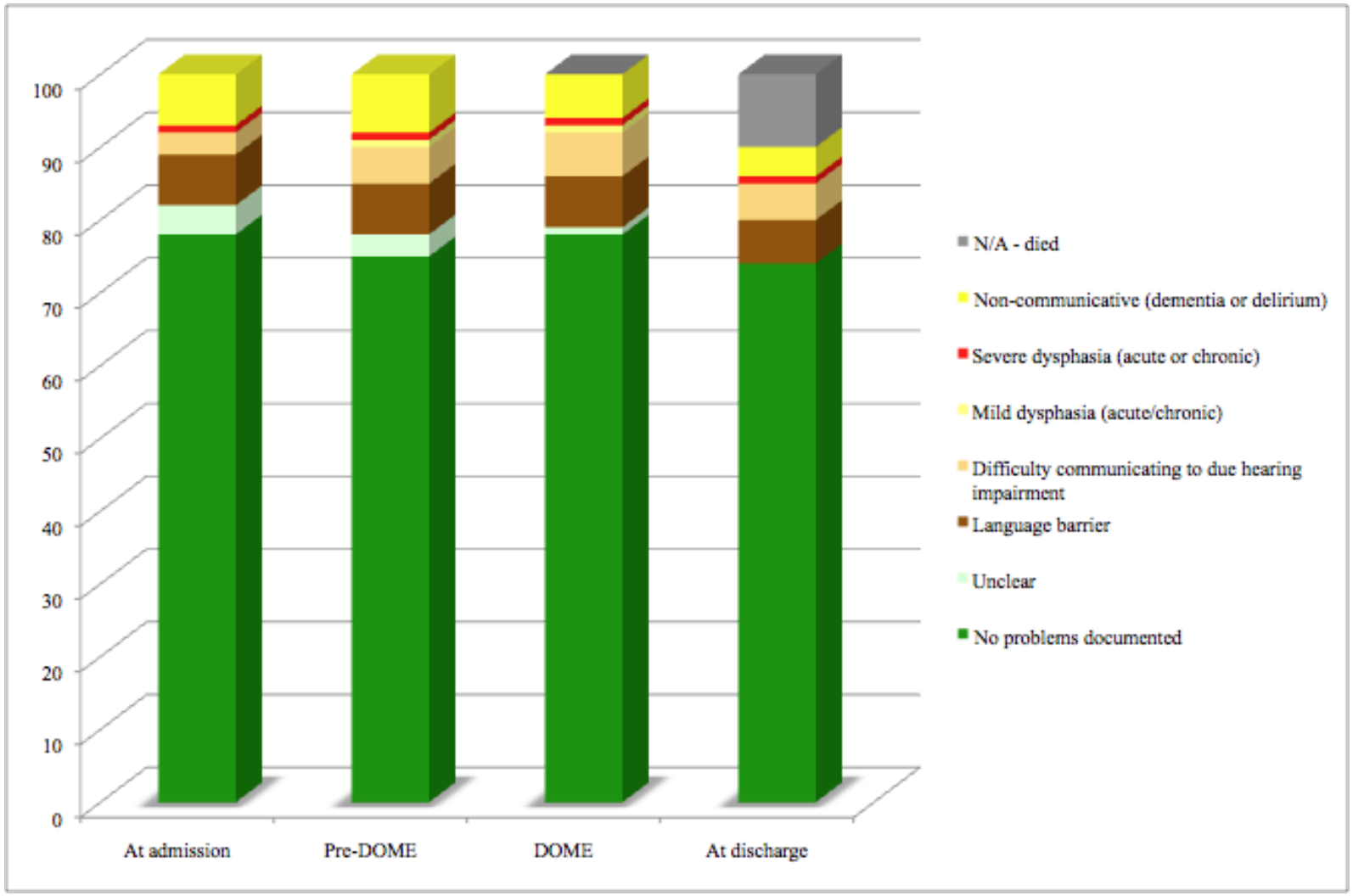
Appendix 9.5. Documentation of visual impairment across the admission.



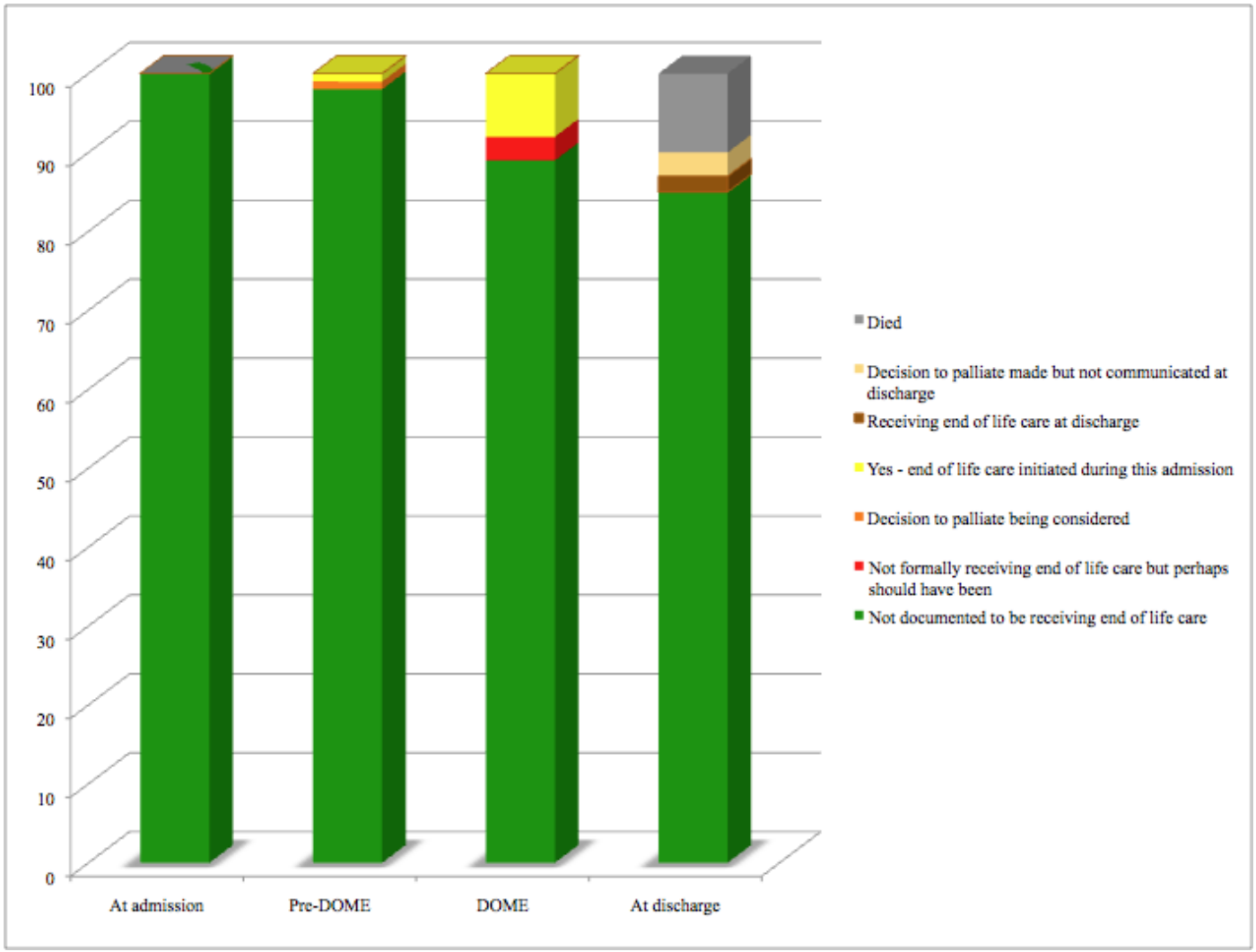
Appendix 9.6. Documentation of hearing impairment across the admission.



Appendix 9.7. Documentation of problems with speech and communication across the admission.



Appendix 9.8. Documentation of receipt of end of life care across the admission.



Appendix 10. Details of analysis of new adverse outcomes using the Long tool.

Appendix 10.1. Cross-tabulation of Place of Care pre-admission with Place of Care on discharge.

		Place of Care on discharge										
		Own/relatives home	Own/relatives home with live in carer	Sheltered accommodation	Residential Home	Respite RH	EMI RH	Nursing Home	Hospice	Rehabilitation unit	Died	**Total**
Place of Care pre-admission	Own/relatives home	47	0	0	2	1	1	6	0	3	7	**67**
	Own/relatives home with live in carer	0	1	0	0	0	0	0	0	0	0	**1**
	Sheltered accommodation	0	0	10	1	1	0	3	1	0	0	**16**
	Residential Home	0	0	0	3	0	0	1	0	0	1	**5**
	Respite RH	0	0	0	0	1	0	0	0	0	0	**1**
	EMI RH	0	0	0	0	0	0	1	0	0	0	**1**
	Rehabilitation unit	0	0	0	0	0	0	1	0	0	0	**1**
	Nursing Home	0	0	0	0	0	0	4	1	0	1	**6**
	Other acute hospital setting	0	0	0	0	0	0	0	0	0	1	**1**
	Homeless	1	0	0	0	0	0	0	0	0	0	**1**
	Total	**48**	**1**	**10**	**6**	**3**	**1**	**16**	**2**	**3**	**10**	**100**

Cells highlighted in blue represent cases in which place of care was unchanged on discharge. Cells in red represent cases in which the discharge destination was "worse" than the pre-admission place of care. Cells in green represent cases in which the discharge destination was "better" than that on admission.

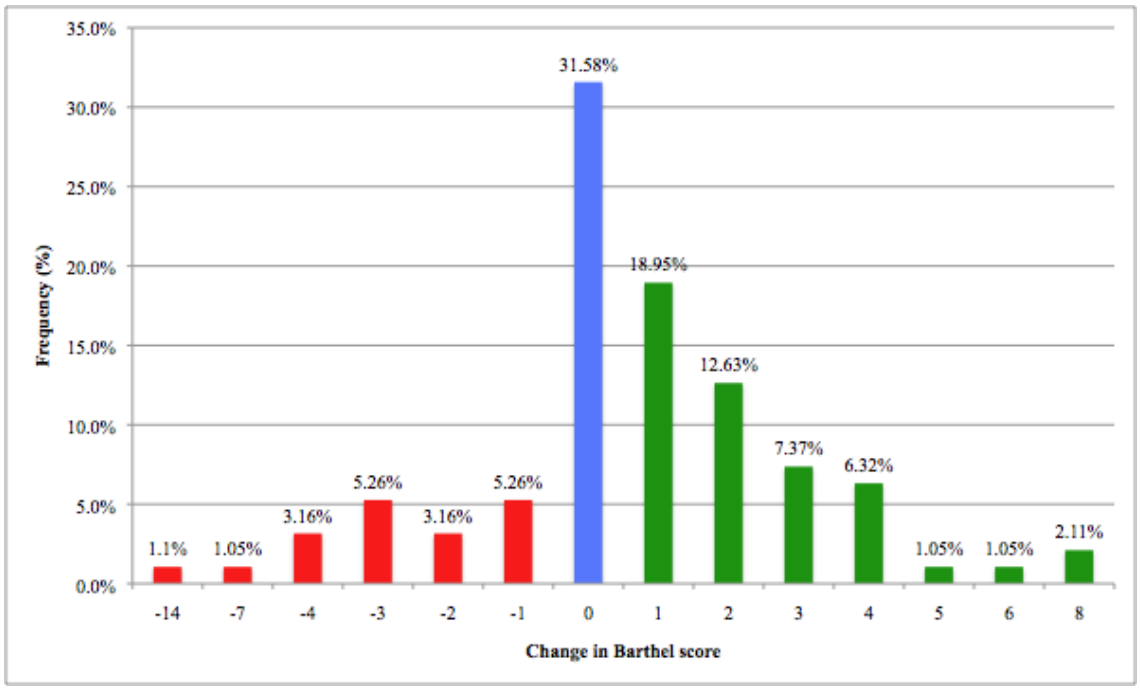
Appendix 10.2. **Cross-tabulation of functional ability pre-admission with functional ability on discharge.**

		Functional ability on discharge					
		Independent for ADLs	Help with DADLs only	Help with DADLs and PADLs	Fully dependent	Died	**Total**
Functional ability pre-admission	Independent for ADLs	9	0	4	0	0	**13**
	Help with DADLs only	0	11	9	0	0	**20**
	Help with DADLs and PADLs	1	0	37	6	8	**52**
	Fully dependent	0	0	0	9	2	**11**
	Not documented	0	1	3	0	0	**4**
	Total	**10**	**12**	**53**	**15**	**10**	**100**

ADL = Activities of daily living
DADL = Domestic activities of daily living
PADL = Personal activities of daily living

Cells highlighted in blue represent cases in which functional ability was unchanged on discharge. Cells in red represent cases in which functional ability was "worse" than that pre-admission. Cells in green represent cases in which functional ability on discharge was "better" than that on admission. Cells in grey represent cases in which no conclusions can be drawn because functional ability pre-admission was not documented.

