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Announcement

Lessons learned from the COVID-19 pandemic through the JHI and IPIP

Without doubt 2020 and 2021 have been some of the most challenging years for those working in infection and infection prevention and control (IPC). The COVID-19 pandemic has had catastrophic effects globally with high morbidity, mortality and financial costs.

Whilst worldwide there was a certain level of preparedness for a possible influenza pandemic, the same can't be said for a novel respiratory virus for which there was no effective anti-viral therapy or vaccine. The uncertainty about how COVID-19 would affect the world was rehearsed in articles by Khan *et al.*, and Peters *et al.*, published in March and April 2020 [1,2]. From then on the JHI has published a large number of COVID-19 related articles from across the globe, enabling readers to rapidly learn from the experience and research of others. Through this Editorial we reflect on the challenges we have faced, what the articles have taught us, and more importantly how we can be better-prepared for the future. At the time of planning the special section we were optimistic that the pandemic was abating, and we hoped the focus would be on recovery from the pandemic. How things change! As we write this many countries are once again strengthening their public health measures, and we face new uncertainty about the threat of the Omicron variant. Indeed, this special section is dominated by papers reporting the ongoing challenges of the pandemic.

One of the first challenges faced during the pandemic was to rapidly increase healthcare workers' (HCW) knowledge, skills and confidence with regards COVID-19 at a stage when scientific knowledge of many aspects of the infection was still very limited. An early survey of the preparedness of UK frontline healthcare workers (HCW) provided reassurance (in retrospect, perhaps naïvely) that HCW felt reasonably confident in their knowledge about the infection, and the infection prevention measures required. The area of least confidence was around diagnostics, with 50% of respondents indicating that they did not feel at all confident in this area [3]. Another HCW survey conducted later in the pandemic by Castro-Sánchez *et al.* found that whilst a local personal protective equipment (PPE) helper scheme was well-received by HCW, they indicated that they would have appreciated support earlier in the pandemic [4]. The key learning from these surveys is that greater support for HCW, especially during the early period of uncertainty and rapid change, should be considered in any future pandemic.

Another challenge faced early in the pandemic was to understand the transmission dynamics of SARS-CoV-2 so that impactful IPC interventions could be employed. In one of several studies performed during the first wave of the pandemic, sampling of environmental surfaces in eight English hospitals detected SARS-CoV-2 on 8.9% of surfaces, leading the authors to recommend that frequently touched surfaces needed to be cleaned regularly [5]. However, these early reports may have overstated the clinical importance of environmental contamination. A joint working party concluded that transmission most often occurs following close contact without PPE. Droplet transmission was considered probable, but transmission via fomites only possible, and transmission via non-respiratory body fluids unlikely [6].

From the outset it was acknowledged that SARS-CoV-2 was spread by the respiratory route. A challenge facing IPC teams was the uncertainty of the significance of droplet versus aerosol spread, the role of aerosol generating procedures and in fact which procedures are considered to be aerosol generating. The debate around the view that larger respiratory droplets are most important in the spread of SARS-CoV-2 continues [7]. Perhaps there needs to be more focus on direct evidence of the risk of infection associated with activities, rather than on the somewhat artificial dichotomy between droplets and aerosols. The recent systematic review by Wilson *et al.*, which found no evidence that a range of procedures of concern in relation to generation of infectious aerosols (including nasogastric tube insertion, pulmonary function tests, and upper airway suction) were associated with an increased risk of transmission of viral respiratory infections, exemplifies this approach [8].

Disinfection and decontamination are important in reducing viral transmission. Early in the pandemic our lack of knowledge of how to effectively decontaminate SARS-CoV-2 was a real challenge, especially when lack of availability of disinfectants forced the use of unfamiliar products in some circumstances. In March 2020 we published reviews by Kampf *et al.* in the JHI and IPIP on evidence for the effectiveness of disinfectants against SARS-Cov-2 [9,10]. These papers rapidly became the most downloaded

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articles in the history of either journal, exemplifying the importance of making information about disinfectants as widely available as possible.

The next challenge presented by the pandemic was the ability to rapidly upscale production and distribution of essential PPE. Shortages left healthcare facilities looking at alternative options including re-using existing single use items, using non-CE marked products and items that were beyond their shelf life. A systematic review concluded they were unable to draw conclusions on the most efficacious and safe methods for decontaminating surgical masks due to the heterogeneous methods used in studies [11]. Although the technology that appears to offer the best prospects for decontamination of PPE is hydrogen peroxide vapour [12,13], we strongly support the opinion of Alt *et al*. that this is an area that should be further explored and developed so that institutions can not only turn to effective decontamination methods that are accessible to them, but can also develop operational plans addressing matters such as user acceptance, traceability and stock management [14].

