

Not just little adults: preparing a children's emergency department for COVID-19

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ABSTRACT

COVID-19 presented unique challenges in preparing our stand-alone children's emergency department for the pandemic and has demonstrated well the paediatric adage, 'children aren't little adults'.

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Emerging details of a novel coronavirus first appeared in our trust epidemiology bulletin on 10 January 2020. On 21 January, the first patient with symptoms consistent with SARS-Cov-2 was admitted to a UK hospital and 3 days later, we produced our first ED clinical guideline on management of suspected cases. We started seeing potential cases, mainly via the National Health Service (NHS) 111 telephone service, in children returning from skiing holidays in Italy in late-February 2020.

Following our busiest month ever in December 2019, we feared a viral respiratory pandemic would bring the department to its knees—the month of March in the Northern hemisphere is traditionally the busiest in acute paediatrics.

Our initial planning reflected this. Alongside the cohorting of patients (see below), we developed a rapid assessment and triage (RAT) process (not established in children's EDs as it is in adult units) to enable senior clinicians to evaluate kids presenting with respiratory illness at triage (see RAT proforma, online supplementary appendix 1) to aid rapid decision making on patient disposition. In case we

were overwhelmed, we also developed a protocol for senior clinicians to 'eyeball' children at the ED front door and to send well-appearing children away without coming into the department.

Spookily, March 2020 turned out to be probably one of our quietest winter months in recent memory (see [figure 1](#)), with attendances some days down to one-third of normal levels. We have not had to use the RAT process. Early epidemiological data suggest low morbidity and mortality among children. Retrospective data from Hubei province, China, found 94.1% of confirmed and suspected cases were either asymptomatic or had mild-moderate symptoms, with very low numbers critically ill.¹ A similar picture has emerged from Madrid, Spain.^{2,3}

But what about the risk to children with comorbidities and compromised immune systems, especially in a tertiary children's hospital like ours? The risk to ED staff? To patients and parents in the waiting room? The impact of a primary care service now delivered remotely? Would some of us be redeployed to help our colleagues looking after adults (half our junior workforce and two out of 10 of the ED consultants are adult trained)?

Lombardy's paediatricians described their preparations as 'more logistical than clinical', underlining their uncertainty over the spectrum of paediatric presentations of COVID-19 in Northern Italy and the potential demand on resources.⁴ In May 2020, our department is unrecognisable. Here are some of the key ways we have adapted and early reflections on our successes and failures.

PATIENT JOURNEY

Triage begins before a child steps through the front door, where children and carers are screened for features of possible COVID-19. Many children's EDs are noisy and chaotic because of the extended family and overloaded buggies they bring with them. This stopped overnight when we imposed a strict one carer, one child

policy. There was initial opposition from some families but this quickly petered out after COVID-19 cases started to rise nationally. The rest of the hospital, which normally prides itself on having the family around the child, also instituted the one carer, one child policy which put a stop to in-hospital transmission of the virus from early April.

Public Health England (PHE) guidance on symptoms was adult focused—cough and fever, now also anosmia—and as data emerged showing that some children also had gastrointestinal symptoms, we broadened our criteria for potential COVID positive patients to include the whole gamut of viral symptoms in kids.⁵

We divided the ED in two, cohorting patients with features of possible COVID-19, or currently observing a 14-day isolation period under government guidance, who are directed to our existing waiting room, or 'orange area'. Carers and children are given surgical masks, although toddlers often won't tolerate these. We are fortunate that the low numbers attending have not led to issues with social distancing. Cohort definitions were rapidly adapted, with the term 'dirty area' scrapped as this understandably worried families and created communication

