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## Editorial

### Washing our hands of the problem



The *JHI* has a long history of publishing on hand hygiene, with a review article as early as 1983 highlighting that hands are the most common vehicle of transmission in the hospital setting [1], whilst recent innovations from the past decade were highlighted by Kathryn French [2]. Last year in our hand hygiene special issue Vermeil *et al.* summarised the history of hand hygiene in a fascinating article ranging from the ancient Babylonians to Semmelweis, Pasteur and Lister before addressing the revolution of alcohol based hand rub (ABHR) and the impact of the World Health Organisation (WHO) SAVE LIVES: Clean Your Hands campaign [3]. This year the focus of the WHO campaign is “Nurses and Midwives: CLEAN CARE is in YOUR HANDS” in honour of the 200<sup>th</sup> anniversary of Florence Nightingale’s birth.

Whilst randomised controlled trials comparing hand washing with placebo, such as the 1960’s trial by Mortimer *et al.* in an Ohio hospital nursery are clearly now unethical [4], there remain areas in which the optimum practice is yet to be identified. For example, the method of hand drying; paper towels, hot air dryers or jet air dryers (JAD’s). JAD’s are becoming ubiquitous, including within the public areas of hospitals, and whilst one study found lower rates of bacterial contamination on hands following the use of JAD’s compared with paper towels, Best *et al.* found higher rates of environmental contamination, which may have implications for JAD use within hospitals [5,6]. There is clearly scope for further work in this area.

The role of sinks and hospital drainage as a source of infection is increasingly recognised, especially in the context of multidrug-resistant Gram-negative bacteria (MDRGNB) [7–10]. Perhaps we should just remove the sinks altogether? This was investigated in a Spanish intensive care unit troubled by MDRGNB as well as a neonatal intensive care unit [11,12] and as an option it appears increasingly feasible given that hand-washing activities only encompassed 4% of activities at sinks in one series [13].

Following global recognition of the harms of single-use plastic, the environmental impact of personal protective equipment (PPE) in hospitals has come under increasing scrutiny with many hospitals seeking to reduce unnecessary glove use. Repeated replacement of gloves to undertake hand hygiene is one such instance where it could be argued that plastic is being wasted. Gloved hand disinfection (for a single patient encounter) has been shown to increase compliance with hand hygiene [14]. Where glove use is appropriate, careful removal and disposal of gloves is important as environmental

contamination is known to occur with doffing of PPE and gloves [15–17].

Given the strength of evidence of the benefit of hand hygiene, combined with national and international guidance, it is remarkable that compliance is not higher [18]. The first barrier is in accurately measuring compliance, which can be a challenge due to the Hawthorne effect — whereby awareness of observation may affect a subject’s behaviour. One way to circumvent this is to use ABHR consumption as a proxy measure for hand hygiene events, although this is also not without its limitations [19,20].

Once compliance has been accurately measured, work can then be undertaken to improve it, the optimal approach to this remains elusive [21–28]. The importance of customizing messaging and interventions: “One size does not fit all” was highlighted in this special edition last year [29] and has been embraced by Salmon *et al.* in the context of the effect of messaging on different healthcare professions [30]. The benefit of taking into account cultural differences was demonstrated by Brink *et al.* who report on the success of introducing a multi-modal hand hygiene framework leveraging the Ubuntu philosophy of “I am who I am because of who we all are” [31]. Greenough *et al.* present a follow-up to a previously published letter on the use of verbal reminders to increase compliance with hand hygiene amongst hospital visitors [32,33]. This recognition of the role that visitors and family members play in the spread of nosocomial infections, particularly if they also have a caring role, as is common in low and middle income countries (LMIC’s), has been considered and the impact of an educational intervention assessed [34]. Along with education, reducing barriers to hand hygiene would be expected to increase compliance rates, borne out by a study demonstrating that a 15s duration of hand rubbing with ABHR was non-inferior to the currently recommended 30s and that compliance was higher with the shorter duration [35].