Earlier in the pandemic the difficulties of setting up rapid and accurate diagnostics meant that infection control precautions and patient placement were vital to help contain COVID-19 spread in hospitals [15]. However, isolating or cohorting patients for many hours is disruptive to the operation of hospitals, and risks exposing uninfected patients to infection. We have recently published several papers that show how rapid diagnostics can be used to direct patient pathways: Hinson *et al*. reported that using the Cepheid GeneXpert to screen patients in an isolation cohort allowed a 65.6% reduction in the median time to removal of patients with a negative test result from the isolation cohort [16]. Drawbacks of rapid PCR-based testing are the cost and the fact that most platforms have limited testing capacity. For these reasons, there is increasing interest in the use of rapid antigen tests, or (for elective admissions at least) stepping away from universal testing. Van Honacker *et al*. suggested that rapid antigen tests may have an adequate performance, especially in high prevalence settings [17]. Indeed, Merrick *et al*. recently reported in *Infection Prevention in Practice* that universal rapid antigen testing resulted in 93% of COVID-19 patients leaving ED with a virological diagnosis, compared with 77% when PCR testing was used. The PPV (97.7%) and NPV (86.4%) of rapid antigen testing were high with a disease prevalence of 34.7% [18] . Moreno-Pérez suggested for elective surgical patients a selective screening strategy to identify patients for PCR testing might be appropriate, at least in lower prevalence settings [19]. However testing is implemented it is important that it is part of a patient pathway that is reliably followed. A study by Mastan *et al*. compared management of hip fractures across 23 orthopaedic trauma units in Northwest England, and found a great deal of heterogeneity in patient pathways, with some involving risks of exposure to COVID-19 from patients and medical staff [20].

One matter that will be judged over time is whether many of the seroprevalence studies that were performed were anything other than an unnecessary distraction: studies of healthcare workers do not appear to have provided any new insights into the epidemiology of COVID-19 [21]. Moreover, the fundamental value of seroprevalence studies were questioned by Lippi, owing to the variable accuracy of tests [22]. Robbins *et al*. also made an interesting observation in a survey of HCW attitudes to antibody testing, expressing concern HCW might misinterpret their seropositivity as a reason to be less compliant with IPC precautions [23].

Earlier in this article we discussed re-use of single use PPE items during the pandemic. Another issue that PPE shortages presented was the use of non-CE-marked, or date-expired PPE items. Van Wezel *et al*. designed a verification protocol to check the quality of non-CE marked respirators; worryingly 67% of respirators tested did not meet their quality criteria [24]. Brun *et al*. described the methods they used to test the compliance of face masks that are beyond their shelf-life; they found only 49% of FFP2 masks and 58% of surgical face masks were fully-compliant [25]. Kampf *et al*. proposed risk-adapted versions of the current standards for alcohol-based hand rubs, face masks and medical gloves/gowns for when supplies are limited [26]. We suspect that the assessment of expired and/or non-CE-marked PPE items will be incorporated into many organisations' pandemic plans in the future.

As the pandemic progressed it became evident it had caused collateral damage to other areas of IPC and antimicrobial stewardship. Sturdy *et al*. shared their experience on a COVID-19 intensive care unit of an increase in nosocomial Gram-negative bacteraemias with evidence of cross transmission between patients. They postulated that the reasons for this were multifactorial but are in part due to a lack of focus on IPC basics during the pandemic, with a shift from using PPE to prevent nosocomial infections to focussing on it primarily protecting HCW [27]. Conversely, measures used to prevent transmission of SARS-Cov-2 will surely become routine practice to protect against nosocomial transmission of other respiratory viruses, as Anton-Vazquez *et al*. recently effectively described in controlling an outbreak of parainfluenza 3 infection pre-pandemic [28]. Donà *et al*. described the possible negative impact the pandemic may have had on multidrug-resistant infections due to PPE and staff shortages in addition to hospital overcrowding [29]. Moreover, Ruiz highlighted that in some countries not only were antibiotics being prescribed widely in hospital for COVID-19 patients, but there was an additional problem from antibiotic use before admission to hospital, including self-administration by up to one third of patients [30]. These areas need to be addressed if we are to be successful in returning to business as usual, and lessons learned need to inform future pandemic-planning.

We must learn lessons from the pandemic, both to ensure that internationally, nationally and institutionally we are as prepared as possible for any future pandemics. Key themes that have emerged from the pages of the JHI are assuring HCWs about their own safety and ensuring that they have adequate training and support; better preparation for the inevitable shortages of PPE; and more focus on safe patient pathways for patients who require hospital contact and who are not infected. We also suggest that more thought needs to be given on whether and how infection prevention and control and antibiotic stewardship can be maintained during a pandemic, and also on how hospitals can begin to reinstate planned clinical and surgical activities as the pandemic progresses.

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K. Prescott*
J. Gray
N. Mahida
G. Winzor
M. Wilkinson
Healthcare Infection Society, Journal of Hospital Infection, Montagu House, Wakefield Street, London WC1N, UK

* Corresponding author. Address: Healthcare Infection Society, Journal of Hospital Infection, Montagu House, Wakefield Street, London WC1N, UK.
E-mail address: journals@his.org.uk (K. Prescott)