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Editor—We read with interest the recent study by Zhong and colleagues¹ in the *British Journal of Anaesthesia*. We would like to thank these authors for sharing their experience of transmission rates to anaesthetists associated with the provision of spinal anaesthesia in patients with coronavirus disease 2019 (COVID-19). These early data are welcome as health care professionals face the challenge of managing the pandemic. However, we suggest that these findings need to be interpreted with caution.

The appropriate personal protective equipment (PPE) to be used in different clinical settings has been a source of controversy and confusion. The choice of appropriate PPE frequently hinges around whether the patient contact involves an aerosol-generating procedure, such as tracheal intubation or extubation. This can be particularly difficult in the obstetric population where the majority of operations are performed under neuraxial anaesthesia (not considered to be an aerosol-generating procedure), but with the ever-present risk of requiring expedient conversion to general anaesthesia with tracheal intubation during surgery. The data presented by Zhong and colleagues¹ suggest that use of Level 1 PPE (surgical mask, hat, gown, and gloves) for spinal anaesthesia was associated with an elevated risk of COVID-19 transmission to the anaesthetist performing spinal anaesthesia compared with Level 3 PPE (positive pressure (pressure demand), self-contained breathing apparatus, and a fully encapsulating chemical protective suit plus inner and outer chemical resistant gloves).

Firstly, with relatively small numbers in a retrospective, observational study, there is an elevated risk of random type 1 error, and the significant finding of reduced risk of transmission with advanced PPE may well have occurred by chance.

With the present study design, it is not possible to control for unmeasured confounders, of which there may be several in this study. While the authors assert that the anaesthetists performing spinal anaesthesia did not have contact with other COVID-19 patients, transmission of disease may not require direct contact with infected individuals as viral transmission can occur through fomite spread, for example from infected hard surfaces. Another relevant factor when assessing the effectiveness of PPE in any context is the issue of asymptomatic carriers. In a radical approach to the pandemic, Iceland has undertaken rigorous and comprehensive measures of source control. This has included testing a higher percentage of the population for COVID-19 than any other country.² The finding that approximately 50% of people infected with COVID-19 are asymptomatic has also been confirmed by other

small population studies.³ Indeed, in Zhong and colleagues¹ study, three out of the five anaesthetists who tested positive did so in the absence of any symptoms. Therefore, the potential impact of exposure of the cohort of anaesthetists to asymptomatic carriers could have been an important confounding factor. We cannot see how the authors can assert with any confidence that the only source of exposure to the virus was during the administration of spinal anaesthesia. The authors have not provided any information about exposure of the anaesthetists to COVID-19 in other clinical or community settings.

Finally, correct donning and doffing of PPE are key to avoiding infection transmission, with the majority of self-contamination errors happening during removal of equipment.⁴ It would be helpful to understand local policies related to PPE used in this study and whether any potential contamination or doffing errors may have occurred.

We acknowledge that uncertainty remains regarding the efficacy and effectiveness of various forms of PPE for COVID-19. Further detailed studies are urgently needed to chart a path towards clarity in appropriate PPE requirements during this pandemic.

Declarations of interest

NL chairs the Education sub-committee of the Obstetric Anaesthetists' Association. She is a senior editor for the *International Journal of Obstetric Anaesthesia*. No other conflicts of interest are declared.

References

1. Zhong Q, Liu YY, Luo Q, et al. Spinal anaesthesia for patients with coronavirus disease 2019 and possible transmission rates in anaesthetists: retrospective, single-centre, observational cohort study. *Br J Anaesth* 2020; **124**: 670–5
2. COVID-19 in Iceland – statistics. Iceland: Directorate of Health and the Department of Civil Protection and Emergency Management; 2020. <https://www.covid.is/data>. [Accessed 30 March 2020]
3. Day M. Covid-19: identifying and isolating asymptomatic people helped eliminate virus in Italian village. *BMJ* 2020; **368**: m1165
4. Tomas ME, Kundrapu S, Thota P, et al. Contamination of health care personnel during removal of personal protective equipment. *JAMA Intern Med* 2015; **175**: 1904–10