This issue also has a section on the evolving epidemic of COVID-19/SARS-CoV-2. Whilst the 2020 WHO hand hygiene campaign laudably marks the 200<sup>th</sup> anniversary of Florence Nightingale’s birth, we suspect that history will associate hand hygiene promotion in 2020 more with control of COVID-19. Hand hygiene has now taken on increased significance in the public mind, being a key measure recommended by the health bodies ECDC, WHO and PHE for preventing the spread of SARS-CoV-2. Already the *JHI* has published experience from China that wearing N95 respirators and enhanced hand hygiene protects healthcare workers from COVID-19 [36]. This is one of a number of articles on COVID-19 that are currently in press. The *JHI* has signed up to the Wellcome initiative to make all COVID-

19 related papers freely available, and we have also widened the opportunity to publish brief descriptions of experiences with COVID-19 as Practice Points. The *JHI* aims to make articles related to COVID-19 freely available as rapidly as possible after submission to assist the international community in planning their responses with access to all available evidence. As such, we welcome further high-quality submissions on this topic.

#### Conflict of interest statement

None.

#### Ethical statement

N/A.

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## References

- [1] Reybrouck G. Role of the hands in the spread of nosocomial infections. *J Hosp Infect* 1983;4:103–10. [https://doi.org/10.1016/0195-6701\(83\)90040-3](https://doi.org/10.1016/0195-6701(83)90040-3).
- [2] French K. Ten articles on hand hygiene innovation that have been reported in the *Journal of Hospital Infection*. *J Hosp Infect* 2018;100:242–3. <https://doi.org/10.1016/j.jhin.2018.07.045>.
- [3] Vermeil T, Peters A, Kilpatrick C, Pires D, Allegranzi B, Pittet D. Hand hygiene in hospitals: anatomy of a revolution. *J Hosp Infect* 2019;101:383–92. <https://doi.org/10.1016/j.jhin.2018.09.003>.
- [4] Mortimer EA, Wolinsky E, Gonzaga AJ, Rammelkamp CH. Role of airborne transmission in staphylococcal infections. *BMJ* 1966;1:319–22. <https://doi.org/10.1136/bmj.1.5483.319>.
- [5] Mutters R, Warnes SL. The method used to dry washed hands affects the number and type of transient and residential bacteria remaining on the skin. *J Hosp Infect* 2019;101:408–13. <https://doi.org/10.1016/j.jhin.2018.12.005>.
- [6] Best E, Parnell P, Couturier J, Barbut F, Le Bozec A, Arnoldo L, et al. Environmental contamination by bacteria in hospital washrooms according to hand-drying method: a multi-centre study. *J Hosp Infect* 2018;100:469–75. <https://doi.org/10.1016/j.jhin.2018.07.002>.
- [7] Weinbren M. Down the drain and back up a drain. *J Hosp Infect* 2019;102:61–2. <https://doi.org/10.1016/j.jhin.2019.01.027>.
- [8] Aranega-Bou P, George RP, Verlander NQ, Paton S, Bennett A, Moore G, et al. Carbapenem-resistant Enterobacteriaceae dispersal from sinks is linked to drain position and drainage rates in a laboratory model system. *J Hosp Infect* 2019;102:63–9. <https://doi.org/10.1016/j.jhin.2018.12.007>.
- [9] Feng Y, Wei L, Zhu S, Qiao F, Zhang X, Kang Y, et al. Handwashing sinks as the source of transmission of ST16 carbapenem-resistant *Klebsiella pneumoniae*, an international high-risk clone, in an intensive care unit. *J Hosp Infect* 2019. <https://doi.org/10.1016/j.jhin.2019.10.006>.
- [10] Turner C, Mosby D, Partridge D, Mason C, Parsons H. A patient sink tap facilitating carbapenemase-producing enterobacteriales transmission. *J Hosp Infect* 2019. <https://doi.org/10.1016/j.jhin.2019.12.020> (in Press).
- [11] Shaw E, Gavalda L, Càmara J, Gasull R, Gallego S, Tubau F, et al. Control of endemic multidrug-resistant Gram-negative bacteria after removal of sinks and implementing a new water-safe policy in an intensive care unit. *J Hosp Infect* 2018;98:275–81. <https://doi.org/10.1016/j.jhin.2017.10.025>.