Appendix 10.3. Change in Barthel score during stay on the DOME ward.



Appendix 10.4. Change in mobility pre-admission to discharge.

		Mobility on discharge										
		Independent	Uses aid but able to go out of home	Unaided but housebound	Uses aid but housebound	Able to transfer from bed to chair but chairbound	**Wheelchair bound**	**Needs help to transfer**	**Needs to be hoisted**	**Completely bed bound**	**Died**	**Total**
Mobility pre-admission	Independent	13	1	0	1	0	0	3	0	0	0	**18**
	Uses aid but able to go out of home	1	16	0	2	0	0	1	1	0	0	**21**
	Unaided but housebound, transfers independently	0	0	1	0	0	0	3	0	0	0	**4**
	Uses aid but housebound, transfers independently	2	0	2	18	0	0	9	0	1	5	**37**
	Able to transfer from bed to chair but chair bound	0	0	0	0	1	0	0	1	0	1	**3**
	Wheelchair bound	0	0	0	0	0	1	0	0	0	0	**1**
	Needs help to transfer	0	0	0	0	0	0	3	0	0	0	**3**
	Needs to be hoisted	0	0	0	0	0	0	0	4	1	2	**4**
	Completely bed bound	0	0	0	0	0	0	0	0	1	1	**2**
	Not documented	1	0	0	1	0	0	1	0	0	1	**4**
	Total	**17**	**17**	**3**	**22**	**1**	**1**	**20**	**6**	**3**	**10**	**100**

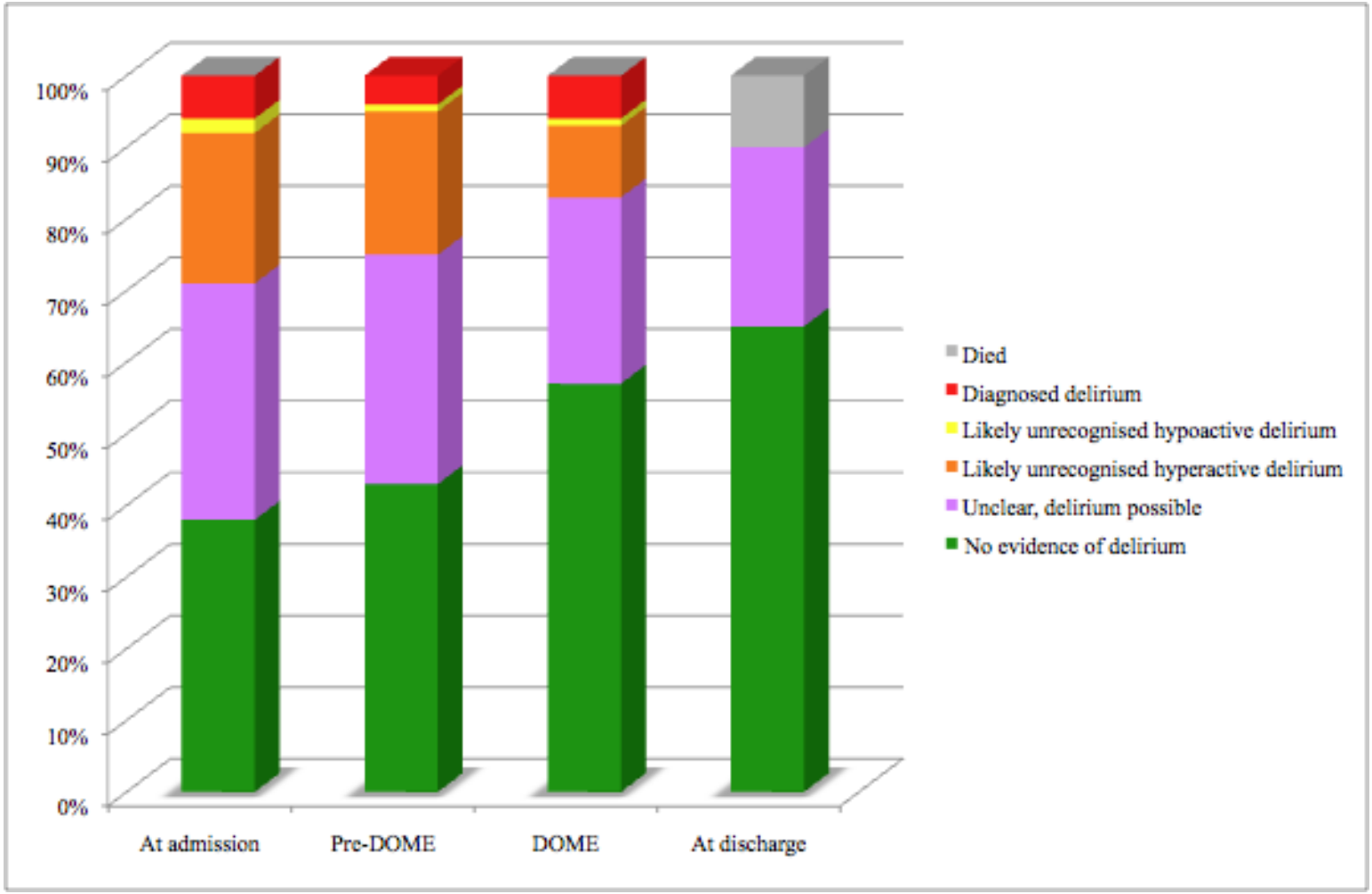
Cells highlighted in blue represent cases in which mobility was unchanged on discharge. Cells in red represent cases in which mobility was “worse” than that pre-admission. Cells in green represent cases in which mobility on discharge was “better” than that on admission. Cells in grey represent cases in which no conclusions can be drawn because mobility pre-admission was not documented.

Appendix 10.5. Change in mobility in hospital - pre-DOME ward to DOME ward.

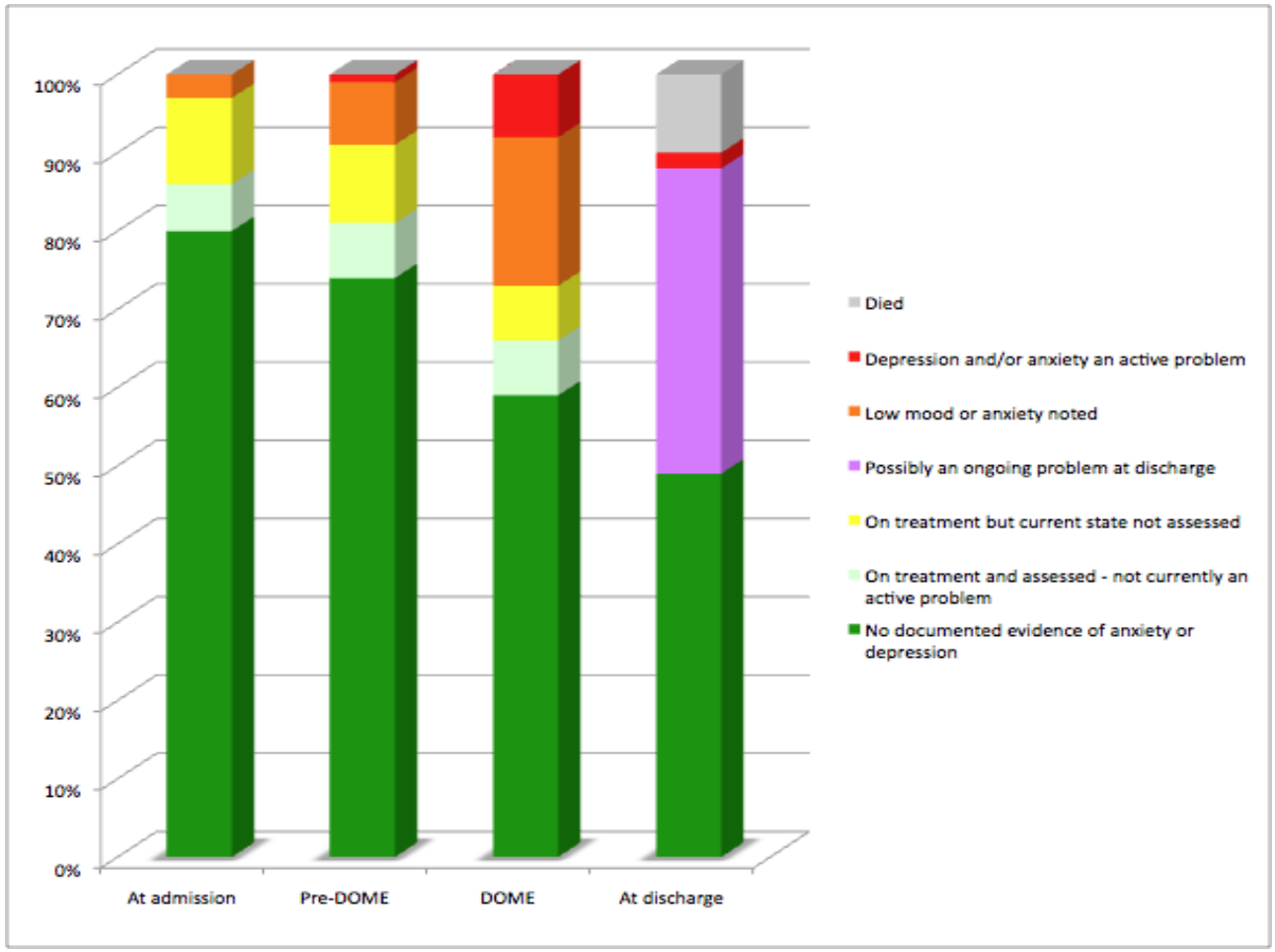
		Mobility on the DOME ward							
		Independent	Independent transfers, independently mobilises with stick/frame	Independent transfers but needs supervision or help to mobilise	Needs supervision or help to transfer	Largely bed bound, able to transfer to chair with assistance of nurse	Largely bed bound, transferred to chair with physio or hoist	Bed bound, no evidence of transfer to chair	Total
Mobility pre-DOME ward	Independent	15	0	0	1	0	0	0	**16**
	Independent transfers, independently mobilises with stick/frame	0	4	0	0	0	0	0	**4**
	Independent transfers but needs supervision or help to mobilise	3	1	5	1	0	0	0	**10**
	Needs supervision or help to transfer	5	3	5	18	0	0	2	**33**
	Largely bed bound, able to transfer to chair with assistance of nurse	1	0	1	3	3	1	0	**9**
	Largely bed bound, transferred to chair with physio or hoist	0	0	1	1	1	3	0	**6**
	Bed bound, no evidence of transfer to chair	1	0	2	6	3	5	5	**22**
	Total	**25**	**8**	**14**	**30**	**7**	**9**	**7**	**100**

Cells highlighted in blue represent cases in which mobility was unchanged on discharge. Cells in red represent cases in which mobility was "worse" than that pre-admission. Cells in green represent cases in which mobility on discharge was "better" than that on admission. Cells in grey represent cases in which no conclusions can be drawn because mobility pre-admission was not documented.

