**Changes in the hospital admission profile of COVID-19 positive patients at a central London trust**

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*Dear Editor,*

There is currently no WHO approved method for counting and coding deaths attributable to COVID-19. Since the start of the pandemic, Public Health England have counted all deaths from individuals who have tested positive for SARS-CoV-2 at any time as being attributable to COVID-19, which has resulted in recent debate.1 Experiences such as these highlight the ongoing challenges of coding and modelling the COVID-19 pandemic as we move past the initial peak and societal restrictions are relaxed.

Here we describe the changing profile of hospital admissions and readmissions, and its potential impact on modelling. In the UK, both the incidence and mortality burden associated with COVID-19 peaked in April 2020 and have subsequently declined.2 NHS trusts are now facing new challenges as the UK transitions to the next stage of the pandemic. In particular, there is a pressing need to re-open non-COVID-19 clinical services safely. As national incidence falls, a clear understanding of the profile of newly admitted SARS-CoV-2 positive patients over time would help hospital trusts focus resources and plan for re-introduction of services.

Imperial College Healthcare NHS Trust (ICHT) is a large central London trust which, by 7th July, had successfully discharged 1283 COVID-19 patients, with 427 deaths. At ICHT, reported COVID-19 admission numbers returned as part of National Health Service situation reporting remained high despite anecdotal clinical experience that numbers of acute admissions were falling. This – and other possible anomalies in national level data available to one of the authors (SJB) – led to an urgent public health request to examine ICHT data in detail. This was approved by the Trust’s Chief Clinical Information Officer and Caldicott Guardian.

We speculated that patients with historic, or incidental, infections were being included in daily admission figures by automated data feeds, with a consequent potential impact on modelling and service planning. We compiled a list of patients who had been reported under ‘Number of confirmed COVID-19 patients admitted with COVID-19 in last 24 hours (total)’ in daily situation reports over a 6-week period following the peak of hospital admission (8th April to 19th May 2020). This included patients who were admitted to hospital with a historic laboratory diagnosis of SARS-CoV-2 or were diagnosed within 24 hours of their hospital admission. Electronic records were reviewed for date of relevant admission and initial PCR diagnosis. We examined clinical notes to determine the reason for admission, which was categorised into six groups: acute COVID-19 infection; a complication from previous COVID-19 infection; incidental SARS-CoV-2 diagnosis with unrelated presentation; previous COVID-19 diagnosis not related to current admission; transfer into trust with pre-existing COVID-19 diagnosis; and no evidence of clinical or PCR diagnosis of COVID-19. Categorisation was determined based on presenting symptoms, imaging, blood results, and the medical notes. Fourteen miscategorised patients without clinical or laboratory evidence of COVID-19 were removed from the analysis.

A total of 319 admissions comprising 314 individual patients were included in the analysis (Figure 1). We observed a drop in reported weekly COVID-19 admissions from weeks 1 to 3, followed by a stabilisation in weeks 4 to 6. Notably, we observed a clear change in admission profile over time. For the week of 13th-19th May, the interval between diagnosis and admission was 37 days (18.5-49.3) days (median, IQR), compared with 0 (0-6) days for 8th-14th April. This was due to a fall in the numbers of true acute COVID-19 disease. However, admission figures appeared to be sustained by patients miscoded as acute COVID-19. These included patients with a historic diagnosis of COVID-19 readmitted with an unrelated condition; those admitted with complications of COVID-19 (e.g. venous thromboembolism, deconditioning); repatriations or inter-hospital transfers; or asymptomatic patients with an incidental finding of SARS-CoV-2 on naso-pharyngeal screening.

Figure 1: Diagnostic categories of COVID-19 admissions to ICHT from 8th April – 19th May 2020

The majority of readmissions with complications had ongoing respiratory symptoms in the absence of proven venous thromboembolism (16/31; 52%). This is similar to a recent letter in this Journal looking at readmissions at a London trust3 and suggests that patients were being discharged optimistically from their primary admission. Deconditioning in the elderly was the second commonest complication (8/31; 26%) and suggests that clinical and social care post-discharge was not able to meet expectations. Interestingly, the number of incidental new diagnoses persisted beyond the drop in acute admissions. This is likely due to an increase in screening of asymptomatic patients, or a reflection of prolonged PCR positivity following infection.

We were concerned that some patients diagnosed over 24 hours after their admission would be missed. Indeed, on examination of additional trust data, 31 patients over the 6-week period were diagnosed beyond 24 hours and would not have appeared in our dataset. We expect most of these unaccounted patients to be acute diagnoses in April, which would amplify our findings rather than contradict them.

These findings raise two key points. Firstly, the potential impact on epidemiology and disease modelling. Miscategorisation of COVID-19 admission profiles may cause an overestimate of acute disease and estimates of community transmission. The daily report studied here was created by semi-automated data processing. As the epidemic proceeded, the original logic underpinning the design of data systems became detached from subsequent requirements and expectations as central data requests developed and strategies around testing evolved. Trusts with higher levels of digital functioning may be more vulnerable to unidentified errors in coding, compared with smaller or less digitally advanced institutions. Policymakers must repeatedly ensure clarity in definitions and guidance documents and trusts must regularly review data collection routines.

Secondly, these data are relevant to planning reconfigured services, suggesting that even as acute COVID-19 admissions fall, there will be a constant flow of patients with previous diagnoses. Trusts must urgently develop clear pathways for readmissions and incidental diagnoses as non-COVID-19 services are being reintroduced nationwide. Key to this will be research on length of infectivity, given most patients with a previous diagnosis of COVID are now presenting over a month following their initially diagnosis, and the risk of re-infection.

References

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