

at least considering a strategy relying on a careful screening of patients for clinical signs or a recent contact with an infected person followed by an RT–qPCR confirmation. However, one must also keep in mind that a negative result is no guarantee of the absence of infection. Studies have shown that RT–qPCR test sensitivity averages 70% when samples were taken from the nasopharynx.¹⁰ Therefore, any patient with a high index of suspicion of COVID-19 should be treated as such in terms of protective measures, even where the RT–qPCR is negative. Radiological findings have shown promise as diagnostic tests for COVID-19 in adult patients.³ In children, according to our results, typical CT changes were present in just 55% of patients, which indicates that CT scanning is of lesser value in children compared with adults.

In conclusion, our meta-analysis sheds light on (i) the absence of specificity regarding COVID-19 symptoms in children and (ii) the relatively high proportion of asymptomatic patients. Our results should be considered when policy is determined for detecting SARS-CoV-2 infection in children in the context of medical and surgical management.

Declarations of interest

The authors declare that they have no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.bja.2020.05.026>.

References

1. Emanuel EJ, Persad G, Upshur R, et al. Fair allocation of scarce medical resources in the time of Covid-19. *N Engl J Med* 2020; **382**: 2049–55
2. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? *Lancet* 2020; **395**: 1225–8
3. Lee-Archer P, von Ungern-Sternberg BS. Paediatric anaesthetic implications of COVID-19—a review of current literature. *Paediatr Anaesth* 2020 Apr 19. <https://doi.org/10.1111/pan.13889>
4. Galván Casas C, Català A, Carretero Hernández G, et al. Classification of the cutaneous manifestations of COVID-19: a rapid prospective nationwide consensus study in Spain with 375 cases. *Br J Dermatol* 2020 Apr 29. <https://doi.org/10.1111/bjd.19163>
5. Dong Y, Mo X, Hu Y, et al. Epidemiology of COVID-19 among children in China. *Pediatrics* 2020; **145**, e20200702
6. Cochrane collaborative, Available from: <https://training.cochrane.org/handbook/current>
7. The Joanna Briggs Institute, Available from: https://joannabriggs.org/sites/default/files/2019-05/JBI_Critical_Appraisal-Checklist_for_Case_Series2017_0.pdf
8. Li R, Pei S, Chen B, et al. Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV-2). *Science* 2020; **368**: 489–93
9. Sutton D, Fuchs K, D'Alton M, Goffman D. Universal screening for SARS-CoV-2 in women admitted for delivery. *N Engl J Med* 2020; **382**: 2163–4
10. Liu R, Han H, Liu F, et al. Positive rate of RT-PCR detection of SARS-CoV-2 infection in 4880 cases from one hospital in Wuhan, China, from Jan to Feb 2020. *Clin Chim Acta* 2020; **505**: 172–5

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Anaesthesia preparedness for COVID-19 pandemic readiness: a medication preservation strategy

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Editor—The rapidly evolving global coronavirus disease 2019 (COVID-19) pandemic has highlighted the growing imbalance between supply and demand for medical resources as a result of limited global production capacity and changing demands. Information on pandemic-related pharmaceutical preparedness is particularly limited, and no Australian or

international guidance is available thus far. Strategies to reduce, conserve, refine, replace, or substitute medications for sustainability during the current pandemic, and for the future, are a critical component to pandemic or disaster preparedness. A critical shortage of essential medications could severely limit access to best patient care and impact

Table 1 Components of the medication preservation toolkit.

1. Operational preparedness	Not started	In progress	Completed	N/A
Organisational planning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Collaboration with all stakeholders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Establish current local and state stock counts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Establish projected stock required	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Communication	Not started	In progress	Completed	N/A
Assess demand in ICU	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess demand in the Emergency Department	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communicate with staff regularly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Implementation	Not started	In progress	Completed	N/A
Reduce wastage, redistribute, refine anaesthetic techniques, substitute, adapt and prepare rapid access solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Audit	Not started	In progress	Completed	N/A
Audit clinical outcomes at different phases of the pandemic to help refine strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

clinical outcomes. We highlight operational and strategic approaches taken by our Anaesthetic Department of The Royal Brisbane and Women’s Hospital (RBWH), Brisbane, QLD, Australia, and provide a practical toolkit as a resource for other institutions undertaking pandemic preparation.

Hospital readiness and emergency response checklists have been described and published by international organisations such as the US Centers for Disease Control (CDC) and the WHO. In 2019, the Australian Government published the Australian Health Management Plan for pandemic influenza, providing a national approach to pandemic preparedness for the Australian healthcare sector.¹ Australian hospitals and specialist societies have provided their respective pandemic plans which are often accessible via their websites.²⁻⁴ The Faculty of Intensive Care Medicine in the UK published guidance on adaptations to standard UK critical care medication prescribing and administration during pandemic pressures. Highlighting medications potentially susceptible to short supply and high demand, the Faculty proposed alternatives to first-line drugs in an ICU setting.⁵ Relevant to usage of anaesthetic medications in a pandemic, the Royal College of Anaesthetists and the Association of Anaesthetists have provided guidance on some mitigation strategies.⁶

Aligning operational and policy action is paramount. However, translation of operational and clinical demand into day-to-day activity under a pandemic situation is extremely challenging. Anaesthetic departments have a major role within a hospital and provide essential and critical care to a variety of hospital services. Cooperation and collaboration between these service providers is crucial in a rapid response situation. The Royal Brisbane & Women’s Hospital is a quaternary hospital with more than 1000 beds, and performs ~ 37 500 procedures annually, including ~10 000 emergency procedures, in 22 operating theatres and 11 procedural areas.

