

that included two proprietary chemicals and silver embedded into the fabric. Cultures of the pocket, sleeve cuff, thigh, and wrist were taken before the scrub attire was donned and at the end of the day after patient care. The researchers found that, at the end of an 8-hour work day, wearing the antimicrobial scrub attire *did not* decrease bacterial or antibiotic-resistant microbial contamination of the HCWs' scrub attire.

In another study of silver impregnated scrubs versus standard scrubs, Gross et al⁵ conducted a study in the emergency medical setting to compare the contamination rates of newly developed silver thread-hybrid clothing with that of standard textile clothing. Samples were taken from jackets and pants of 10 emergency workers at day 0 (preservice), day 3 after use, and day 7 after use over a divided 4-week period to test this hypothesis. No significant difference in the extent of microbial contamination was detected between these 2 materials.

These studies suggest that the presence of a fluid barrier, the type of fabric, the active antimicrobial ingredient, the onset of action, kill time, and nonleaching characteristics of the fabric and technology should be carefully assessed to ensure effectiveness and safety. This is, as Ms. Boutin points out, definitely an issue that warrants further research.

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Amber H. Mitchell, DrPH, MPH, CPH¹

Affiliation: 1. International Safety Center, Apopka, Florida.

Address correspondence to Amber H Mitchell, DrPH, MPH, CPH, International Safety Center, 741 Muirfield Circle, Apopka, FL 32712 (amber.mitchell@internationalsafetycenter.org).

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Mobile Phone Microbial Contamination Among Neonatal Unit Healthcare Workers

To the Editor—Mobile phones are reservoirs for pathogenic bacteria, and their frequent use by healthcare workers (HCWs) makes them a perfect vehicle for nosocomial transmission.^{1–6} Because no study has concentrated on microbial contamination of HCW mobile phones in neonatal units, we investigated this contamination source in this specific environment.

The study was carried out at the neonatal unit of the teaching hospital Umberto I in Rome, Italy. The study participants, healthcare workers and students in this unit, were asked to anonymously answer a 13-item questionnaire including age, sex, job profession, mobile phone type, and cleaning activity, after which culture samples were obtained from their mobile telephones.

Sterile swabs moistened with sterile demineralized water were rotated over the phone's surface and immediately plated onto blood and MacConkey agars using standard microbiological procedures. Isolates were identified using the bio-Merieux API system (bioMerieux, Durham, NC).

Statistical analyses were performed using SPSS software (version 14.0 for Windows, Chicago, IL). When observed frequencies were >5 , χ^2 with Yates correction was used to compare the proportions observed in the 2 groups. When frequencies were ≤ 5 , Fisher's exact test was used.

A total of 50 mobile phones were sampled from 22 doctors, 19 nurses, and 9 medical students (7 males, 43 females). The average age of the participants was 38.3 ± 12.7 years, (median 37.5 years; range, 20–61 years), and self-reported use in the preceding 24 hours was 14.5 ± 10.9 times (median 10 times; range, 2–40 times). The average duration of mobile phone ownership was 17.6 ± 19.7 months, and 17 HCWs (34%) declared mobile phones “very important for their work.”

Overall, 43 mobile phones (86.0%) demonstrated evidence of some bacterial contamination, and 66 different strains were isolated (1 bacterial species on 26 mobile phones, 2 on 14 mobile phones, and ≥ 3 on 3 mobile phones). In particular, 10 mobile phones (20.0%) grew bacteria known to cause healthcare infection (Table 1).

Only 26 HCWs (52.0%) indicated that they cleaned their mobile phones in the following ways: dump cloth (27.0%), dry cloth (23.1%), spectacles detergent (15.4%), alcohol (11.5%),

TABLE 1. Distribution of Microorganisms Isolated from HCW Mobile Phones

| Organisms | No. of strains (%) |
|--|--------------------|
| Methicillin-resistant <i>S. aureus</i> ^a | 5 (7.6) |
| Methicillin-susceptible <i>S. aureus</i> ^a | 1 (1.5) |
| Methicillin-resistant coagulase-negative staphylococci | 13 (19.7) |
| Methicillin-susceptible coagulase-negative staphylococci | 31 (46.9) |
| Enterococci ^a | 4 (6.1) |
| Other Gram positive | 5 (7.6) |
| Gram negative | 7 (10.6) |
| Total | 66 |

^aPathogens known to cause healthcare infections.

some disinfectant (7.7%), amukine (7.7%), gel (3.8%), and/or chlorhexidine (3.8%).

Although not statistically significant, microorganism isolation was more frequent when “no cleaning of mobile phone” was reported (95.8% vs 76.9%). Pathogen isolation was associated with a specific mobile phone type, ie, “slide mobiles” (risk ratio [RR], 3.86; 95% confidence interval [CI], 1.44–10.36; $P=.048$), and this association approached significance when mobile use frequency in the previous 24 hours was considered (20.1 ± 13.3 vs 13.0 ± 9.7 ; $P=.06$). In addition, the pathogen isolation rate was higher among students (33.3%) than doctors (22.7%) and nurses (10.5%). Age, sex, and presence of a phone cover were not significantly associated with pathogens (data not shown).

