Journal of Hospital Infection 101 (2019) 482–486

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevier.com/locate/jhin

Letters to the Editor

Incidence of meticillin-resistant *Staphylococcus aureus* contamination on mobile phones of medical students

Sir,

Nosocomial infections (NIs) affect 7–10% of hospitalized patients globally, imposing a huge burden on healthcare systems worldwide through prolonged hospital stays, increased resistance of micro-organisms to antimicrobials, and massive additional healthcare costs [1]. In Malaysia, the prevalence of NIs has been reported to be 13.9%, and 36% of all antibiotics prescribed are for NIs [2]. This underscores the importance of proper infection control in limiting increasing antimicrobial resistance and healthcare expenditure.

Mobile phones are being scrutinized increasingly as potential reservoirs for pathogens, due to their widespread bedside use in hospital wards as point-of-care medical resources [3,4]. We describe the investigation of bacteria, particularly meticillin-resistant *Staphylococcus aureus* (MRSA), carried on the mobile phones of preclinical and clinical medical students in a teaching hospital in Malaysia. To our knowledge, no studies have been published to date on the contamination rate of healthcare workers' (HCWs) mobile handheld devices with healthcare-associated pathogens in hospitals in Malaysia.

Fifty preclinical students (semester 1 students who were least likely to have exposure to the hospital environment) and 45 clinical students (semester 10 students who were most exposed to the hospital environment) from the International Medical University, Kuala Lumpur, Malaysia were recruited. Ethical approval was obtained from the IMU Joint-Committee on Research and Ethics (EC/IRB Ref No. 4.17/JCM-110/2016). Written consent was obtained from the participants. Their mobile phones were sampled using a modified protocol [5]. Two cotton swabs moistened with phosphate-buffered saline (PBS) were used for each mobile phone. The swabs were left in a centrifuge tube with PBS for 15 min. The PBS solution was inoculated on to tryptic soy agar (TSA) and chromID MRSA/*S. aureus* agar (Ref 414524; bioMérieux, Marcy l'Etoile, France). The plates were incubated at 37°C for 48 h, after which the colony-forming units (CFU) within 30–300 colonies were counted and recorded. Colonies on the TSA plates were classified according to morphology, and Gram-stained for identification under a microscope at 1000× magnification. Statistical analyses of Fisher's exact test and Mann-Whitney U-test were performed using Statistical Package for the Social Sciences Version 20 (IBM Corp., Armonk, NY, USA). $P \leq 0.05$ was considered to indicate statistical significance.

Compared with preclinical students, a significantly higher proportion of clinical students were found to have *S. aureus* (77.8%) and MRSA (20.0%) contamination on their mobile phones. Mobile phones of clinical students also had significantly heavier growth of *S. aureus* and MRSA (Table I). Other suggested micro-organisms isolated on TSA were *Staphylococcus epidermidis*, *Streptococcus pneumoniae*, *Acinetobacter* spp., *Candida albicans* and *Pseudomonas aeruginosa*.

In this pilot study, our results demonstrated that clinical students had significantly higher levels of bacterial colonization by *S. aureus* and MRSA compared with preclinical students. Clinical students also had a higher proportion of contaminated mobile phones, while their median *S. aureus* count was three times that of preclinical students. This, coupled with the fact that *S. aureus*

Table I
Growth of micro-organisms from mobile phones of preclinical and clinical students

Variable		Preclinical students (*N*=50)	Clinical students (*N*=45)	*P*-value
TSA plates	No. of plates with growth of micro-organisms (%)	44 (88.0)	43 (95.6)	0.171
	CFU count (/mL), median (IQR)	80 (40–580)	100 (40–1210)	0.330
chromID *S. aureus* plates	No. of plates with growth of micro-organisms (%)	30 (60.0)	36 (77.8)	0.029[a]
	CFU count (/mL), median (IQR)	20 (0–140)	60 (20–210)	0.05[a]
chromID MRSA plates	No. of plates with growth of micro-organisms (%)	0 (0.0)	9 (20.0)	0.001*
	CFU count (/mL), median (IQR)	0 (0–0)	0 (0–0)	0.001[a]

CFU, colony-forming unit; IQR, interquartile range; MRSA, meticillin-resistant *Staphylococcus aureus;* TSA, tryptic soy agar; chromID, selective agar.
[a] Significant difference between preclinical and clinical students.

and MRSA are among the three most common nosocomial pathogens according to local epidemiological data [2], strongly suggests that the hospital environment was responsible for occupational exposure of clinical students to *S. aureus* and MRSA. Mobile phones contaminated with MRSA can subsequently act as reservoirs resulting in spread among MRSA-naive populations and environments, leading to community-acquired MRSA infections [6]. This study shows that it is necessary to include clinical students in hospital infection control policies.