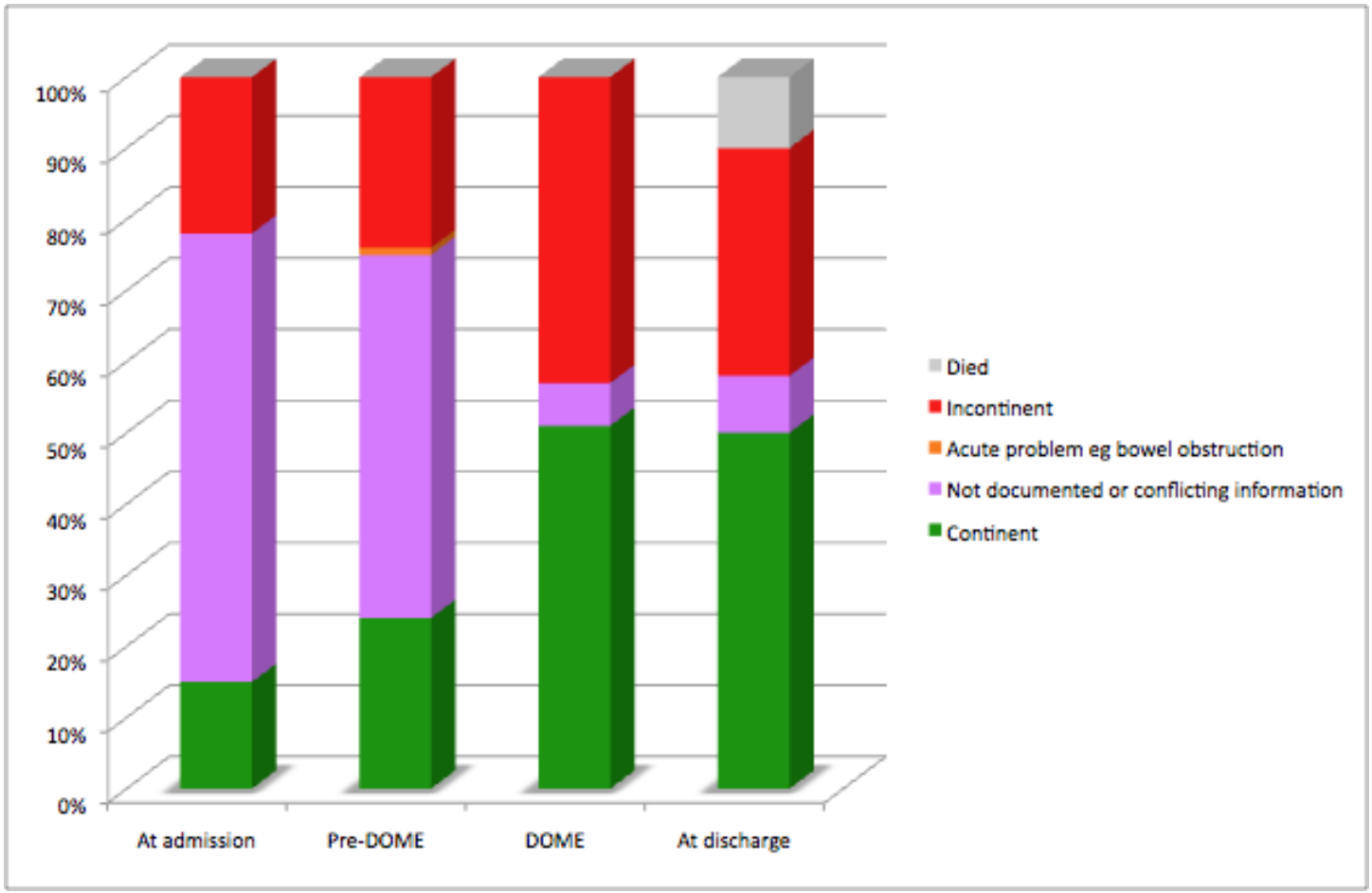
Appendix 10.6. The incidence of delirium across the hospital admission.



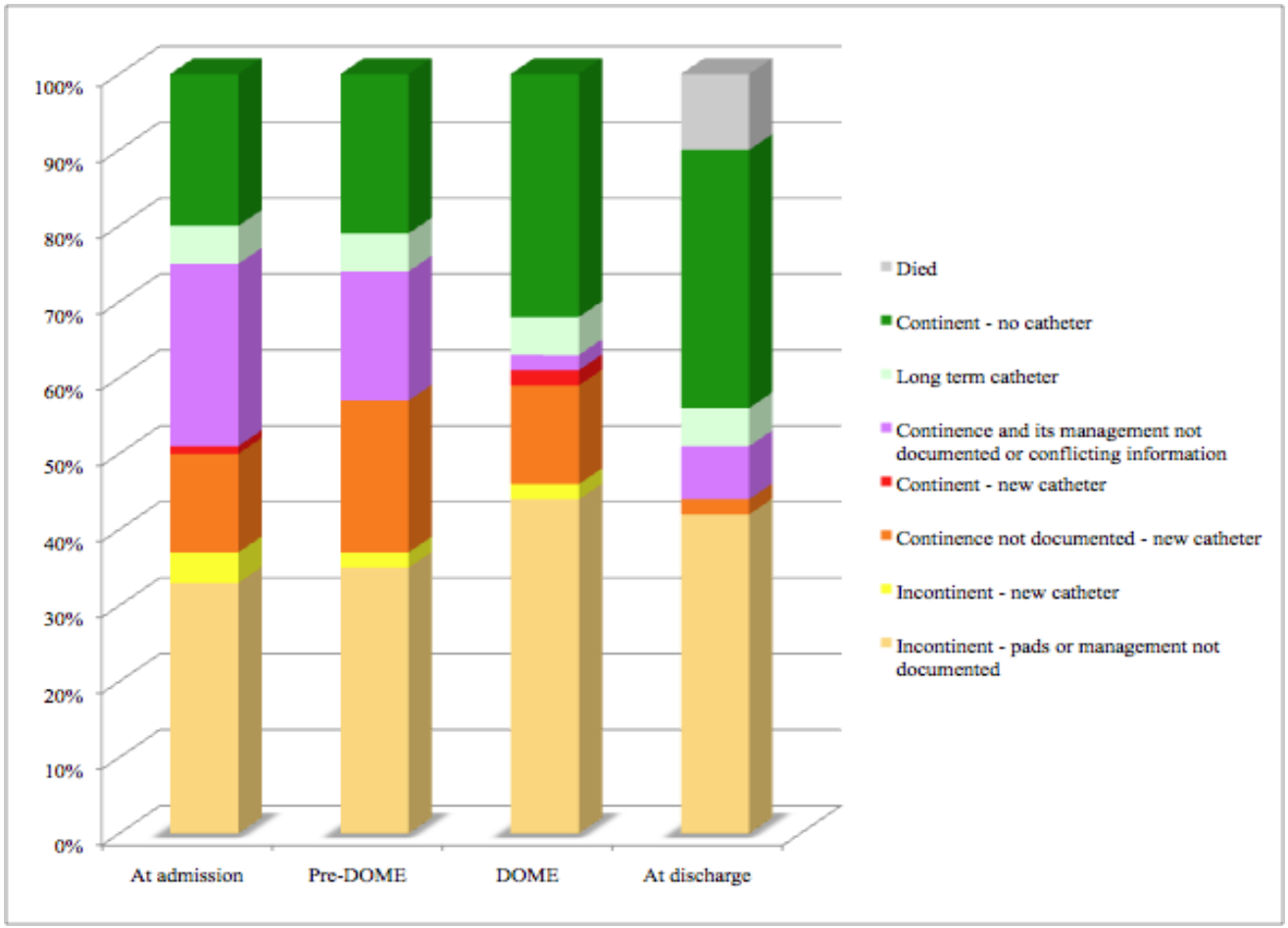
Appendix 10.7. Depression and anxiety during the admission.



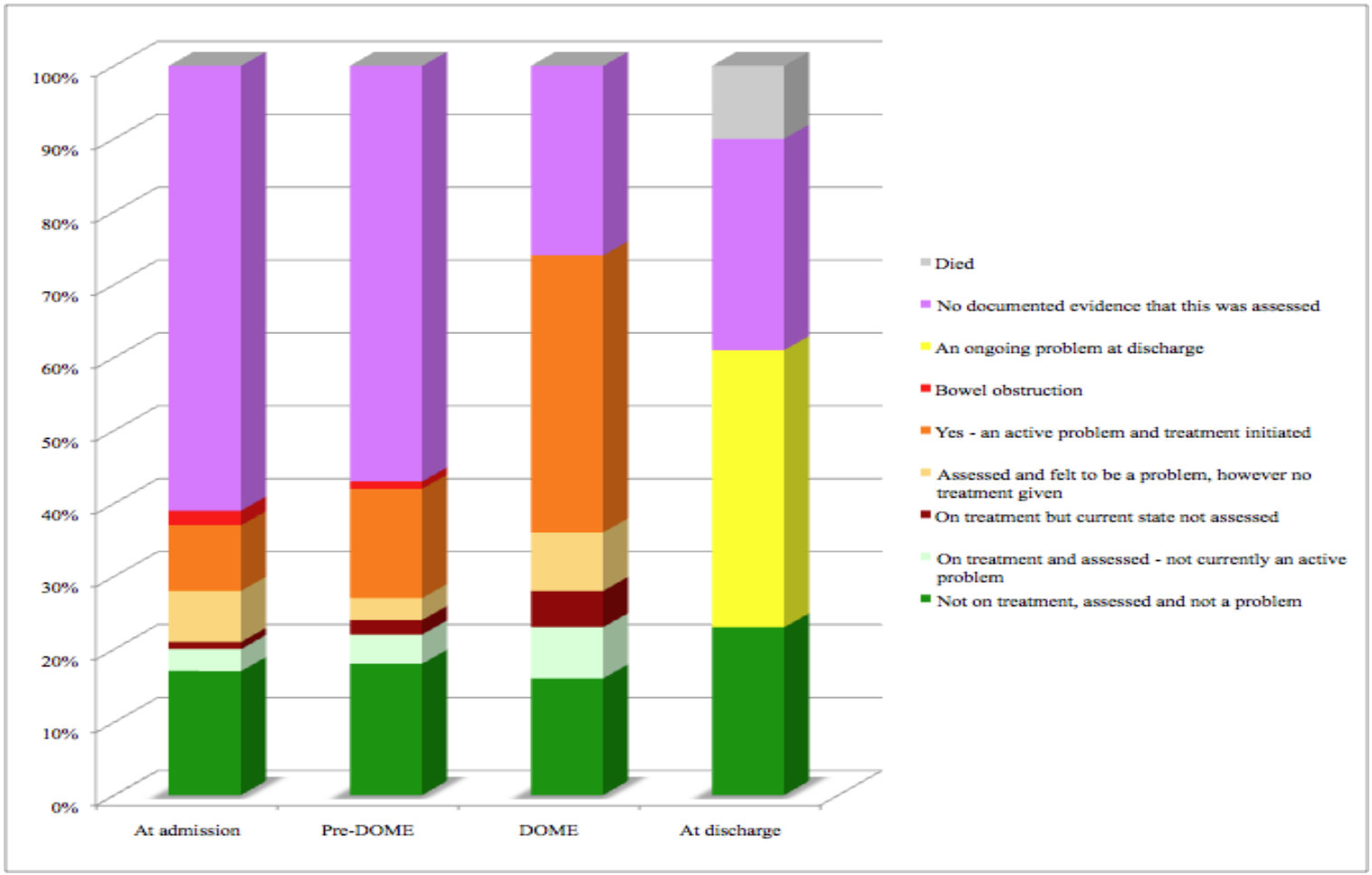
Appendix 10.8. Faecal incontinence.