- [12] Tracy M, Ryan L, Samarasekera H, Leroi M, Polkinghorne A, Branley J. Removal of sinks and bathing changes to control multidrug-resistant Gram-negative bacteria in a neonatal intensive care unit: a retrospective investigation. *J Hosp Infect* 2020. <https://doi.org/10.1016/j.jhin.2020.01.014> (in Press).
- [13] Grabowski M, Lobo JM, Gunnell B, Enfield K, Carpenter R, Barnes L, et al. Characterizations of handwashing sink activities in a single hospital medical intensive care unit. *J Hosp Infect* 2018;100:e115–22. <https://doi.org/10.1016/j.jhin.2018.04.025>.
- [14] Fehling P, Hasenkamp J, Unkel S, Thalmann I, Hornig S, Trümper L, et al. Effect of gloved hand disinfection on hand hygiene before infection-prone procedures on a stem cell ward. *J Hosp Infect* 2019;103:321–7. <https://doi.org/10.1016/j.jhin.2019.06.004>.
- [15] Poller B, Hall S, Bailey C, Gregory S, Clark R, Roberts P, et al. “VIOLET”: a fluorescence-based simulation exercise for training healthcare workers in the use of personal protective equipment. *J Hosp Infect* 2018;99:229–35. <https://doi.org/10.1016/j.jhin.2018.01.021>.
- [16] Hall S, Poller B, Bailey C, Gregory S, Clark R, Roberts P, et al. Use of ultraviolet-fluorescence-based simulation in evaluation of personal protective equipment worn for first assessment and care of a patient with suspected high-consequence infectious disease. *J Hosp Infect* 2018;99:218–28. <https://doi.org/10.1016/j.jhin.2018.01.002>.
- [17] Munoz-Gutierrez KM, Canales RA, Reynolds KA, Verhoughstraete MP. Floor and environmental contamination during glove disposal. *J Hosp Infect* 2019;101:347–53. <https://doi.org/10.1016/j.jhin.2018.10.015>.
- [18] Mahida N. Hand hygiene compliance: are we kidding ourselves? *J Hosp Infect* 2016;92:307–8. <https://doi.org/10.1016/j.jhin.2016.02.004>.
- [19] Dalziel C, McIntyre J, Chand AG, McWilliam S, Ritchie L. Validation of a national hand hygiene proxy measure in NHS Scotland. *J Hosp Infect* 2018;98:375–7. <https://doi.org/10.1016/j.jhin.2017.10.001>.
- [20] Borg MA, Brincat A. Addressing the controversy of 100% hand hygiene compliance: can alcohol rub consumption data serve as a useful proxy validator? *J Hosp Infect* 2018;100:218–9. <https://doi.org/10.1016/j.jhin.2018.04.024>.
- [21] Alshehari AA, Park S, Rashid H. Strategies to improve hand hygiene compliance among healthcare workers in adult intensive care units: a mini systematic review. *J Hosp Infect* 2018;100:152–8. <https://doi.org/10.1016/j.jhin.2018.03.013>.
- [22] Diefenbacher S, Fliss PM, Tatzel J, Wenk J, Keller J. A quasi-randomized controlled before-after study using performance feedback and goal setting as elements of hand hygiene promotion. *J Hosp Infect* 2019;101:399–407. <https://doi.org/10.1016/j.jhin.2019.02.001>.
- [23] Dunne CP, Kingston L, Slevin B, O’Connell NH. Hand hygiene and compliance behaviours are the under-appreciated human factors pivotal to reducing hospital-acquired infections. *J Hosp Infect* 2018;98:328–30. <https://doi.org/10.1016/j.jhin.2018.02.022>.
- [24] Gould DJ, Navaie D, Purssell E, Drey NS, Creedon S. Changing the paradigm: messages for hand hygiene education and audit from cluster analysis. *J Hosp Infect* 2018;98:345–51. <https://doi.org/10.1016/j.jhin.2017.07.026>.
- [25] Kilpatrick C, Tartari E, Gayet-Ageron A, Storr J, Tomczyk S, Allegranzi B, et al. Global hand hygiene improvement progress: two surveys using the WHO Hand Hygiene Self-Assessment Framework. *J Hosp Infect* 2018;100:202–6. <https://doi.org/10.1016/j.jhin.2018.07.036>.
- [26] Lydon S, Grealley C, Tujjar O, Reddy K, Lambe K, Madden C, et al. Psychometric evaluation of a measure of factors influencing hand hygiene behaviour to inform intervention. *J Hosp Infect* 2019;102:407–12. <https://doi.org/10.1016/j.jhin.2019.02.003>.
- [27] Seo HJ, Sohng KY, Chang SO, Chaung SK, Won JS, Choi MJ. Interventions to improve hand hygiene compliance in emergency departments: a systematic review. *J Hosp Infect* 2019;102:394–406. <https://doi.org/10.1016/j.jhin.2019.03.013>.