The presence of *S. aureus* and MRSA on mobile phones could also be a symptom of a larger problem. Ulger *et al.* found that the hands of their studied population had consistently higher rates of contamination compared with each person's respective mobile phone [7]. It is therefore probable that MRSA can be found on the hands of more than one-fifth of our clinical student population. Of the micro-organisms isolated on TSA, *Acinetobacter* spp., *S. pneumoniae* and *P. aeruginosa* are known nosocomial pathogens.

This study is limited by the small number of participants, and its results should be validated with a larger population of clinical students and other groups of HCWs in future studies. Confirmation of the identity of cultured micro-organisms could be undertaken using additional identification techniques such as polymerase chain reaction and Analytical Profile Index systems. The antimicrobial susceptibility of these pathogens could also be performed to see how their resistance patterns measure up with those of NIs.

NIs are preventable with proper HCW behaviour and compliance with evidence-based infection prevention procedures and guidelines. Hence, there is an urgent need to emphasize mobile phone hygiene in order to mitigate the transmission of pathogens in and outside the hospital, while reaping the benefits of point-of-care use of these devices.

Acknowledgements

The authors would like to acknowledge the contributions of H.S. Ang, J.M. Ali, J.D. Phua, and P. Rajanthran in data collection, and R.G. Shirahatti for his advice in this research project.

Conflict of interest statement
None declared.

Funding source
This study was supported by the International Medical University (Grant No. 88902-N01-213-1201-IS222).

References

[1] World Health Organization. Report on the burden of endemic healthcare-associated infection worldwide. Geneva: WHO; 2011. Available at: http://apps.who.int/iris/bitstream/handle/10665/80135/9789241501507_eng.pdf;jsessionid=097C75988EA67F983DA184CBB263AD84?sequence=1 [last accessed July 2018].

[2] Hughes AJ, Ariffin N, Huat TL, Abdul Molok H, Hashim S, Sarijo J, et al. Prevalence of nosocomial infection and antibiotic use at a university medical center in Malaysia. Infect Control Hosp Epidemiol 2005;26:100–4.

[3] Brady RRW, Wasson A, Stirling I, McAllister C, Damani NN. Is your phone bugged? The incidence of bacteria known to cause nosocomial infection on healthcare workers' mobile phones. J Hosp Infect 2006;62:123–5.

[4] Smibert OC, Aung AK, Woolnough E, Carter GP, Schultz MB, Howden BP, et al. Mobile phones and computer keyboards: unlikely reservoirs of multidrug-resistant organisms in the tertiary intensive care unit. J Hosp Infect 2018;99:295–8.

[5] Hedin G, Rynback J, Lore B. New technique to take samples from environmental surfaces using flocked nylon swabs. J Hosp Infect 2010;75:314–7.

[6] Thomas S, Crooks K, Islam F, Massey PD. Community-associated methicillin-resistant *Staphylococcus aureus* infections in Aboriginal children attending hospital emergency departments in a regional area of New South Wales, Australia: a seven-year descriptive study. Western Pac Surveill Response J 2017;8:6–12.

[7] Ulger F, Esen S, Dilek A, Yanik K, Gunaydin M, Leblebicioglu H. Are we aware how contaminated our mobile phones with nosocomial pathogens? Ann Clin Microbiol Antimicrob 2009;8:7.

Z.N.L. Goh
P.Y. Chung*
School of Medicine, International Medical University, Kuala Lumpur, Malaysia

* Corresponding author. Address: Department of Pathology, School of Medicine, International Medical University, Bukit Jalil, 57000 Kuala Lumpur, Malaysia. Tel.: +6012 6914822.
E-mail address: katrina_chung@imu.edu.my (P.Y. Chung)

Available online 1 February 2019

https://doi.org/10.1016/j.jhin.2019.01.022

Is it necessary to test the sterility of urine prior to outpatient cystoscopy?

Sir,

Antibiotic prophylaxis before simple cystourethroscopy is well defined by the American Urological Association (AUA) guidelines [1]: only patients with a risk factor for urinary tract infection (UTI) should receive prophylaxis based on fluoroquinolone or trimethoprim-sulphamethoxazole for <24 h. In the French Urological Association guidelines [2], antibiotic prophylaxis is not recommended, irrespective of risk factors for UTI. Moreover, there is no consensus regarding systematic bacteriuria screening in asymptomatic patients before cystoscopy, leading to a variety of individual practices. The prevalence of asymptomatic bacteriuria is high, ranging from 5.6% to 22% in the literature [3,4]. However, the rate of febrile UTI after cystoscopy is low. Recent studies reported a rate of <5% [5–7]. The high frequency of asymptomatic bacteriuria, which contrasts with the few infectious complications related to cystoscopy, should raise questions about the need to control urine sterility prior to the procedure.

For several years now, we have not performed routine urine culture (UC) testing before cystoscopy in asymptomatic