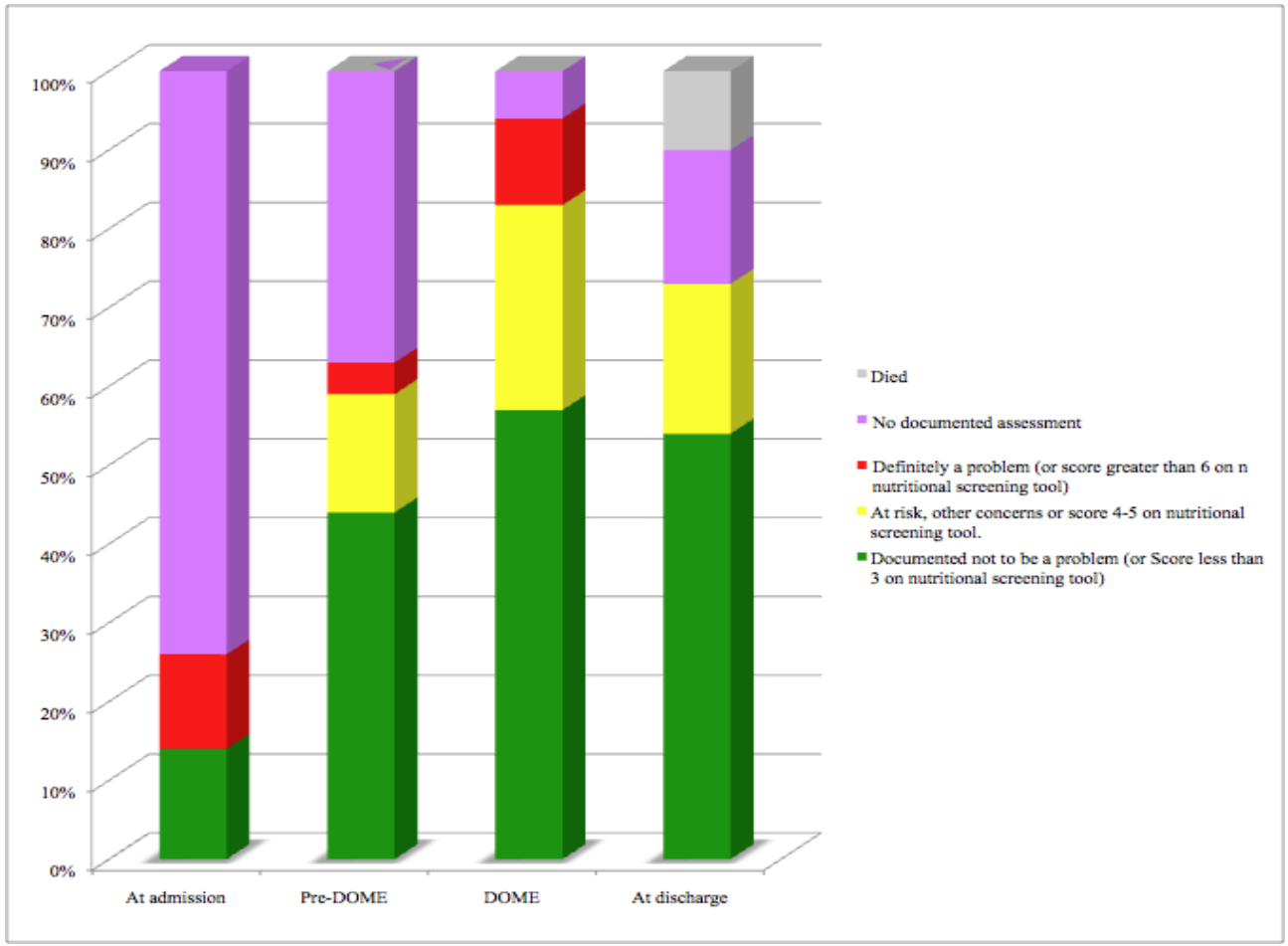
Appendix 10.9. Urinary incontinence.



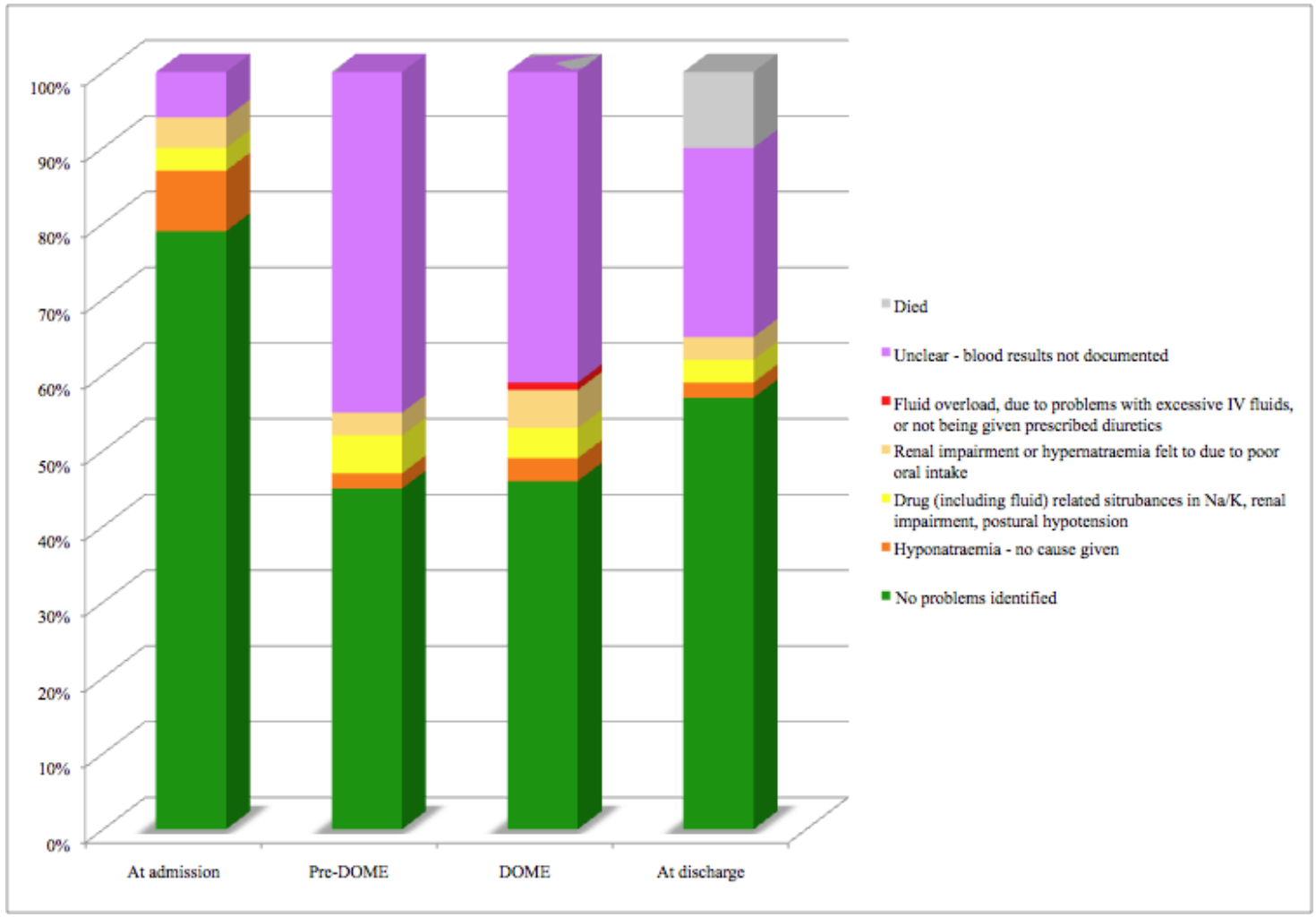
Appendix 10.10. Constipation.



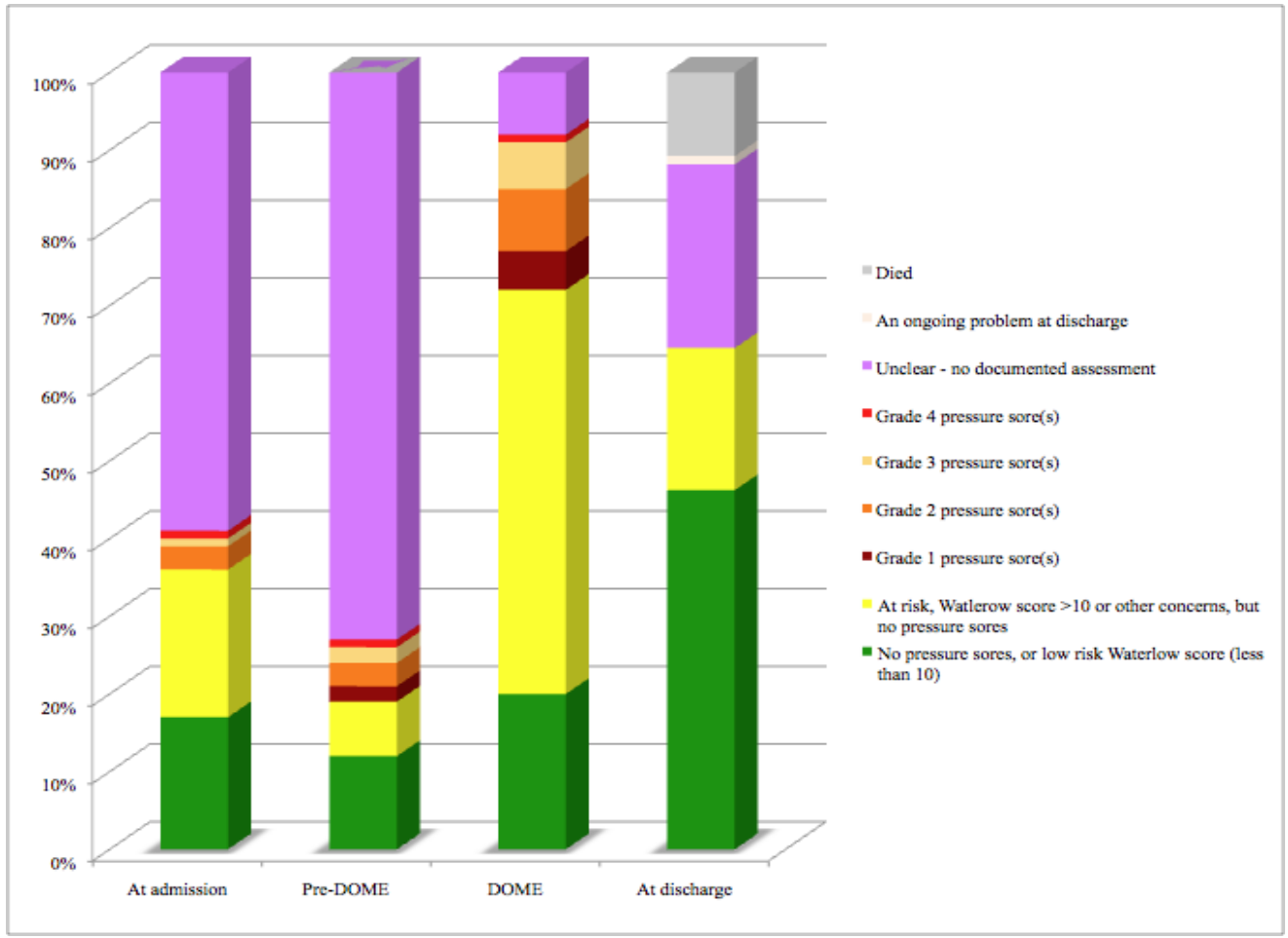
Appendix 10.11. Documentation of nutritional assessment during the admission.