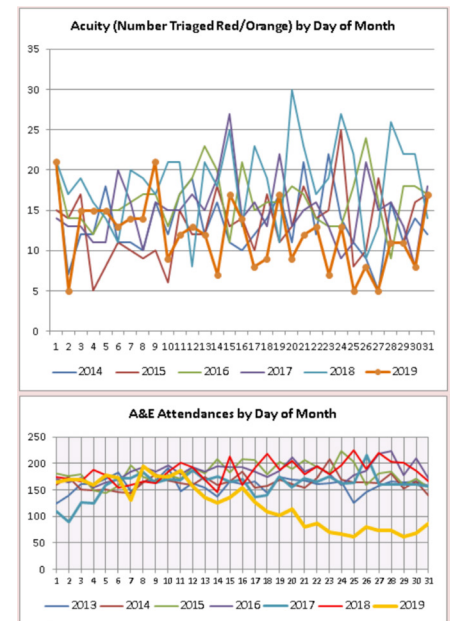


Figure 1 March 2020 Birmingham Children's Hospital ED activity showing reduction in attendances (starting approximately 12 March 2020) but with level of high acuity patients maintained (note graphs represent financial year so 'March 2019' as represented here reflects March 2020). ED, emergency department, A&E, Accident and Emergency (old name for ED)

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challenges for staff. Patients felt to be very low risk are directed to a 'clean' secondary triage area (renamed 'green side') in the erstwhile Clinical Decisions Unit, although the reportedly high rates of asymptomatic carriage in children remain a concern.⁵ Testing capacity has been a problem nationally and we have been no exception but all children admitted are now tested for COVID-19, even if they are asymptomatic.

As part of cohorting, we now run two separate triage areas and two patient registration points alongside the staff screening patients at the ED entrance, helped by extra staff seconded to the ED from areas of the hospital where elective activity has been paused. We also have contingency plans to cohort patients in the open bay of our observation unit if attendances are high. A vital learning point for any new ED building will be to ensure that it is pandemic ready, ensuring safe ventilation, availability of negative pressure rooms, a layout that can be quickly adapted to cohorting and dedicated areas for radiology and treatments.⁶ For example, our current three-bedded resuscitation area is small and separated only by curtains, creating difficulties for staff and families when performing aerosol generating procedures (AGP) and our reception desk was open to the patient waiting area (originally seen as child friendly).

A 'single queue' model has been implemented with our general paediatric colleagues. General practitioner referrals have dropped dramatically, and ambulance arrivals have increased, with paediatric cases diverted to us from the rest of the city to assist hospitals which experienced massive demand on their adult services.

We have also designed protocols to rationalise follow-up of minor injuries by our orthopaedic and plastics teams, who now triage our referrals and decide themselves on whether children need to return for review of whether this can be done remotely. Our own daily ED clinics have been put on hold and we call back only minor burns for dressing changes (we are mulling options to do some of this remotely). We think the scope of our own ED clinics will change greatly when we return to normal business, bringing fewer children back and using more remote follow-up.

Personal protective equipment

The issues around personal protective equipment (PPE) have defined the COVID-19 pandemic but for a children's ED, where we sing songs and blow

bubbles to calm nerves, PPE has made our therapeutic role more challenging. Children have burst into tears when we enter a cubicle despite smiling as hard as we can with our eyes above our fluid resistant surgical face masks.

We have placed 'grab bags' of level 3 PPE (fluid repellent gown, FFP3 (Filtering Face Piece) mask, eye protection, gloves) in resus for major trauma or out-of-hospital arrest calls but its use in the children's resuscitation room has not been straightforward. Staff safety is a priority but we also wanted to minimise waste of valuable gowns and FFP3 masks. We initially followed PHE guidance that could be interpreted as saying only airway personnel need to don full PPE.⁷ However, it quickly became clear that different PPE for different team members led to anxiety and confusion. We now put the whole resuscitation team in level 3 PPE, following Resuscitation Council (UK) guidelines that class cardiac compressions as an AGP, while imposing even stricter crowd control at what can often be overstaffed events.⁸

As the paediatric Major Trauma Centre for the region, we were advised additionally by our Microbiology team to don level 3 PPE for major trauma patients as data from adult centres had shown a significant proportion of these patients testing positive for COVID-19. The reason for this is not clear but thought possibly to be related to the number of people handling a major trauma patient.