- [28] Staines A, Vanderavero P, Duvillard B, Deriaz P, Erard P, Kundig F, et al. Sustained improvement in hand hygiene compliance using a multi-modal improvement programme at a Swiss multi-site regional hospital. *J Hosp Infect* 2018;100:176–82. <https://doi.org/10.1016/j.jhin.2018.04.010>.
- [29] Tartari E, Pires D, Pittet D. “One size does not fit all” - customizing hand hygiene agents, messages, and interventions. *J Hosp Infect* 2018;98:324–7. <https://doi.org/10.1016/j.jhin.2018.02.020>.
- [30] Salmon S, Phua MY, Fisher D. One size does not fit all: the effectiveness of messaging for hand hygiene compliance by profession in a tertiary hospital. *J Hosp Infect* 2019. <https://doi.org/10.1016/j.jhin.2019.09.008> (in Press).
- [31] Brink AJ, Messina AP, Maslo C, Swart K, Chunnillal D, van den Bergh D, et al. Implementing a multi-faceted framework for proprietorship of hand hygiene compliance in a network of South African hospitals: leveraging the Ubuntu philosophy. *J Hosp Infect* 2019. <https://doi.org/10.1016/j.jhin.2019.11.004> (in Press).
- [32] Hummel AT, Vleck K, Greenough WB. A quality improvement initiative for improving hospital visitor hand hygiene. *J Hosp Infect* 2019;101:422–3. <https://doi.org/10.1016/j.jhin.2018.12.019>.
- [33] Salma EMV, Samiha K, Modupe O, Edward S, Karen V, Morgan K, et al. Can educational speech intervention improve visitors hand hygiene compliance? *J Hosp Infect* 2019. <https://doi.org/10.1016/j.jhin.2019.12.002> (in Press).
- [34] Biswal M, Angrup A, Rajpoot S, Kaur R, Kaur K, Kaur H, et al. Hand hygiene compliance of patients’ family members in India: importance of educating the unofficial “fourth category” of healthcare personnel. *J Hosp Infect* 2019. <https://doi.org/10.1016/j.jhin.2019.09.013> (in Press).
- [35] Harnoss JC, Dancer SJ, Kaden CF, Baguhl R, Kohlmann T, Papke R, et al. Hand antisepsis without decreasing efficacy by shortening the rub-in time of alcohol-based handrubs to 15 seconds. *J Hosp Infect* 2019. <https://doi.org/10.1016/j.jhin.2019.09.004> (in Press).
- [36] Wang X, Pan Z, Cheng Z. Association between 2019-nCoV transmission and N95 respirator use. *J Hosp Infect* 2020. <https://doi.org/10.1016/j.jhin.2020.02.021> (in Press).

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