Despite a number of published hospital checklists, to our knowledge there is currently no published medication preparedness toolkit or checklist for pandemic readiness for hospitals in general, or for anaesthetic departments in particular. The described medication preservation toolkit is part of our *Practical Anaesthetic Department Readiness Checklist* developed in response to the COVID-19 pandemic (Ethics approval: LNR/2020/QRBW/64183). We have made considerable efforts to ensure that the information described is supported by current knowledge and recommendations. This toolkit ([Supplementary Table 1](#)) has been prepared to support anaesthetists and to provide some guidance. It is structured, highlighting four key components ([Table 1](#)): operational preparedness, communication, implementation, and audit, each with a list of proposed actions and their implementation status. We recommend that anaesthetic departments anticipating or experiencing an extreme demand for, or a shortage of essential medications (induction agents, sedatives, analgesics, muscle relaxants, reversal agents, and vasopressors), be prepared to implement each action effectively and as soon as it is required. In the case of a pandemic, implementation of this toolkit during the early phase of known imported cases is likely to be more effective than in the subsequent phase of community spread of the disease.

Since December 2019, the outbreak of a novel coronavirus has challenged health and hospital systems and clinicians alike. It is anticipated that this will continue. Pandemic and disaster preparation and response requires a coordinated, collaborative, and organised approach. We have summarised and conceptualised an anaesthetic department pandemic preparedness strategy to be used as a medication preservation toolkit. This toolkit was developed as part of our *Practical Anaesthetic Department Readiness Checklist* in response to the COVID-19 pandemic, but many of the recommendations

described are generic in principle and anticipated to be applicable to any sized anaesthesia department. All actions undertaken should align with the hospital emergency or pandemic management plan and pharmacy policies, address interdepartmental implications, and undergo regular reassessment of appropriateness and applicability.⁷ It is envisaged that this would be adaptable to future pandemics, outbreaks, natural disasters, and mass casualty events that will continue to challenge hospital resource management. Disaster preparation and response requires a coordinated, collaborative, and organised approach and this structured toolkit provides a pathway to this.

Declarations of interest

The authors declare that they have no conflicts of interest.

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Appendix A. Supplementary data

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References

1. Australian Government Department of Health. *Australian health management plan for pandemic influenza*. Canberra: Commonwealth of Australia; 2019. Available from, [https://www1.health.gov.au/internet/main/publishing.nsf/Content/519F9392797E2DDCCA257D47001B9948/\\$File/w-AHMPP1-2019.PDF](https://www1.health.gov.au/internet/main/publishing.nsf/Content/519F9392797E2DDCCA257D47001B9948/$File/w-AHMPP1-2019.PDF). [Accessed 27 March 2020]
2. North Hospital Metro, Health Service. *Royal Brisbane and Women's Hospital (RBWH) pandemic influenza plan: annex of the RBWH emergency and disaster response plan*. Brisbane (Australia): State of Queensland (Metro North Hospital and Health Service). Available from, https://qheps.health.qld.gov.au/_data/assets/pdf_file/0021/413463/pand-man-plan.pdf. [Accessed 27 March 2020]
3. ASA COVID-19 Working Group. *Pandemic planning role for Australian anaesthetists*. Sydney (Australia): Australian Society of Anaesthetists; 2020. Available from, <https://www.asa.org.au/wordpress/wp-content/uploads/News/eNews/covid-19/ASA-pandemic-planning-summary.pdf>. [Accessed 1 April 2020]
4. World Federation of Societies of Anaesthesiologists. *Coronavirus – guidance for anaesthesia and perioperative care providers*. London (UK): WFSA; 2020. Available from, <https://www.wfsahq.org/resources/coronavirus>. [Accessed 20 March 2020]
5. *Guidance on adaptations to standard UK critical care medication prescribing and administration practices during pandemic emergency pressures*. London (UK): ICM; 2020. Available from, <https://static1.squarespace.com/static/5e6613a1dc75b87df82b78e1/t/5e8612f80993e242651fbc86/1585844985693/Guidance-on-adaptations.pdf>. [Accessed 1 April 2020]
6. *Guidance on potential changes to anaesthetic drug usage and administration during pandemic emergency pressures*. London (UK): Royal College of Anaesthetists and Association of Anaesthetists; 2020. Available from, www.icmanaesthescovid-19.org. [Accessed 1 April 2020]
7. Kuza CM, McIsaac III JH. Emergency preparedness and mass casualty considerations for anesthesiologists. *Adv Anesth* 2018; **36**: 39–66

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Does prolonged propofol sedation of mechanically ventilated COVID-19 patients contribute to critical illness myopathy?

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