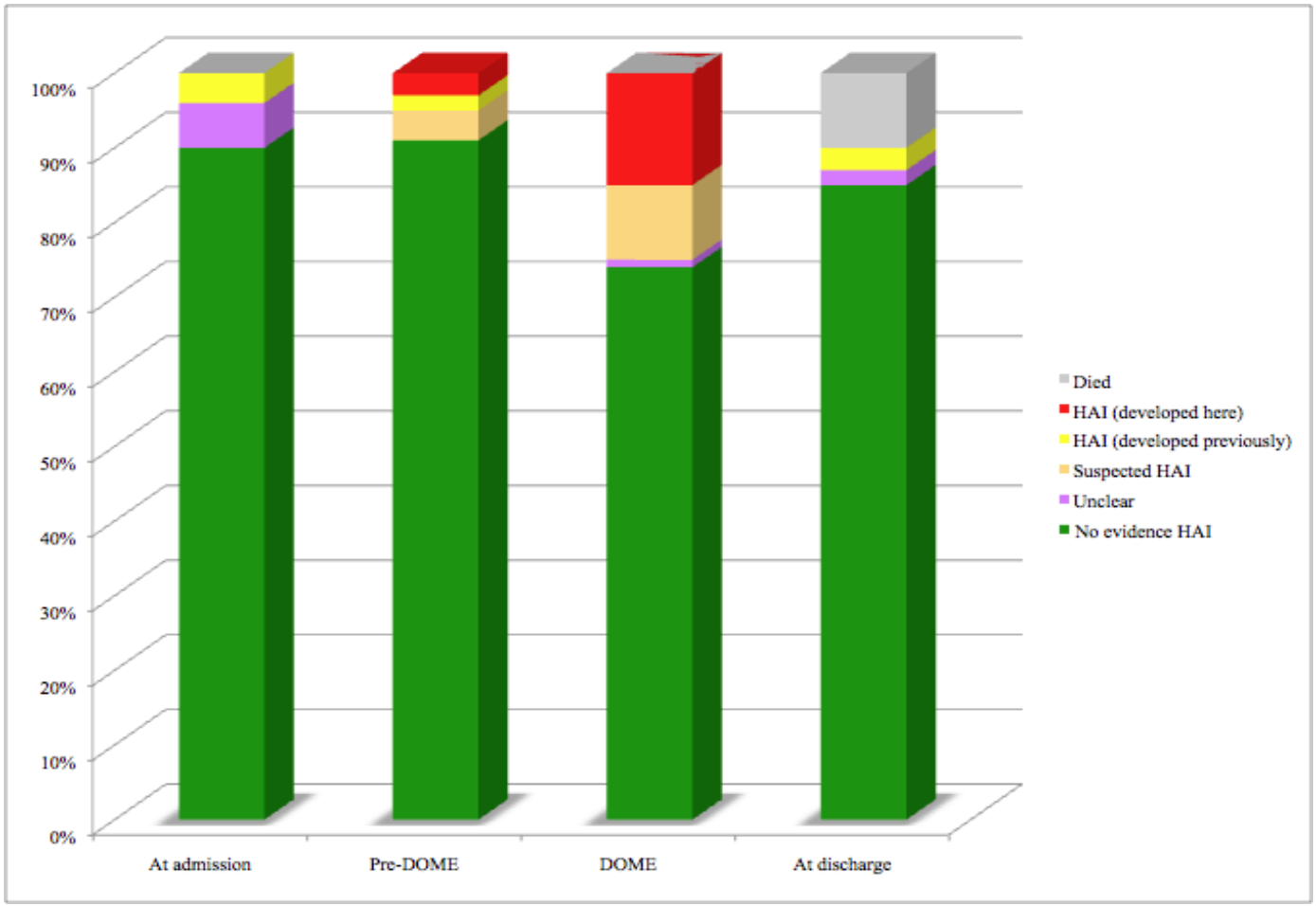
Appendix 10.12. Documented problems with sodium and fluid balance.



Appendix 10.13. Documentation of pressure sore risk and occurrence across the admission.



Appendix 10.14. Hospital acquired infection.



Appendix 10.15. Types of hospital acquired infection.

	Infection	Incidence
Definite HAIs	Hospital acquired pneumonia (aspiration)	4[*†††‡]
	Hospital acquired pneumonia (post-op)	1[‡]
	Hospital acquired pneumonia (cause not specified)	11[#]
	Catheter associated E Coli UTI	2[*]
	Catheter associated pseudomonas UTI	1
	Catheter associated multiresistant coliform UTI	1
	Catheter associated UTI (organism not specified)	1[‡]
Suspected HAIs	Non-catheter associated enterococcal UTI	1
	Hospital acquired pneumonia	4
	Clostridium difficile infection	3[#]
	Catheter associated UTI (organism not specified)	1
	Non-catheter associated UTI	1
	Viral gastroenteritis	1

Cases with multiple HAIs:

[*] Aspiration pneumonia and catheter associated E Coli UTI.

[†] Two aspiration pneumonias.

[‡] Postoperative pneumonia, catheter associated UTI and further aspiration pneumonia.

[#] Hospital acquired pneumonia and suspected *C. difficile* infection

Appendix 11. All Process Measure scores.

Appendix 11.1. Process Measures associated with complexity markers.

Complexity Marker	Management at admission and pre-DOME	Mean score*	Management on the DOME wards	Mean score*
Cognitive impairment	Acknowledged on admission	2.97	If new diagnosis, discussed with pt/ family, investigations considered, follow up arranged?	1.78
			Appropriate use of MCA/DOL guidance	4.69
	Challenging behaviour not mislabeled as aggression or poor cooperation	2.33	Challenging behaviour not mislabeled as aggression or poor cooperation	2.26
Swallowing problems	Enquiry about usual swallow, dentition and mouth care made on admission and any problems identified early	1.65	Was a timely swallowing assessment made and recommendations followed?	3.81
			Problems with oral hygiene, dentition, candida identified and treatments initiated	1.78
	Correct consistencies identified, ordered and given to patient	3.71	Correct consistency of food identified, ordered and given to patient	3.91
	Good management of dysphagia – handed over, correct positioning, SALT involvement as necessary	3.43	Good management of dysphagia - handed over, correct positioning, recommendations from SALT handed over and followed	3.33
	Medication review carried out and alternatives sought where possible	2.17	Medication review carried out and alternatives sought where possible	2.43
	If NG inserted - minimal distress, minimal insertions and CXR's, correct patient positioning for feeding, plans for review	3.40	If NG inserted - minimal distress, minimal insertions and CXR's, correct patient positioning for feeding, plans for review	2.75
			If PEG inserted (or considered) no complications, good decision making (MDT, risk benefit discussion with pt/family), plans for review	3.33
Visual and hearing impairment, speech and communication problems	Strategies used to minimise these and maximise communication (e.g. wax removal, written communication, interpreter etc)	1.96	Strategies used to minimise these and maximise communication (e.g. wax removal, written communication, interpreter etc)	2.36
End of Life Care	Appropriate DNAR and level of care decisions	4.33	Appropriate DNAR and level of care decisions made during ward stay and communicated at discharge to avoid unnecessary readmission etc.	3.87
			Appropriate involvement of other professionals eg ITU/palliative care	3.27
			Appropriate use of medications and LCP	3.33
	Appropriate discussion/explanation with relatives +/- patient?	5.0	Appropriate discussion/explanation with relatives +/- patient	4.00
	Avoidance of unnecessary investigations or treatment?	4.5	Avoidance of unnecessary investigations or treatment	4.14
	Overall mean	**3.228**	**Overall mean**	**3.19**
	Standard deviation	**1.112**	**Standard deviation**	**0.877**
	Lower quartile	**2.17**	**Lower quartile**	**2.377**
	Upper quartile	**4.33**	**Upper quartile**	**3.90**

*The following six point Likert scale was used to rate each of the process measures. Cases which scored 0 (not applicable) were removed from the analysis.
(0=Not applicable, 1=Not done, 2=Partially done, 3=About half done, 4=Almost completely done, 5=Completely done)

Cells highlighted in red indicate items that scored below the interquartile range for this group of process measures, cells highlighted in green indicate items which scored above the interquartile range, and cells highlighted in yellow indicate those within the interquartile range.

Appendix 11.2. Process Measures associated with geriatric syndromes ("outcome measures").

Geriatric syndrome	Management at admission and pre-DOME	Mean score*	Management on the DOME wards	Mean score *
Functional and mobility decline	Early ascertainment of baseline function, mobility and care needs	3.72	Allowed/encouraged to use same strategies as at home	4.36
	Seen by OT/PT as soon as possible	4.24	No delays in therapy assessments/treatments	4.69
	Encouraged to sit out/ mobilise /self care early	3.04	Encouraged to sit out / mobilise and self care wherever possible	3.75
Delirium	Prompt and correct recognition, with no mislabelling	1.97	Prompt and correct recognition, with no mislabelling	1.95
	Compassionate care, including environmental considerations (eg delirium room, lighting etc)	1.37	Compassionate care, including environmental considerations (e.g. lighting)	1.28
	Attempts made to find and correct underlying cause?	2.5	Attempts made to find and correct underlying cause?	2.17
	Cautious management eg with sedation	3.15	Cautious management e.g. with sedation	3.0
Depression & Anxiety	Identified on admission	2.27	Appropriate management including referral to psychiatric services if necessary	2.79
	Possible effects on presentation and management of other problems considered	1.9	Possible effects on management of other problems considered	2.53
	Reassurance given if appropriate	2.13	Reassurance given when needed	2.85
Continence and urinary catheters	Enquiry about continence made at admission	2.4	Continence assessment (history and examination)	1.73
	Appropriate initial management and investigations (eg PR, MSU)?	1.95	Appropriate investigations?	1.7
	Proactive management (ie assessment and regular toileting) rather than just containment?	1.39	Proactive management rather than just containment?	1.63
			Active promotion of continence - e.g. regular toileting, involvement of OT's.	1.96
	If catheterised, good indication documented, plans for early removal	2.12	If catheterised, good indication documented and removed as soon as possible, and adequate plans to ensure TWOC successful	2.85
Constipation	Enquiry about bowels made on admission?	2.3	(Proper) monitoring of bowel habit - stool charts filled in and acted upon	2.38
	Appropriate management initiated, with clear plans for review	2.17	Adequate and timely management of problems	2.56
	Appropriate investigations requested if applicable	2.29	Appropriate and timely investigations if necessary	2.38
	Pre-emptive management - e.g. laxatives with opiates	3.07	Pre-emptive management - e.g. laxatives with opiates	2.23
Falls	Risk assessment of falls made and acted upon	1.8	Risk assessment of falls made and acted upon	2.66
	Referral to falls services made where appropriate	1.72	Referral to falls services made where appropriate	2.33
			Adequate management - (nursing and medical) of underlying causes and of injuries etc.	3.14
	Treatment with bisphosphonates/calcium/vitamin D considered	1.45	Treatment with bisphosphonates/calcium/vitamin D considered	2.66
	Efforts made to identify cause of fall(s) including medication review	2.38	Efforts made to identify cause of fall(s) including medication review	2.84
Undernutrition	Enquiry about ability to self feed made on admission	2.28	Referral to dietician if necessary and recommendations followed	3.76

