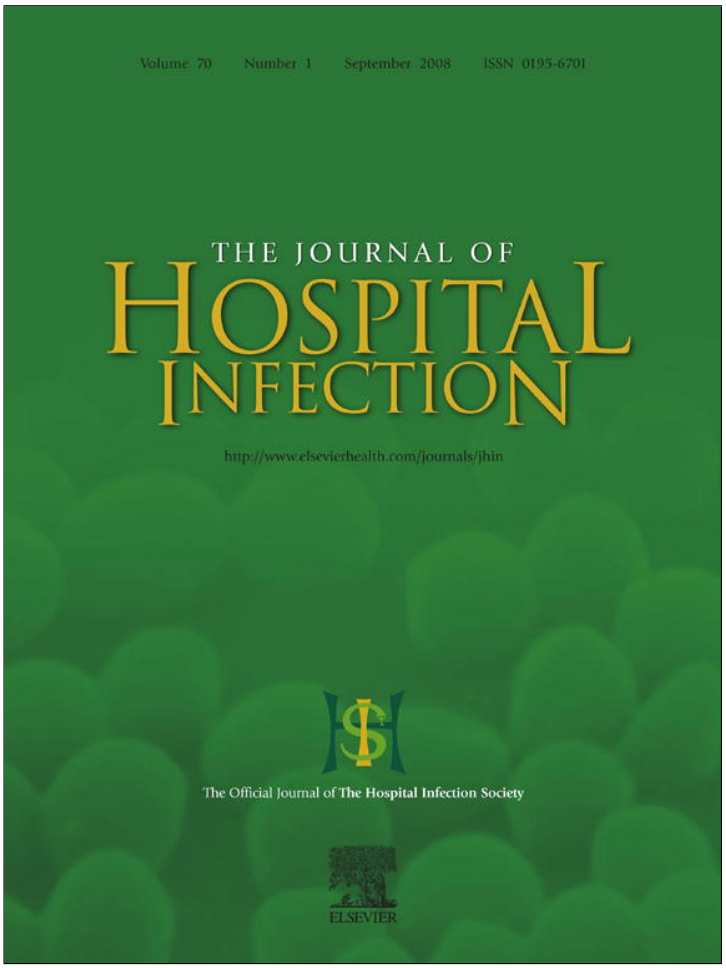

Response to R.R. Brady, M.G. Dunlop, A.P. Gibb: infection controls — the hospital bed-control handset

Madam,

We thank Brady *et al.* for their interest in our review of the role of beds in the transmission of infection. However, our review was related to the basic bed; electronic handsets are not standard on all beds and therefore this issue was not included in our review.

We agree with the authors that bed-control hand-sets are a possible source of hospital-acquired infection and emphasise that they must be adequately decontaminated like all other components of the bed. The authors refer to the difficulty of cleaning handsets, which are electronic components attached to the bed, and which cannot be cleaned using water and detergent. There is, therefore, an onus on manufacturers to provide clear guidelines on the decontamination of equipment for all materials, e.g. steel, synthetic, plastic, fabric as outlined by the Medicines and Healthcare Products Regulatory Agency.[1]

Answers to the authors' questions about the adequacy of decontamination may be found by reference to their own study, where they report sampling of bed-control handsets of occupied and unoccupied beds.[2] They found that 12% of bed-control handsets were contaminated with meticillin-resistant *Staphylococcus aureus* and other pathogens when sampled on two occasions. Of 14 unoccupied beds, they reported recovering coagulase-negative staphylococci and *Bacillus* spp. from handsets, and five samples yielded no growth. This suggests that the decontamination procedure after patient discharge (if conducted) was effective, or that pathogens failed to grow or be recovered from handsets of unoccupied beds. Coagulase-negative staphylococci or *Bacillus* spp. are generally considered commensals and are rarely implicated in infection unless recovered from blood in the presence of an intravascular catheter.

We endorse strongly the view that the issue of who should clean what, where and when, is primarily the responsibility of senior managers in local institutions.[2]

Conflict of interest statement
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Pyjamas and sheets as a potential source of nosocomial pathogens

Madam,

It is recognised that the most important and frequent mode of transmission of nosocomial infections is through direct contact between a susceptible host and an infected or colonised person. Direct contact is mainly attributed to healthcare workers who do not wash their hands effectively before attending patients. Additionally, susceptible hosts may be infected indirectly via intermediate objects, such as contaminated instruments, needles, dressings, or gloves.[1] A healthcare worker who touches pathogens on contaminated surfaces can then transport these pathogens to patients by the contact route. Indeed, the sources of contamination in 21.1% of 1561 nosocomial outbreaks studied have been attributed to contaminated surfaces.[1] Importantly, most common nosocomial pathogens may persist on surfaces for months and can thereby be a continuous source of transmission.[2] Another form of