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Sustainable response to the COVID-19 pandemic in the operating theatre: need for more than just personal protective equipment

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Editor—Coronavirus disease 2019 (COVID-19) has the potential to overwhelm highly developed healthcare systems.¹ With the disease being highly contagious and capable of efficient asymptomatic transmission, there is a growing concern of patient and staff safety in anaesthesia and critical care amid the COVID-19 pandemic.²

Our outbreak response is influenced by local contexts, including disease burden in the population, resources available to the healthcare system, and sociocultural considerations. Generations of Hong Kong people have witnessed the severe acute respiratory syndrome (SARS) outbreak in 2003. The emergence of COVID-19 has awakened a flood of fearful memories. Healthcare professionals in Hong Kong reacted expeditiously.

Since January 2020, our anaesthetic unit at Kwong Wah Hospital has been adopting a series of contingency measures aimed at reducing the risk of perioperative transmission of COVID-19, inspired by our experience during SARS in 2003 when we were the first district general hospital in Hong Kong to admit a patient with ‘atypical pneumonia’ subsequently known as SARS. We have incorporated the hierarchy of controls in designing our containment strategies, as discussed recently by Wong and colleagues³ from Singapore.

During the SARS crisis in 2003, about 49% of cases in Hong Kong were related to outbreaks in healthcare settings.⁴ Since then, stringent infection control guidelines and practices have been introduced to our public hospitals.⁵ As the SARS

experience taught us the paramount importance of meticulous hand hygiene and safe de-gowning when using personal protective equipment (PPE), our hospital infection control team was quick to respond to the current outbreak by organising ‘train-the-trainer’ workshops on PPE use for all specialties. Airway management is a particularly high-risk event, and multiple simulation training sessions have been organised by our anaesthetic colleagues to enhance preparedness in managing potential COVID-19 patients requiring ventilation support.

Shortly after our local government activated the ‘emergency response level’ on January 25, 2020, less time-critical elective operations, such as hysterectomy for benign gynaecological conditions and joint replacement surgery, were postponed, aligning with the government’s preparedness plan to reserve adequate resources for management of potential COVID-19 patients. Patients admitted to the hospital are screened for any recent history of fever, respiratory symptoms, travel, and close contact with sick individuals.

Furthermore, frontline doctors are now able to retrieve a local resident’s border crossing record within the past 30 days directly from the Immigration Department’s system,⁶ and deliberate concealment of any significant travel history is a criminal offense. Extensive contact tracing and mandatory quarantine policy played a significant role in outbreak containment. Highly sensitive reverse transcriptase–polymerase chain reaction-based tests for the novel coronavirus, severe acute respiratory syndrome coronavirus 2



Fig 1. Anaesthetist having lunch alone in the common room with plastic dividers to separate spaces.

(SARS-CoV-2) have been provided by the government-funded Public Health Laboratory Centre since January, and the average turnaround time is <24 h. The liberal testing approach endorsed by public health authorities allowed anaesthetists to screen for COVID-19 for highly suspected cases, a measure not in place back in the early days of the SARS epidemic in 2003. For elective surgeries, suspected cases are postponed until the patient tests negative twice.

We also see a shift from general to regional anaesthesia whenever possible in our department as a measure to reduce the incidence of aerosol-generating procedures (AGPs), such as tracheal intubation. A small group of anaesthetists with special interest in regional anaesthesia assembled a 'peripheral nerve block support team' to assist other colleagues in performing more challenging techniques.

Outside the operating theatre, we practise social distancing amongst ourselves in non-clinical areas. Transparent acrylic panels (Fig 1) are erected as protective barriers in staff rest areas, where healthcare workers have meals or close social contact. Alcohol hand sanitiser dispensers are placed in convenient locations to promote hand hygiene.