This is the first study to investigate HCWs mobile phone bacterial contamination in a neonatal unit; previously, only parent’s mobile phones had been screened in this specific environment.³ More than 80% of HCW mobile phones showed some bacterial contamination and, most importantly, ~20% carried pathogens that could potentially cause healthcare infections. Gram-positive preponderance, and specifically coagulase-negative staphylococci (CNS), was in agreement with the findings of other researchers^{1–7} and in other pediatric wards.^{8,9}

Currently, no study has shown a direct relationship between mobile phone bacterial contamination and healthcare infections. Undoubtedly, however, microorganisms can be transferred from person to person or from inanimate objects to hands. Therefore, fomites such as mobile phones can potentially introduce pathogens to areas such as neonatal units.⁴ Despite the possible transmission of pathogens, half of HCWs did not perceive any risk from mobile phone contamination, and the variety of cleansing methods reported by these HCWs reflected the absence of guidelines. It is well known that disinfectant use and cleaning can significantly reduce bacterial contamination,^{1,2,4,8,10} and it was not surprising that “no cleaning of mobile phone” was related to microorganism isolation.

We also considered mobile phones by type and structure (eg, “slide mobiles”) in association with pathogens; these findings were most likely related to difficulties in cleaning and decontamination.

The results of this study reveal considerable mobile phone contamination by bacteria known to cause nosocomial

infection. Therefore, the potential of mobile phones to spread microorganisms should be included and seriously considered in any debate regarding contact precautions. Particularly, this issue is of great concern in neonatal areas, where highly susceptible patients, newborns, receive care.

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Giovanni Battista Orsi;¹
Fabio Natale;²
Gabriella d’Ettore;¹
Carmela Protano;¹
Vincenzo Vullo;¹
Mario De Curtis²

Affiliation: 1. Dipartimento di Sanità Pubblica e Malattie Infettive, “Sapienza” Università di Roma, Italia; 2. Dipartimento di Pediatria e Neuropsichiatria Infantile, “Sapienza” Università di Roma, Italia.

Address correspondence to GB Orsi, Dipartimento di Sanità Pubblica, “Sapienza” Università di Roma, P.le Aldo Moro 5, 00185 Roma, Italy (giovanni.orsi@uniroma1.it).

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Inconsistencies Regarding the Number of Outbreaks and Mortality Rate of Hospital-Acquired Infections Caused by Contaminated Propofol

To the Editor—We read with interest a review article by Vonberg and Gastmeier,¹ in which they ambitiously summarized the majority of hospital-acquired infections related to in-hospital contaminated substances with the aim of postulating the most important medical drug- and fluids-related outbreaks. First, we would like to express our concerns about the values stated in Table 1 of this debatable review.

Specifically, we perceive important inconsistencies in the number of propofol-related outbreaks and the mortality rate reported, and these inconsistencies call into question the quality of their search strategy. We wish to share our findings with these authors as well as other readers interested in this topic.

According to the methodology of the review and the results based on the articles retrieved through the open database they used,² the authors included only 6 outbreaks associated with contaminated propofol during 1990–2005. But reviewing the literature, we disagree with this value because more outbreaks evidently occurred during this time period. For example, why did the authors not include the outbreaks published by Bennett et al³ in 1995? Although this was a case-control study on postoperative infections, 6 of the 7 outbreaks reported were associated only with receipt of propofol (ie, infusions or maintenance), and in only 1 of these 6 outbreaks was the microorganism (identical to that isolated from the patient) recovered from an opened vial of propofol.³ Moreover, in the same article, Bennett et al reported 2 deaths that Vonberg and Gastmeier also probably missed. Perhaps the web database (an unofficial platform of outbreaks)² selected by the authors was not appropriate to correctly answer the question posed in the review. Furthermore, propofol is not only a promoter medium for bacterial growth, it is also a recognized intravenous anesthetic that facilitates yeasts and fungal growth as well as the transmission of viruses. Therefore and notably, the number of outbreaks might be even greater than those published, and this study limitation must also be highlighted.

On the other hand, the mortality rate reported in the review was 13.8% (4 of 29), but this percentage is inconsistent with other values missed by the search. Overall, this mortality rate must be rejected for the following reasons. First, according to the literature between 1990 and 2002 reviewed by Mattner and Gastmeier,⁴ who have more closely reported the true values, the number of patients (survivors) included in outbreaks caused by propofol contamination was, in total, 92 patients (>>29 reported by Vonberg and Gastmeier) in 7 outbreaks (>6 reported by Vonberg and Gastmeier).⁵ Second, as we discussed above, Bennet et al³ reported 7 outbreaks traced to propofol contamination, including 62 patients and 2 deaths;

TABLE 1. Reported Outbreaks Associated with Contaminated Propofol from 1989 through 2002 (Based on Mattner and Gastmeier³)

| No. of Outbreaks Reported | Year ^a | Infection | Patients | Deaths |
|---------------------------|-------------------|---------------------|----------|--------|
| 4 clusters | 1990 | Wound infection | 24 | NR |
| 1 | 1994 | BS | 4 | 0 |
| 7 | 1995 | BS, SS | 62 | 2 |
| 1 | 1997 | BS | 5 | 0 |
| 1 | 2001 | Hepatitis C | 5 | 0 |
| 1 | 2001 | BS, wound infection | 7 | 2 |
| 1 | 2002 | BS | 4 | 2 |

NOTE. NP, not reported; BS, bloodstream; SS, surgical site.

^aYear the report was published.