Damian Roland, Honorary Associate Professor and Consultant in Paediatric Emergency Medicine, Children’s Emergency Department, Leicester Royal Infirmary: @Damian\_Roland

Ruud G Nijman, Academic clinical lecturer, Faculty of Medicine, Department of Infectious Diseases, Section of Paediatric Infectious Diseases, Imperial College London: @rgnijman

Caroline Ponmani, Paediatric emergency medicine consultant, Barking, Havering, and Redbridge University Hospitals NHS Trust, London

Alasdair P S Munro, Clinical Research Fellow in Paediatric Infectious Diseases, NIHR Clinical Research Facility, University Hospital Southampton, NHS Foundation Trust, Southampton: @apsmunro

***Competing interest****: None declared*

**Arriving late, delayed, or not at all—presentations to paediatric emergency departments during covid-19 pandemic**

Following the rapid spread of the covid-19 pandemic, health services across the world began operational planning for a predicted surge in attendances of covid-19. It quickly became clear however, that children’s services were not going to be overrun, and in fact the opposite concern arose. Attendances were down roughly 70% by April in England, with similar reports worldwide. [1]

This led to concerns that children with acute illness were being kept home inappropriately with an Italian case series suggesting children were being harmed by delays in presenting to hospital. [2] Two recent publications from the UK on this problem of “delayed” presentations in children appear to have conflicting conclusions. [3,4] The first based on a cross sectional survey study of paediatricians found 30% in the UK had witnessed one or more cases of delayed presentations as a direct result of covid-19 [3]. The second included 1,349 consecutive children presenting to Emergency Departments from seven hospitals in a two-week window and found only in 51 children had been delayed presenting and only 6 of these were admitted [4].

As the winter period is likely to see a second wave of cases, understanding how to interpret these competing findings, and how best to address them, will be necessary. After years of climbing emergency department attendances in the face of falling rates of invasive infections and trauma, the prevailing message has been that parents have had too low a threshold for bringing children to the emergency department. Now, as health providers we risk saying the opposite. We believe there are three areas to consider in determining how to ensure public health messaging has the appropriate content and is focused on the relevant audience: the context of reduced presentations, the definition of delayed diagnosis, and objectivity in determining outcomes.

## **Reduced presentations**

We must be wary of our interpretations of delays in presentation in the context of globally reduced attendances, as the two are not as closely correlated as it might appear. Social distancing to combat covid-19 prevents circulation of all communicable diseases. It is well documented that infections make up a large proportion of all children’s emergency department attendances with fever, breathing difficulties, or gastroenteritis so it should be no surprise that we see far fewer of these cases. Improved compliance with home asthma medication, reduced air pollution levels, and reduced exposure to viral triggers and allergens likely contributed to the reduced number of children with wheeze or asthma presenting to the emergency department. Similar reductions in low acuity attendances in particular were seen during the MERS outbreak in South Korea [5]. We must be particularly careful about subjective assessments in this context, as the children coming to hospital with more severe illness will be more notable in the absence of other, less unwell children*.* A fall in attendances in, and of, itself should not be a cause for concern, but once a narrative has evolved that children are presenting sicker because they are presenting later, this will immediately bias our assessment of the reason why the child was so unwell at the time they arrived in hospital.

## **Late, delayed and missed diagnosis: definitions**

It is important we apply consistent and well defined terminology. There must be a clear distinction drawn between presentations which are *late* and those which are *delayed*. Children have a high tolerance to compensate physiologically from many illnesses (especially infections) and can appear relatively well until late in the course of the illness when they rapidly deteriorate. These *late* *presentations* are a well-recognised phenomenon in paediatrics [6]. More controversial is defining a *delayed* *presentation* and while some disease specific definitions have been attempted there is as yet no consensus.

Central to the difference between a *late* presentation and a *delayed* presentation will be the degree of harm that a patient suffers by the *delay* in recognition and treatment of the underlying pathology. During the covid-19 outbreak a delay could have been the result of a parents/carers fear of exposure to SARS-CoV-2 in healthcare facilities, as well as the lack of access to close family members and other social contacts to provide advice. This includes healthcare pathways being perceived not to be available.

However, delays may also have been introduced by changes to clinical assessments by health care professionals being remote, rather than in-person, or there being modified health advice as a direct result of the covid-19 outbreak. We must here consider another category of *missed diagnoses*. This is when a child has been assessed for acute illness by a health professional and is diagnosed with a benign condition due to a seemingly mild illness, then later presents acutely unwell with more florid symptoms which make the diagnosis clearer. In the Italian series, English emergency department series and other anecdotal reports children were “presented to” healthcare professionals who reassured parents only for the families to return later and be determined to be a delayed presentation. [1,3] Although the outcome was no different between the missed diagnosis, or delayed presentation, we now risk assigning causation to a different part of the care pathway. The interventions needed to respond to these problems are not the same. Given its endemic nature in healthcare, missed diagnosis is an issue of training or system error, while delayed presentations require primarily strong public health communication.