Since the outbreak, many anaesthetists in Hong Kong have been routinely using N95 respirators, face shields, and water-resistant gowns during AGPs, even when COVID-19 is not suspected. Whilst it may be better to err on the side of caution, the shortage of PPE is a catastrophic reality that should not be understated.⁷ In our city, administrative measures introduced to conserve PPE sparked grievances amongst frontline healthcare workers, who questioned the safety of extended use or reuse of N95 respirators.⁸ The hotly contested issue of prudent use of PPE needs to be handled with empathy and sensitivity.

Disruption to our usual clinical practice leads to a wide range of implications for our patients and fellow anaesthetists. If elective surgery is postponed to cater for potential influx of COVID-19 patients, how will we cope with the increasingly long waiting list when the pandemic is over? How can we minimise interruptions in specialty training and career development of those re-deployed to other clinical units during this time? If there is a need to ration healthcare resources, how should we maintain essential services in the operating theatre efficiently and ethically?

Although COVID-19 has an overall lower case fatality rate than SARS or Middle East respiratory syndrome (MERS) so far,⁹ the tremendous stress placed on healthcare systems globally is alarming.¹⁰ We must refrain from any sense of complacency and make no reservation in protecting healthcare workers from infection and exhaustion in this protracted battle against COVID-19. Whilst the outbreak is somewhat under control in Hong Kong, we are facing a potential shortage of PPE and isolation facilities. Now, 17 yr after the SARS terror, preparedness is still a lifelong lesson for us to learn.

Anaesthesia is a safety-oriented specialty; anaesthetists are always trained to be proactive in risk management and

well prepared for the worst-case scenario. We believe anaesthetists should play a pivotal role in tackling the COVID-19 crisis and preventing the breakdown of our healthcare system. This is a historic moment that calls for commitment and solidarity.

Declarations of interest

The authors declare that they have no conflicts of interest.

References

- Rosenbaum L. Facing Covid-19 in Italy—ethics, logistics, and therapeutics on the epidemic's front line. *N Engl J Med Adv* 2020. <https://doi.org/10.1056/NEJMp2005492>. Access published on March 18
- Peng PWH, Ho PL, Hota SS. Outbreak of a new coronavirus: what anaesthetists should know. *Br J Anaesth Adv* 2020. <https://doi.org/10.1016/j.bja.2020.02.008>. Access published on February 27
- Wong J, Goh QY, Tan Z, et al. Preparing for a COVID-19 pandemic: a review of operating room outbreak response measures in a large tertiary hospital in Singapore. *Can J Anaesth Adv* 2020. <https://doi.org/10.1007/s12630-020-01620-9>. Access published on March 11
- Leung GM, Ho LM, Lam TH, Hedley AJ. Epidemiology of SARS in the 2003 Hong Kong epidemic. *Hong Kong Med J* 2009; **15**: S12–6
- Cheng VCC, Chan JFW, To KKW, Yuen KY. Clinical management and infection control of SARS: lessons learned. *Antivir Res* 2013; **100**: 407–19
- South China Morning Post. Coronavirus: two Hong Kong residents infected on Diamond Princess cruise die in Japan. Available from: <https://www.scmp.com/news/hong-kong/health-environment/article/3074065/great-coronavirus-escape-17-people-under>. [Accessed 30 March 2020]
- World Health Organization. Shortage of personal protective equipment endangering health workers worldwide. Available from: <https://www.who.int/news-room/detail/03-03-2020-shortage-of-personal-protective-equipment-endangering-health-workers-worldwide>. [Accessed 22 March 2020]
- South China Morning Post. Union pushes back as Hospital Authority urges longer mask usage. Available from: <https://www.scmp.com/news/hong-kong/health-environment/article/3050543/coronavirus-new-mask-guidelines-rankle-union>. [Accessed 22 March 2020]
- Guarner J. Three emerging coronaviruses in two decades. *Am J Clin Pathol* 2020; **153**: 420–1
- Legido-Quigley H, Asgari N, Teo YY, et al. Are high-performing health systems resilient against the COVID-19 epidemic? *Lancet* 2020; **395**: 848–50

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