	Steps made to ensure help given if needed (eg red tray)	2.69	Steps made to ensure help given if needed (eg red tray), dentures	3.0
	Nutrition risk score (eg MUST) carried out and patient weighed, and findings acted upon	3.16	Nutrition risk score carried out (eg MUST) and acted upon	4.06
	Any other concerns eg Hx of weight loss acted upon	3.18	Patient weighed and any concerns acted upon	3.81
Iatrogenic problems with fluid balance/sodium	Problems with sodium and hydration identified on admission	3.42	Problems with sodium and hydration identified	4.38
	Encouraged to drink and helped where necessary	2.92	Encouraged to drink and helped where necessary	1.75
	Appropriate management of any problems - including medication review	3.33	Appropriate management of any problems - including medication review	3.0
Pressure Sores	Pressure areas examined where appropriate	3.36	Pressure areas examined where appropriate	4.53
	Waterlow score done and acted upon	2.19	Waterlow score done and acted upon	4.22
	History obtained from community of recent management strategies and progress	1.75	History obtained from community of recent management strategies and progress	1.8
	Considered as a source of sepsis if appropriate	1.67	Considered as a source of sepsis if appropriate	2.43
Hospital Acquired infection	Infection control precautions taken	3.0	Infection control precautions taken	3.22
	Consideration of HAI if recent admission	3.2	Consideration of HAI if recent admission	3.25
	Appropriate management - eg catheter changed, appropriate AB's used	4.1	Appropriate management - eg catheter changed, appropriate AB's used	4.3
	Consideration of C diff if diarrhoea or recent Ab use	4.33	Consideration of C difficile if risk factors and symptoms	4.18
	Appropriate cultures/tests sent and results followed up	3.33	Appropriate cultures/tests sent and results followed up	3.32
Venous Thromboembol-ism	Consideration of VTE among diagnoses if appropriate	4.0	Consideration of VTE among diagnoses if appropriate	3.0
	Appropriate management of anticoagulation on admission	4.17	Appropriate management of anticoagulation during ward stay and on discharge	5
	Appropriate VTE prophylaxis started on admission	4.0		
	Overall mean	**2.717**	**Overall mean**	**2.986**
	Standard deviation	**0.855**	**Standard deviation**	**0.957**
	Lower quartile	**2.045**	**Lower quartile**	**2.305**
	Upper quartile	**3.330**	**Upper quartile**	**3.772**

*The following six point Likert scale was used to rate each of the process measures. Cases which scored 0 (not applicable) were removed from the analysis.
(0=Not applicable, 1=Not done, 2=Partially done, 3=About half done, 4=Almost completely done, 5=Completely done)

Cells highlighted in red indicate items that scored below the interquartile range for this group of process measures, cells highlighted in green indicate items which scored above the interquartile range, and cells highlighted in yellow indicate those within the interquartile range.

Appendix 11.3. Management of acute medical problems.

Management at admission and pre-DOME	Mean score*	Management on the DOME wards	Mean score*
Early and effective geriatric specialist input, and advice followed	2.44	Prompt recognition of acute problems	3.83
Thorough history and examination (A&E)	3.15	Thorough clinical assessment when new problems arise	3.73
Thorough history and examination (Medics)	3.64		
Availability and use of information e.g. observations, old results and notes, information from community (A&E)	3.07	Use of all available information e.g. observations, old results and notes	3.7
Availability and use of information e.g. observations, old results and notes, information from community (Medics)	3.45		
Diagnoses – none missed or incorrect	3.88	Diagnoses – none missed or incorrect	3.99
Investigations – appropriate (none unnecessary or missed), timely, indications clear	4.03	Investigations – appropriate and timely	3.91
Management plans – appropriate (none unnecessary or missed) and timely	3.92	Management plans – appropriate and timely	4.0
No evidence of discomfort or complications as a result of investigations or treatments	4.12	No evidence of discomfort or complications as a result of investigations or treatments	4.09
Good planning and handover of result checking, patient review and actions to be taken	2.98	Good planning and handover of result checking, patient review and actions to be taken, including rescue plans and contingency planning	3.3
Senior review (PTWR or earlier) – timely and adequate	4.03	Senior involvement – timely and adequate	3.99
Overall mean	**3.519**	**Overall mean**	**3.838**
Standard deviation	**0.546**	**Standard deviation**	**0.240**
Lower quartile	**3.07**	**Lower quartile**	**3.715**
Upper quartile	**4.03**	**Upper quartile**	**3.995**

*The following six point Likert scale was used to rate each of the process measures. Cases which scored 0 (not applicable) were removed from the analysis.
(0=Not applicable, 1=Not done, 2=Partially done, 3=About half done, 4=Almost completely done, 5=Completely done)

Cells highlighted in red indicate items that scored below the interquartile range for this group of process measures, cells highlighted in green indicate items which scored above the interquartile range, and cells highlighted in yellow indicate those within the interquartile range.

Appendix 11.4. Generic issues. a) Process measures for medication management (applicable in all cases).

Issue	Mean score*
Full DH on admission, including doses and allergies, documented in notes	3.87
Full DH within first 24 hours, including doses and allergies	4.37
Assessment and management of concordance issues (pre-admission and during admission)	1.71
Appropriate use of PRN drugs	3.84
No delays in obtaining drugs or giving treatment	4.31
If new treatment started (or changed or stopped), indication and plans for review documented clearly	3.54
No problems with inappropriate prescribing	4.22
No problems with fluids, analgesia, diabetic management or anticoagulation	4.32
No adverse drug reactions	4.68
Good medication review where appropriate - no problems that could have been prevented by this	3.47
Overall mean	**3.833**
Standard deviation	**0.840**
Lower quartile	**3.523**
Upper quartile	**4.333**

*The following six point Likert scale was used to rate the medication management process measures: 0=Not applicable, 1=Not done, 2=Partially done, 3=About half done, 4=Almost completely done, 5=Completely done. Cases which scored 0 (not applicable) were removed from the analysis.

Cells highlighted in red indicate items that scored below the interquartile range for this group of process measures, cells highlighted in green indicate items which scored above the interquartile range, and cells highlighted in yellow indicate those within the interquartile range.

Appendix 11.5. Generic issues. b)Process measures associated with other generic issues (applicable in all cases).

Issue		Mean score*
Multi-disciplinary team working, communication and handover	Appropriate and thorough handover between day team and out of hours team (doctors, nurses, therapists)?	2.26
	Appropriate and thorough communication between professions?	2.61
	Documented information is consistent between different team members	2.56
	Recommendations from specialists (including therapists and pharmacists) followed	2.89
	Good handover when patient is moved between wards	2.78
Communication with patient and family	Discussion or explanation of diagnoses and treatment plans with patient (and family if appropriate).	2.7
	Reassurance if patient frightened or anxious.	2.19
Access to Services and Equipment	Use of best equipment to enhance mobility, function, nutrition, communication (including patients own if necessary - including hearing aids, dentures etc)	2.34
	Trouble-free transport around the hospital (eg for investigations)?	2.94
	Received investigations in a timely fashion?	2.75
	Good access to higher levels of care if needed?	2.83
	Number of ward transfers kept to a minimum?	2.65
Decision Making	Appropriate ceiling of care and DNAR decision making?	1.88
	Appropriate use of MCA/DOL guidance	2.67
	All investigations necessary	2.73
Discharge Planning	Swift identification of care/social needs, early in admission	2.51
	Good MDT discharge planning	2.86
	Appropriate involvement of discharge co-ordinator	2.7
	Appropriate use of MCA/DOL guidelines when making discharge decisions	2.82
	Adequate documentation of new problems and treatments to GP and community services	2.24
	Clearly documented communication of PT/OT concerns and arrangements/referrals made	2.28
	No unnecessary time in hospital	2.16
	Clear documentation of plans for review and/or follow up	2.33
	Overall mean	**2.551**
	Standard deviation	**0.285**
	Lower quartile	**2.280**
	Upper quartile	**2.780**

*The following four point Likert scale was used for these generic process of care issues: 0 = not applicable, 1= not done, 2 = sometimes, not always done, 3 = Done. Cases which scored 0 (not applicable) were removed from the analysis.

Cells highlighted in red indicate items that scored below the interquartile range for this group of process measures, cells highlighted in green indicate items which scored above the interquartile range, and cells highlighted in yellow indicate those within the interquartile range.

Appendix 12. Full process measure data from COMPACT review

Appendix 12.1. Process Measures associated with geriatric syndromes ("outcome measures") at Sites 2 and 3.

Geriatric syndrome	Management at admission and pre-DOME	Mean score Site 2*	Mean score Site 3*	Management on the DOME wards	Mean score Site 2*	Mean score Site 3*
Functional and mobility decline	Early ascertainment of baseline function, mobility and care needs	3.84	3.89	No delays in therapy assessments/treatments	4.84	4.31
	Encouraged to sit out/ mobilise /self care early	3.78	3.15	Encouraged to sit out / mobilise and self care wherever possible	4.50	3.71
Delirium	Prompt and correct recognition, with no mislabelling	2.07	3.06	Prompt and correct recognition, with no mislabelling	2.00	4.07
	Compassionate care, including environmental considerations (eg delirium room, lighting etc)	1.00	2.46	Compassionate care, including environmental considerations (e.g. lighting)	2.29	3.21
	Attempts made to find and correct underlying cause?	4.00	3.87	Attempts made to find and correct underlying cause?	3.50	4.31
	Cautious management e.g. with sedation	4.00	3.54	Cautious management e.g. with sedation	3.25	4.17
Continence and urinary catheters	Enquiry about continence made at admission	1.82	3.75	Continence assessment (history and examination)	1.53	3.80
	Appropriate initial management and investigations (eg PR, MSU)?	1.71	2.88			
	Proactive management (ie assessment and regular toileting) rather than just containment?	1.39	2.20	Active promotion of continence - e.g. regular toileting, involvement of OT's.	1.55	2.57
	If catheterised, good indication documented, plans for early removal	1.80	3.18	If catheterised, good indication documented and removed as soon as possible, and adequate plans to ensure TWOC successful	2.36	4.00
	Overall mean	**2.54**	**3.20**	**Overall mean**	**2.87**	**3.79**
	Standard deviation	**1.21**	**0.58**	**Standard deviation**	**1.22**	**0.57**
	Lower quartile	**1.63**	**2.78**	**Lower quartile**	**1.78**	**3.46**
	Upper quartile	**3.88**	**3.78**	**Upper quartile**	**4.00**	**4.24**

Appendix 12.2. Process Measures associated with complexity markers – Sites 2 and 3.

Complexity Marker	Management at admission and pre-DOME	Site 2 mean score*	Site 3 mean score*	Management on the DOME wards	Site 2 mean score*	Site 3 mean score*
Cognitive impairment	Acknowledged on admission	3.45	3.97	If new diagnosis, discussed with pt/ family, investigations considered, follow up arranged?	2.46	3.88
				Appropriate use of MCA/DOL guidance	3.88	4.00
	Challenging behaviour not mislabeled as aggression or poor cooperation	5.00	4.06	Challenging behaviour not mislabeled as aggression or poor cooperation	4.50	4.35
Visual and hearing impairment, speech and communication problems	Strategies used to minimise these and maximise communication (e.g. wax removal, written communication, interpreter etc)	3.00	2.47	Strategies used to minimise these and maximise communication (e.g. wax removal, written communication, interpreter etc)	3.43	3.26
End of Life Care	Appropriate DNAR and level of care decisions	1.44	2.79	Appropriate DNAR and level of care decisions made during ward stay and communicated at discharge to avoid unnecessary readmission etc.	2.39	4.03
				Appropriate involvement of other professionals eg ITU/palliative care	5.00	3.71
				Appropriate use of medications and LCP	4.75	3.25
	Appropriate discussion/explanation with relatives +/- patient?	3.50	1.76	Appropriate discussion/explanation with relatives +/- patient	4.00	2.79
	Avoidance of unnecessary investigations or treatment?	3.50	4.19	Avoidance of unnecessary investigations or treatment	5.00	4.32
	Overall mean	**3.31**	**3.21**	**Overall mean**	**3.93**	**3.73**
	Standard deviation	**1.14**	**1.00**	**Standard deviation**	**1.00**	**0.53**
	Lower quartile	**2.61**	**2.29**	**Lower quartile**	**2.95**	**3.26**
	Upper quartile	**3.88**	**4.09**	**Upper quartile**	**4.88**	**4.18**

Appendix 12.3. Process scores for the management of acute medical problems at Sites 2 and 3.