## **Objective Outcomes**

We need rigorous evidence to be able to provide answers and direct interventions. So it is important we collect information as free from bias as possible (needing strict definitions to reduce subjectivity) and we measure both a numerator (delayed presentations) and a denominator/comparator (total presentations stratified by condition). Most importantly we assess outcomes objectively, in absolute terms and compared to a control period. Finding measurable differences in the clinical course of childhood illnesses will always be challenging due to the rarity of adverse outcomes and therefore require multicentre study design.

It will also be important to understand parents’ decision-making motives and reasoning on bringing their child to hospital. This will require linking qualitative data to quantitative studies. This mixed approach might offer better understanding of missed opportunities earlier in the disease episode, to understand reasons for delayed presentations, to inform integrated care pathways, and to ensure appropriate public health messages. Moreover, to assess the specific impact of covid-19 we will need to compare current data with historical data and compare if the perception of delayed presentations, however defined, has shifted.

The emergence of the Childhood Multisystem Inflammatory Syndrome provides an additional complexity. Like a torsion of the testicle, once the clinical condition has been defined they will always present too late, even if they have temporally presented early. Gathering retrospective data on when interventions should have occurred, versus when they have occurred, is always fraught with difficulty.

Concerns regarding delays of children presenting to hospital due to covid-19 are valid and must be addressed. As health systems around the world plan for their first winter with covid-19 in circulation, a balance must be struck. It is likely we can expect more reports of delayed presentations; and therefore evidence based public health system messaging is important. Parents need to know that hospitals are open and ready to care for their children when they need them, but also feel confident to manage minor ailments at home with watchful waiting, to prevent a system already operating beyond capacity from becoming further overwhelmed.

Contributions

DR, RN and AM conceived the original idea with all authors contributing to an original draft which was then edited. All authors agreed the final manuscript.

Exclusive Licence

The Corresponding Author has the right to grant on behalf of all authors and does grant on behalf of all authors, a worldwide licence (<http://www.bmj.com/sites/default/files/BMJ%20Author%20Licence%20March%202013.doc>) to the Publishers and its licensees in perpetuity, in all forms, formats and media (whether known now or created in the future), to i) publish, reproduce, distribute, display and store the Contribution, ii) translate the Contribution into other languages, create adaptations, reprints, include within collections and create summaries, extracts and/or, abstracts of the Contribution and convert or allow conversion into any format including without limitation audio, iii) create any other derivative work(s) based in whole or part on the on the Contribution, iv) to exploit all subsidiary rights to exploit all subsidiary rights that currently exist or as may exist in the future in the Contribution, v) the inclusion of electronic links from the Contribution to third party material where-ever it may be located; and, vi) licence any third party to do any or all of the above. All research articles will be made available on an open access basis (with authors being asked to pay an open access fee—see <http://www.bmj.com/about-bmj/resources-authors/forms-policies-and-checklists/copyright-open-access-and-permission-reuse>). The terms of such open access shall be governed by a [Creative Commons](http://creativecommons.org/) licence—details as to which Creative Commons licence will apply to the research article are set out in our worldwide licence referred to above.

# References

1 Isba R, Edge R, Jenner R, *et al.* Where have all the children gone? Decreases in paediatric emergency department attendances at the start of the COVID-19 pandemic of 2020. *Arch Dis Child* 2020;:archdischild-2020-319385. doi:10.1136/archdischild-2020-319385

2 Lazzerini M, Barbi E, Apicella A, *et al.* Delayed access or provision of care in Italy resulting from fear of COVID-19. *Lancet Child Adolesc Heal* 2020;**4**:e10–1. doi:10.1016/S2352-4642(20)30108-5

3 Lynn RM, Avis JL, Lenton S, *et al.* Delayed access to care and late presentations in children during the COVID-19 pandemic: a snapshot survey of 4075 paediatricians in the UK and Ireland. *Arch Dis Child* Published Online First: 2020. doi:10.1136/archdischild-2020-319848

4 Roland D, Harwood R, Bishop N, *et al.* Children’s emergency presentations during the COVID-19 pandemic. *Lancet Child Adolesc Heal* Published Online First: 30 June 2020. doi:10.1016/S2352-4642(20)30206-6

5 Lee SY, Khang Y-H, Lim H-K. Impact of the 2015 Middle East Respiratory Syndrome Outbreak on Emergency Care Utilization and Mortality in South Korea. *Yonsei Med J* 2019;**60**:796. doi:10.3349/ymj.2019.60.8.796

6. Green SM, Nigrovic LE, Krauss BS. Sick Kids Look Sick. *Ann Emerg Med* 2015;**65**:633–5. doi:10.1016/J.ANNEMERGMED.2014.11.012