Table I Microorganisms recovered from pyjamas and bed sheets after their overnight use by patients

Patient no.	Fabric	*Enterococcus faecalis*			Coagulase-negative staphylococci		MRSA	MSSA	*Proteus mirabilis*	*Bacillus* spp.	*Corynebacterium* spp.	*Escherichia coli*		*Pseudomonas aeruginosa*
		cfu	Va	P	cfu	Ox	cfu	cfu	cfu	cfu	cfu	cfu	ESBL	cfu
1	Sheet	100 000			–		60	–	–	50	–	–		–
2	Sheet	10 000	S	R	1000	R	–	–	–	–	–	–		–
	Pyjama	160	S	R	–		–	–	–	50	–	–		–
3	Sheet	100	S	S	600	R	–	–	–	–	–	–		–
	Pyjama	50	S	S	–		–	160	–	–	–	–		–
4	Sheet	100	S	S	260	S	–	–	–	–	–	–		–
	Pyjama	60	S	S	270	S	–	–	–	120	–	–		–
5	Sheet	500	S	S	10 000	S	–	–	–	–	100 000	–		–
	Pyjama	100	S	S	250	S	–	–	–	130	–	–		–
6	Sheet	50	S	S	5600	R	–	–	–	50	–	–		–
	Pyjama	60	S	S	1800	R	–	–	–	50	–	–		–
7	Sheet	70	S	S	–		–	–	–	80	–	–		–
	Pyjama	10 000	S	S	100 000	R	–	–	–	1200	–	–		–
8	Pyjama	–			60	S	–	–	–	50	–	100	–	–
	Sheet	100 000	S	R	100 000	R	–	100	370	–	–	–		–
9	Sheet	20	S	S	200	R	–	–	–	50	–	–		–
	Pyjama	100 000	S	R	100 000	R	–	–	–	200	–	–		–
10	Sheet	–			95	S	50	–	–	500	–	–		80
	Pyjama	–			1000	S	–	–	–	50	–	–		–
11	Sheet	–			–		15 000		–	200	–	–		–
12	Sheet	–			700	R	–	–	–	100	–	–		–
	Pyjama	–			80	S	–	–	–	150	–	–		–
13	Sheet	–			1100	R	–	–	–	20	–	–		–
	Pyjama	–			1000	R	–	–	–	–	–	120	+	–
14	Sheet	–			500	S	8000	–	–	–		–		–
15	Sheet	–			200	R	–	–	–	60	–	–		–
	Pyjama	–			600	R	–	–	–	300	–	–		–
16	Sheet	–			300	R	–	–	–	30	–	–		–
	Pyjama	–			700	R	–	–	–	200	–	–		–
17	Sheet	–			30 000	S	–		–	–		–		–
18	Sheet	–			–	–	15 000	–	–	–		–		–

MRSA, meticillin-resistant *Staphylococcus aureus*; MSSA, meticillin-sensitive *Staphylococcus aureus*; Va, vancomycin; P, penicillin; Ox, oxacillin; ESBL, extended-spectrum β-lactam resistance; S, sensitive; R, resistant.

contact spread is via endogenous transmission of the patient's own flora from one part of the host's body to another.[3] Recently, the notion that airborne transmission of bacteria contributes significantly to hospital-acquired infections is gaining recognition.[4] Although a better understanding of how nosocomial pathogens are transmitted and more rigorous infection control measures are being implemented, it is clear that the current modalities to reduce nosocomial infections are not sufficient, as the rates of nosocomial infections, especially those caused by antibiotic-resistant bacteria, are increasing alarmingly worldwide.

Recently we have hypothesised that contaminated textiles in hospitals might be an important source of microbes contributing to endogenous, indirect-contact, and aerosol transmission of nosocomial-related pathogens.[5] Textiles are an excellent substrate for bacterial and fungal growth under appropriate moisture and temperature conditions. Microbial shedding from the body occurs continuously.[6]

We hypothesised that a bacterium, when shed into a textile fabric between the patient and the bed, either in his pyjama or directly on the sheet, would readily proliferate since the moisture and temperature in the textile microenvironment would be likely to promote its proliferation. We now present data that substantiate this premise. We swabbed one area of 10 cm^2 of each pyjama and bed sheet before and after its overnight usage by 18 patients in a hospital ward (Department of Internal Medicine, Kaplan Medical Center, Rehovot, Israel). The presence of micro-organisms and their characterisation was then determined by regular standard microbiology assays in place at the Hospital Microbiology Laboratory. No micro-organisms were retrieved from the sheets and pyjamas when tested prior to use (data not shown) but, as shown in Table I, a wide array of micro-organisms was found in the pyjamas and sheets after overnight use (the pyjamas of five patients were eventually not tested after overnight use for reasons not related to the study). The area swabbed corresponded to the surface that was in contact with the patient's back. The data in Table I indicate that from the sheet and pyjama used by patient 8, six different micro-organisms were found. Four, three, two, and one micro-organisms were recovered from the fabrics used by two, nine, four, and two patients, respectively. The micro-organisms found included *Enterococcus faecalis*, coagulase-negative staphylococci, *Staphylococcus aureus*, *Proteus mirabilis*, *Bacillus* spp., *Corynebacterium* spp., *Escherichia coli*, and *Pseudomonas aeruginosa*. Some of the micro-organisms found were antibiotic resistant (Table I), known to be involved in nosocomial infections.