Management at admission and pre-DOME	Mean score Site 2*	Mean score Site 3*	Management on the DOME wards	Mean score Site 2*	Mean score Site 3*
Early and effective geriatric specialist input, and advice followed	4.12	3.05	Prompt recognition of acute problems	4.29	4.48
Thorough history and examination	3.94	4.02	Thorough clinical assessment when new problems arise	4.33	4.46
Availability and use of information e.g. observations, old results and notes, information from community	3.79	3.64	Use of all available information e.g. observations, old results and notes	4.05	4.33
Diagnoses – none missed or incorrect	4.44	3.98	Diagnoses – none missed or incorrect	4.59	4.47
Investigations – appropriate (none unnecessary or missed), timely, indications clear	4.66	4.19	Investigations – appropriate and timely	4.49	4.26
Management plans – appropriate (none unnecessary or missed) and timely	4.62	3.85	Management plans – appropriate and timely	4.63	4.02
Good planning and handover of result checking, patient review and actions to be taken	3.63	3.82	Good planning and handover of result checking, patient review and actions to be taken, including rescue plans and contingency planning	3.76	4.04
Overall mean	**4.17**	**3.79**	**Overall mean**	**4.31**	**4.30**
Standard deviation	**0.41**	**0.37**	**Standard deviation**	**0.31**	**0.20**
Lower quartile	**3.79**	**3.64**	**Lower quartile**	**4.05**	**4.04**
Upper quartile	**4.62**	**4.02**	**Upper quartile**	**4.59**	**4.47**

Appendix 12.4. Process measures for medication management at Sites 2 and 3.

Issue	Mean score Site 2*	Mean score Site 3*
Full DH on admission, including doses and allergies, documented in notes	4.40	4.21
Full DH within first 24 hours, including doses and allergies	4.90	4.52
Assessment and management of concordance issues (pre-admission and during admission)	1.45	2.83
Appropriate use of PRN drugs	4.06	4.07
No delays in obtaining drugs or giving treatment	4.89	4.08
If new treatment started (or changed or stopped), indication and plans for review documented clearly	3.71	3.98
No problems with inappropriate prescribing	4.84	4.10
No problems with fluids, analgesia, diabetic management or anticoagulation	4.48	4.17
No adverse drug reactions	4.88	4.51
Good medication review where appropriate - no problems that could have been prevented by this	4.07	4.00
Overall mean	**4.17**	**4.04**
Standard deviation	**1.04**	**0.47**
Lower quartile	**3.97**	**4.00**
Upper quartile	**4.88**	**4.29**

Appendix 12.5. Process measures associated with other generic issues at Sites 2 and 3.

Issue		Mean score Site 2*	Mean score Site 3*
Decision Making	Appropriate ceiling of care and DNAR decision making?	2.44	3.91
	Appropriate use of MCA/DOL guidance	4.27	4.17
	All investigations necessary	4.84	4.32
Discharge Planning	Swift identification of care/social needs, early in admission	3.69	4.29
	Good MDT discharge planning	4.59	4.42
	Appropriate involvement of discharge co-ordinator	5.00	3.80
	Appropriate use of MCA/DOL guidelines when making discharge decisions	4.06	3.91
	Adequate documentation of new problems and treatments to GP and community services	3.91	3.85
	Clearly documented communication of PT/OT concerns and arrangements/referrals made	3.53	4.30
	No unnecessary time in hospital	4.72	3.62
	Clear documentation of plans for review and/or follow up	3.74	4.14
	Overall mean	**4.07**	**4.07**
	Standard deviation	**0.73**	**0.26**
	Lower quartile	**3.69**	**3.85**
	Upper quartile	**4.72**	**4.30**

Appendix 13. Pre-intervention questionnaire.

Quality of care & information sharing in elderly medicine – a questionnaire for all clinical staff on 8W

Thank you for completing this questionnaire, which should only take five minutes.

It will help us to understand more about hospital-acquired complications in older people, and whether information sharing within the multidisciplinary team could be improved.

Completion of this questionnaire is entirely voluntary.
Your answers will be kept confidential and anonymous, and will only be used by the research team.

If you have any questions about this questionnaire, please contact Dr. Susy Long (02075943105 or s.long@imperial.ac.uk) or Dr. Sarah Brice, (Consultant 8W)

*****Please fill in the following information first*****

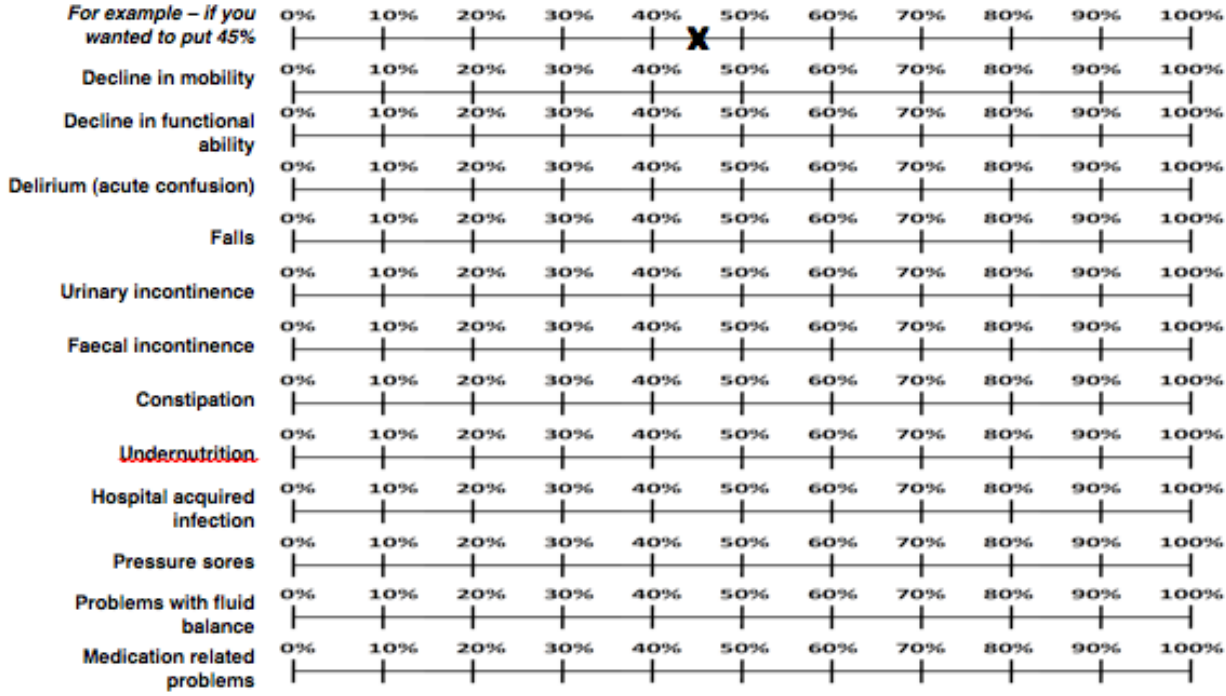
Your profession (eg. physiotherapist, doctor, nurse):.....

Number of years since you qualified:.....

PLEASE TURN OVER AND COMPLETE THE QUESTIONNAIRE

When you have finished, please return your completed to questionnaire to one of the designated yellow boxes on the ward

Think about elderly medical patients where you work. How often roughly do you think these complications arise during the hospital admission? Please mark a cross on the scale to indicate your guess for each, as shown in the example below:



Thinking more closely about the way the multidisciplinary team works, how often do you think the following occur? (please tick)

Different members of the team:	Never	Occasionally	Often	Very often	All the time
Have different perceptions of what the main problems are for the patient					
Have different expectations for the patient's recovery/progress during the hospital stay					
Give different messages to patients/families/carers					

Thinking about the patients that you are currently looking after, in how many do you think the following statements are true?

	None	Some	About half	Most	All
I am aware of the important facts about aspects of care relevant to my discipline					
I am aware of all the important facts about all aspects of care, including those that other professionals are mainly responsible for					
I feel that I know enough about the patients to make the best decisions about their care					
I understand all of the goals of care for these patients					
As a team, we have made action plans for each patient aimed at preventing hospital associated problems (rather that dealing with them if and when they happen)					

Thinking about how we document care decisions, how much do you agree with the following statements?

	Completely disagree	Slightly disagree	Neither disagree or agree	Agree slightly	Completely agree
It is difficult to find key information					
It is easy to find information from other professionals about important aspects of patient care					
I always read notes made by other professionals					
I know the important facts about what the patients were like and how they were doing before they came to this ward					
I always know if there are any important developments out of hours					

Thank you very much! Please place your completed questionnaire in one of the yellow boxes on the ward.

Appendix 14. Post-intervention questionnaire.

Quality of care & information sharing in elderly medicine – a questionnaire for all clinical staff on 8W

Thank you for completing this questionnaire, which should only take five minutes. You may remember filling in a similar questionnaire before we started using the yellow goal sheets.

The aim is to help us to understand more about hospital-acquired complications in older people, and whether information sharing within the multidisciplinary team could be improved.

Completion of this questionnaire is entirely voluntary.
Your answers will be kept confidential and anonymous, and will only be used by the research team.

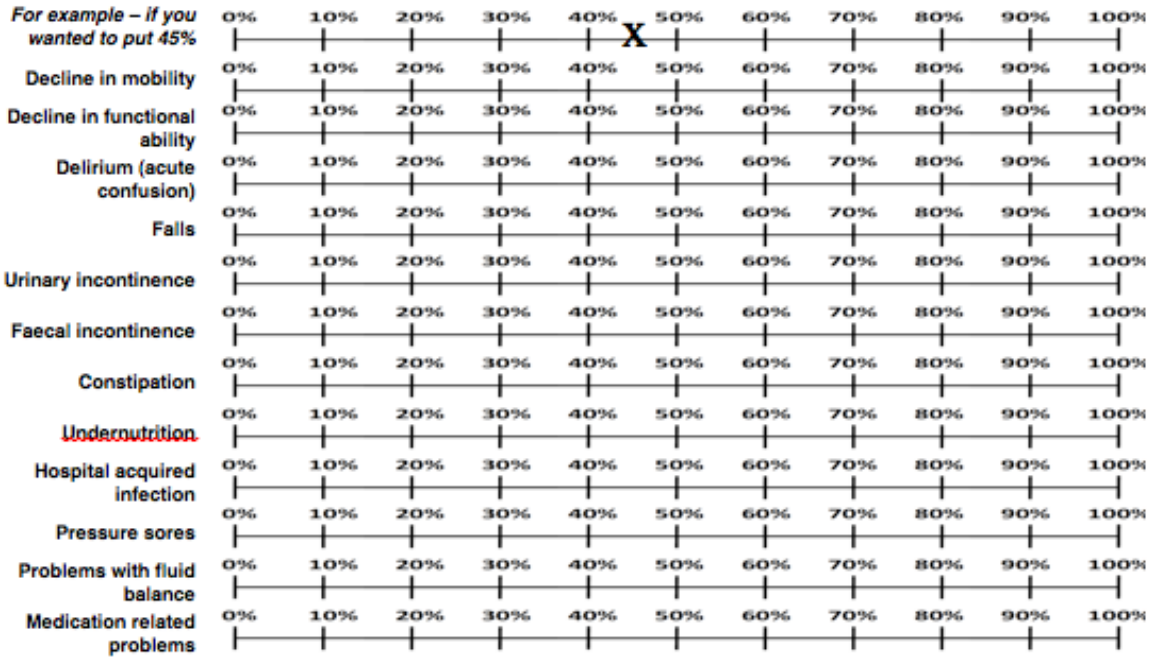
If you have any questions about this questionnaire, please contact Dr. Susy Long (02075943105 or s.long@imperial.ac.uk) or Dr. Sarah Brice, (Consultant 8W)

****Please fill in the following information first:****

Your profession (e.g. physiotherapist, doctor, nurse).....