Another paediatric challenge with PPE has been what constitutes an AGP in children, with worried questions over whether this included a crying child. Prior to changes in college guidance, the consultant team pragmatically suggested minimising throat examinations in children—difficult after years of ingrained practice—with clinicians donning level 2 PPE (surgical mask, apron, gloves and eye protection) for taking swabs. This was debated nationally by paediatric colleagues via social media and was subsequently agreed by the Royal College of Paediatrics and Child Health.⁹

We also debated the PPE level needed for nebulisers—a very common treatment in the children's ED—as Australia, New Zealand and North America have classed this intervention as an AGP. We have followed PHE advice in classing nebulisers as a non-AGP but have modified our wheeze guideline to emphasise use of inhalers, even in mildly hypoxic children, using inhaled Ipratropium Bromide alongside inhaled Salbutamol

for burst therapy (with a spacer over nasal cannula delivering oxygen).⁷

Clinical guidelines, best practice and information sharing

The information battle has been one of the most striking aspects of COVID-19 planning. Our COVID-19 ED guideline is currently on its 11th version (see online supplementary appendix 2). What started as a list of countries from PHE has evolved into a reference guide on paediatric presentations of COVID-19, PPE instructions and other operational guidance. Nevertheless, such is the pace of changing guidance it can feel as though every update becomes immediately obsolete. Our COVID-19 patient information leaflet covers safety-netting advice, mental health, breast feeding and how to navigate NHS 111 (see patient information leaflet, online supplementary appendix 3).

Staff anxiety is a huge issue, driven by social media.¹⁰ Clinical guidelines updated every few days are insufficient to address this, as there is an abundance of competing misinformation at their fingertips. Transparency has been key, being open about what we know and what we don't know.

A dedicated COVID-19 WhatsApp group was initiated as an avenue for disseminating up to date information quickly. One ED Consultant has taken on a pastoral role managing staff questions related to COVID-19. The pastoral consultant has 'surgeries' at certain times, as she was receiving calls day and night. The ED consultant WhatsApp group now has a 20:00–8:00 hours curfew to try and establish some mental breathing space. This is alongside hospital-wide initiatives, including a telephone counselling service open 24 hours a day.

Children's EDs are sadly no strangers to child deaths. While we have so far been spared the mental anguish of some of our adult colleagues having to communicate heart-breaking news via smartphone to loved ones, some of us have had to break bad news in PPE, while limiting family members in the clinical area, which has only added to the difficulty of this emotionally challenging task.

Other modifications to normal working

► Workforce strategies have been changed dependent on need. Our challenge has been to fill shifts in this small subspecialty in times of crisis. Staff sickness was seen to be the greatest challenge and rotas have been

adapted, with management and study time cut to fill an emergency back-up rota.

- ▶ Trainees still want to be taught and for some this may be their only paediatric placement. With the hospital's strict social distancing policies, we have designed a teaching programme delivered via Zoom. This looks likely to remain after the pandemic as instead of the usual 4–5 trainees attending Friday morning teaching in our cramped seminar room, 34 trainees from both within the ED, the hospital and the wider region, dialled in last week to participate in teaching on emergency thoracotomy.

REFLECTIONS

Given our low attendances, it sometimes feels like we have overprepared. So far, we have not had to redeploy our own staff. But we know we cannot let down our guard until we know this virus better. Just as we began to relax about disease severity in children, case reports began to emerge of sick children presenting with a worrying inflammatory syndrome in Europe and North America, Paediatric Inflammatory Multisystem Syndrome Temporally related to SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2).¹¹ We have already admitted a small number of children who meet the syndrome criteria.

Planning has begun for a recovery phase but we are not yet at a stage to decide when this will start. We worry about the children who aren't coming to the ED, especially vulnerable children living in difficult social circumstances who are not being seen regularly at school or elsewhere in the community due to lock-down.¹² As children start to make a tentative return to our department, we also worry about how to maintain social-distancing in our small waiting room. And when schools reopen, we worry about the paediatric winter and how COVID-19 will affect the slew of children presenting with Respiratory

Syncytial Virus, Influenza and other acute respiratory illnesses.

In 2 months, we have dramatically changed the way we work to become COVID-operational. While you may have a vision of how your department should change to operate in a pandemic, be prepared to get there incrementally as your changes will impact your other colleagues in unpredictable ways. And be prepared to rip it all up and start again if the situation changes (who remembers *Coronavirus Pods?*). Above all, we know that we must learn from this to prepare for the next pandemic.

Collaborators Paul Franklin and James Allbones, Informatics Department, Birmingham Women's and Children's NHS Foundation Trust.

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