Contaminated textiles, such as contaminated sheets and pyjamas, could directly contaminate hospital personnel, in addition to being a source of aerosol transmission of micro-organisms. Hospital staff, even by using protective equipment such as gloves, can contaminate themselves by touching the contaminated textiles and then transfer the micro-organisms to other patients directly or indirectly by contaminating other surfaces, such as door knobs. The data presented here not only support our hypothesis that textiles may be an important source of nosocomial pathogen proliferation, but give strong support to the notion that making hospital textiles, especially those that come in contact with the patients, such as patient's sheets, pillowcases, robes, and pyjamas, with safe materials that have potent biocidal properties, would help reduce an important source of micro-organisms involved in nosocomial infections.

Conflict of interest statement

G. Borkow is the Chief Medical Scientist of Cupron. J. Gabbay is the CEO of Cupron, Inc.

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Are lanyards a risk for nosocomial transmission of potentially pathogenic bacteria?

Madam,

Many factors including the hands, white coats, ties and stethoscopes have been identified as potential vehicles for hospital-acquired infections.[1–3] In our trust there has been a proliferation of the use of lanyards to carry identification badges, which we regard as similar to ties in their pendulous nature and risk of harbouring and transmitting organisms between patients. We swabbed the pass-holders and lanyards of healthcare workers using standard techniques for the detection of microbial growth as part of our Trust's quality assurance programme in reducing hospital-acquired infection.

One hundred hospital staff were randomly approached and asked to state the frequency and method by which their lanyard and plastic badge-holder were washed/decontaminated. The presence of any visible soiling of these items was noted. The plastic badge-holder was then swabbed using a standard microbial swab saturated with sterile 0.9% saline solution. Each swab was then immediately used to inoculate a blood agar (E&O Laboratories, Bonnybridge, UK) and then MRSA selective chromogenic agar plate (bioMérieux, Basingstoke, UK). The strip of lanyard (5 cm) in contact with the nape of the wearer's neck was also sampled by pressing it onto the same range of agar plates. The plates were then incubated aerobically at 37 °C, and were examined at 24 and 48 h for the presence of organisms.

Ninety-five percent of healthcare workers ($N = 100$) had lanyard/pass-holders that grew bacteria, predominately skin flora (70%), after 48 h. Eight percent of badge-holders and 7% of lanyards were colonised with coliform organisms (not identified further). In addition 3% of badge-holders and 2% of lanyards were colonised with *Proteus* sp. Three badge-holders and two lanyards were colonised with meticillin-susceptible *Staphylococcus aureus* (MSSA). No growth of meticillin-resistant *Staphylococcus aureus* (MRSA) was detected on either the lanyards or badge-holders. Only 39% of staff washed their badge-holder and 27% their lanyard. Thirty-five percent of lanyards were noticeably soiled.

In contrast to the Australian study by Kotsanas *et al*. only 3% of badge-holders and 2% of lanyards in our survey were colonised with MSSA, and no MRSA were recovered.[4] Broth enrichment has been shown to increase MRSA detection rates from clinical screening samples compared to direct plating of swabs.[5] This technique, which is not routinely used in our laboratory, was also not employed in this study. It is therefore possible that low numbers of Staphylococci may not have been detected. At the time of the study, however, the Trust was running a sustained infection prevention and control campaign, particularly targeting staff to employ good hand hygiene/hand-washing techniques and consistent application of best practice to reduce nosocomial spread of MRSA and a programme of screening high-risk patients for MRSA colonisation. This may also have had a beneficial impact on lanyard/badge-holder colonisation rates. Although this survey was primarily aimed at detection of staphylococci, several other potential pathogens were isolated, including *Proteus* spp. and other coliform organisms and streptococci.

The UK Department of Health has introduced the 'naked below the elbow' campaign and associated dress code for NHS staff, which includes recommendations for abandonment of neckties for clinical staff owing to the risk of transmission of organisms from patient to patient via this route.[6] We suggest that lanyards/pass-holders should be considered to pose a similar risk, and that staff should not wear these items during episodes of clinical contact/care.

Conflict of interest statement

None declared.