Number of years since you qualified:.....

Think about elderly medical patients where you work. How often roughly do you think these complications arise during the hospital admission? Please mark a cross on the scale to indicate your guess for each, as shown in the example below:



Please turn over and complete the rest of the questionnaire

Thinking more closely about the way the multidisciplinary team works, how often do you think the following occur? (please tick)

Different members of the team:	Never	Occasionally	Often	Very often	All the time
Have different perceptions of what the main problems are for the patient					
Have different expectations for the patient's recovery/progress during the hospital stay					
Give different messages to patients/families/carers					

Thinking about the patients that you are currently looking after, in how many do you think the following statements are true?

	None	Some	About half	Most	All
I am aware of the important facts about aspects of care relevant to my discipline					
I am aware of all the important facts about all aspects of care, including those that other professionals are mainly responsible for					
I feel that I know enough about the patients to make the best decisions about their care					
I understand all of the goals of care for these patients					
As a team, we have made action plans for each patient aimed at preventing hospital associated problems (rather that dealing with them if and when they happen)					

Thinking about how we document care decisions, how much do you agree with the following statements?

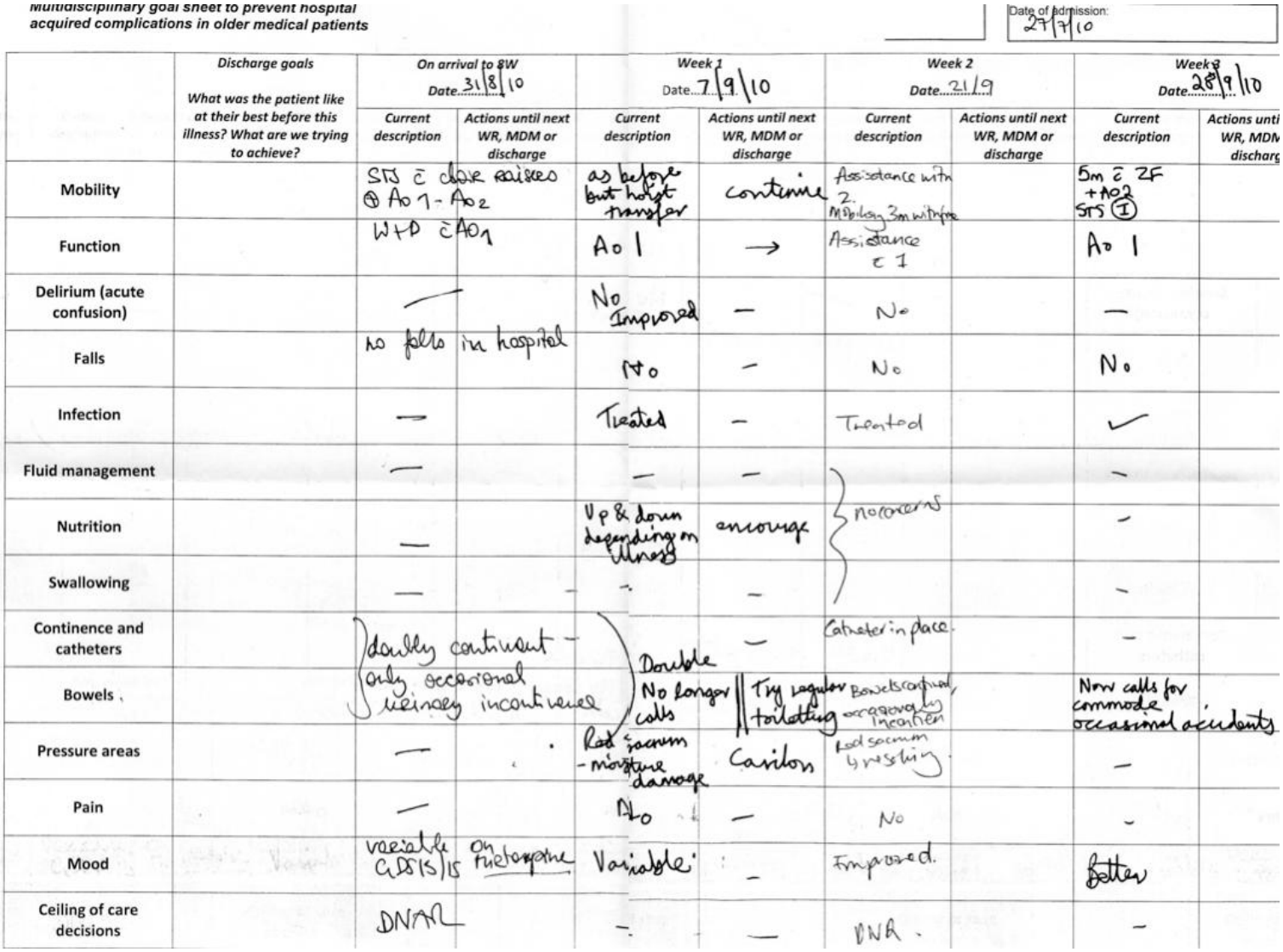
	Completely disagree	Slightly disagree	Neither disagree or agree	Agree slightly	Completely agree
It is difficult to find key information					
It is easy to find information from other professionals about important aspects of patient care					
I always read notes made by other professionals					
I know the important facts about what the patients were like and how they were doing before they came to this ward					
I always know if there are any important developments out of hours					

What did you think of the goal sheets (the yellow sheets we have been using recently)?
How much do you agree with the following statements (Please tick):

	Completely disagree	Slightly disagree	Neither disagree or agree	Agree slightly	Completely agree
The goal sheets make it easier to find key information					
It is worth the investment of time to fill in the goal sheets					
The goal sheets improve multidisciplinary collaboration					
The goal sheets help me know the important facts about what the patients were like and how they were doing before they came to this ward					
The goal sheets have been useful when making clinical decisions					
I have used the goal sheets when making decisions about patient care					
I have used the goal sheets as an aide memoir when talking to relatives					
I have referred to the goal sheets when writing summaries e.g. at discharge					
I have used the goal sheets as an educational aid					

Thank you! Please put the completed questionnaire in one of the yellow boxes on the ward

Appendix 15. An extract from a completed goal sheet.



Multidisciplinary goal sheet to prevent hospital acquired complications in older medical patients

Date of admission: 27/7/10

	Discharge goals What was the patient like at their best before this illness? What are we trying to achieve?	On arrival to 8W Date 31/8/10 Current description	 Actions until next WR, MDM or discharge	Week 1 Date 7/9/10 Current description	 Actions until next WR, MDM or discharge	Week 2 Date 21/9 Current description	 Actions until next WR, MDM or discharge	Week 3 Date 28/9/10 Current description	 Actions until WR, MDM discharg
Mobility		STS c chair raises @ Ao 1 - Ao 2		as before but hoist transfer	continue	Assistance with 2. Mobilising 3m with frame		5m c 2F + Ao2 STS (I)	
Function		WTD c Ao 1		Ao 1	→	Assistance c 1		Ao 1	
Delirium (acute confusion)		—		No Improved	—	No		—	
Falls		no falls in hospital		No	—	No		No	
Infection		—		Treated	—	Treated		✓	
Fluid management		—		—	—			—	
Nutrition		—		Up & down depending on illness	encourage	normal		—	
Swallowing		—		—	—			—	
Continence and catheters		doubly continent - only occasional urinary incontinence		Double	—	Catheter in place.		—	
Bowels				No longer calls	Try regular toileting	Bowels continent, occasionally incontinent		Now calls for commode occasional accidents	
Pressure areas		—		Red sacrum - moisture damage	Cavilon	Red sacrum healing.		—	
Pain		—		No	—	No		—	
Mood		variable GDS 15/15 on mirtazapine		Variable	—	Improved.		Better	
Ceiling of care decisions		DNAR		—	—	DNR.		—	

Thesis-related publications, presentations and prizes.

Published papers:

- Long S, Neale G, Vincent C. (2009) Practising safely in the foundation years. BMJ (Clinical research ed.) Jan 1;338:b1046.
- Long, S., Arora, S., Moorthy, K., Sevdalis, N., & Vincent, C. (2011). Qualities and attributes of a safe practitioner: identification of safety skills in healthcare. BMJ Quality & Safety *20*:(6), 483-490.

Book Chapters in press:

- Long, S., Vincent, C. (2010). "Patient Safety in Older People" (in press) for Pathy's Principles and Practice of Geriatric Medicine: Wiley Blackwell.
- Long, S., Smith, A., Zaman, J. (2011). "The PhD" (in press) for Getting into Academic Medicine: Arnold Hodder

Reports/other:

- Brice, S., Long, S., Forbes, M., Shanley, R., Vincent, C., & Woloshynowych, M. (2009). Identifying risks to older patients – a scoping exercise. A report for the Dunhill Medical Trust.
- Written and oral evidence presented to and published in the Sixth Report from the House of Commons Health Select Committee: Patient Safety, 2009, The Stationery Office.

Oral and poster presentations:

- "How Can we Measure and Improve Safety and Quality in Older Medical Patients", (oral) NW Thames regional BGS meeting, April 2011.
- Long SJ, Brice SE, Forbes MJ, Shanley RA, Ames DE, Woloshynowych M, Vincent CA. What do staff perceive to be the risks to older patients in hospital, and what interventions could reduce these risks? - an interview study, winner of the Fergus-Anderson prize for best scientific poster, British Geriatrics Society Spring Meeting, 2009, also presented at ISQUA, Dublin, 2009 (oral and poster)

- Long SJ, Ames DE, Vincent CA. "What do we know about the types, incidence and outcomes of adverse events in older hospitalised medical inpatients? A systematic literature review and re-analysis of major international adverse event studies" (poster, ISQUA, Dublin, 2009).
- Brice SE, Long SJ, Shanley RA, Ames DE, Woloshynowych M, Vincent CA. What interventions are there to reduce risk and improve quality and safety for older hospital inpatients? A scoping review of the literature. (Poster, British Geriatrics Society Spring Meeting, 2009; oral and poster, ISQUA, Dublin, 2009).
- Adams SE, Smith AJ, Long SJ, Ames DE, Vincent CA. Anticipatory Medicine and Safety Skills - a training programme. (Poster, International Forum for Safety and Quality in Healthcare, Paris, 2008).

Prizes:

- Winner of the Fergus-Anderson prize for best scientific poster, British Geriatrics Society Spring Meeting, 2009

Papers in preparation for submission:

I am in the process of preparing a number of papers from the work presented in this thesis for submission for publication:

- Long SJ, Ames DE, Vincent CA. "What do we know about the types, incidence and outcomes of adverse events in older hospitalised medical inpatients? A systematic literature review and re-analysis of major international adverse event studies"
- Long SJ, Brice SE, Forbes MJ, Shanley RA, Ames DE, Woloshynowych M, Vincent CA. "What do staff perceive to be the risks to older patients in hospital, and what interventions could reduce these risks?"
- Long SJ, Ames DE, Vincent CA. "Exploration of a new approach to using retrospective case record review to assess quality and safety in older medical inpatients; the Long Tool"
- Long SJ, Ames DE, Vincent CA. "Development and testing of a new retrospective case record review tool for use by local clinical teams to assess the care of older medical inpatients; COMPACT"
- Long SJ, Ames DE, Brice SE, Dar A, Vincent CA. "Using a multidisciplinary goal sheet to improve safety and quality on a medicine for the elderly ward"