Wedding rings are not a significant source of bacterial contamination following surgical scrubbing

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ABSTRACT

INTRODUCTION Despite some evidence that the wearing of rings may increase the microbial load, there is currently nothing to suggest that viable bacteria remain following a standard surgical scrub. The aim of the study was to examine the distribution and type of microbial flora seen on the hands of doctors following a standard surgical scrub.

MATERIALS AND METHODS Ten surgeons and 10 anaesthetists, all of whom wore wedding rings on the fourth finger of their left hand, participated in the study. Each individual was asked to 'scrub-up' as for their normal first scrub of the day. Following completion of washing, the wedding ring was removed, its internal circumference swabbed and the swab placed in a culture medium. Volunteers placed each hand palm-down on separate agar plates. The plates were incubated and the number of colonies counted and classified.

RESULTS The culture plates of one of the anaesthetists were damaged in transit leaving a total of 19 subjects for analysis. In all the palm imprint plates, coagulase-negative staphylococci were grown. One surgeon grew coagulase-negative staphylococci from the ring swab. A *Candida* spp. from the right hand of one surgeon was grown. There was no statistically significant difference between the number of colony-forming units (CFUs) cultured from the right and left (ring-wearing) hands of the surgeons ($P = 0.260$) and anaesthetists ($P = 0.345$). There was no statistical difference in CFUs when surgeons were compared with anaesthetists ($P = 0.383$ for right hand and $P = 0.234$ for left).

CONCLUSIONS This preliminary study would suggest that a traditional band wedding ring is not a source of a bacterial load following a standard surgical scrub procedure and, as such, there is no requirement for their removal pre-operatively.

KEYWORDS

Microbiology – Wedding rings – Jewellery – Surgical scrub – Contamination

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The practice of 'scrubbing-up' for theatre is a well-rehearsed routine in operating theatres world-wide and is designed to remove contaminating debris from the hands and forearms, reduce the microbial count to as low levels as possible and to leave an anti-microbial residue on the skin to prevent the growth of micro-organisms for several hours.¹

The National Association of Theatre Nurses (NATN) suggests that all jewellery should be removed before any surgical procedure;² thus, whilst all theatre nurses invariably follow protocols to the letter, most medical staff are less stringent in relation to the wearing and removal of wedding rings.

Although there is good evidence to suggest that the wearing of rings on the hands of healthcare personnel does increase the microbial load,^{3–6} there is little evidence to show whether that effect is reflected in microbial loads on

the hands (and particularly around the ring) after a standard surgical scrub. This preliminary study is intended to address this issue by examining in a qualitative and semi-quantitative fashion the distribution and type of microbiological flora seen on the hands of doctors following a standard surgical scrub.

Materials and Methods

The study cohort consisted of 10 volunteer surgeons and 10 anaesthetists all of whom were right-hand dominant and wore wedding rings on the fourth finger of their left hand. Only subjects wearing a single wedding ring were included and those wearing multiple ring and costume jewellery were excluded. Each individual was asked to 'scrub-up' as for their normal first scrub of the day.

Following completion of the washing procedure, the wedding ring was removed and its internal circumference swabbed using a sterile dry cotton skin swab to harvest bacterial samples. Every volunteer then placed each hand palm-down on separate agar plates to allow imprints of the control and ring-hands to be cultured. Swabs were plated out on horse blood agar plates and all plates were incubated for 24 h at 37°C. The number of colonies were then counted and classified.

Statistical analysis was carried out using SPSS v.11.0 statistical software. Following tests for normality using the Shapiro-Wilk test, data were further analysed using the Wilcoxon signed ranks and Mann-Whitney non-parametric tests.

Results

Nineteen of the 20 wedding rings were simple gold bands, the remaining ring was a wedding ring consisting of two interwoven bands.

The culture plates of one of the anaesthetic volunteers were damaged in transit leaving a total of 19 subjects for analysis. It can be seen from Table 1 that in every culture of

palm imprints coagulase-negative staphylococci, a common skin commensal, were grown. Conversely, no micro-organisms were cultured from the ring swab except from one of the surgeons. Again, this grew a coagulase-negative staphylococci culture and was cultured from the only ring with an irregular surface. The only other organism grown was a *Candida* spp. from the right hand of one of the surgeons although this was not in the distribution of the ring finger.

There was no statistically significant difference between the number of colony-forming units (CFUs) cultured from the right and left (ring-wearing) hands of the surgeons ($P = 0.260$). Similarly, there was no statistically significant difference between the number of CFUs cultured from the right and left hands of the anaesthetists ($P = 0.345$). Although there was an apparent difference in total numbers of CFUs between surgeons and anaesthetists with surgeons having less CFUs than the anaesthetists, this difference was not statistically significant ($P = 0.383$ for right hand and $P = 0.234$ for left).

Discussion

Whilst it is widely publicised that the wearing of rings on at least one finger of the hand increases the microbial load,

Table 1 Comparison of number of culture forming units and organisms cultured on the hands and wedding rings of study volunteers

n	Surgeon						n	Anaesthetist					
	Right hand		Left hand		Ring			Right hand		Left hand		Ring	
	CFUs	Orgs	CFUs	Orgs	CFUs	Orgs		CFUs	Orgs	CFUs	Orgs	CFUs	Orgs
1	1	CNS	1	CNS	0	–	1	34	CNS	20	CNS	0	–
2	14	CNS	8	CNS	0	–	2	5	CNS	49	CNS	0	–
3	4	CNS	2	CNS	0	–	3	12	CNS	150	CNS	0	–
4	2	CNS	1	CNS	0	–	4	120	CNS	300	CNS	0	–
5	5	CNS		CNS			5	2	CNS	2	CNS	0	–
	100	Cand	3		0	–							
6	2	CNS	1	CNS	0	–	6	5	CNS	3	CNS	0	–
7	1	CNS	1	CNS	0	–	7	1	CNS	1	CNS	0	–
8	10	CNS	1	CNS	0	–	8	5	CNS	1	CNS	0	–
9	5	CNS	29	CNS	0	–	9	1	CNS	1	CNS	0	–
10	2	CNS	2	CNS	2	CNS							

CFUs, colony forming units with 100 colonies equivalent to 10^6 organisms; Orgs, organisms; CNS, coagulase-negative staphylococci; Cand, *Candida* spp.

there is no evidence, to date, of any relationship between wearing rings and the rate of surgical wound infections.⁷ There is also very little evidence available on the effectiveness of a standard surgical scrub on reducing the microbial load of ring wearers to levels seen on non-ring wearers.⁸

Jacobson *et al.*⁹ concluded that, following thorough hand washing, the microbial load on the hands of ring wearers was similar to that of non-ring wearers despite the initial load being higher in the former group. However, in this study, a formal surgical scrub using anti-microbial agents was not performed. The subjects were also students, not well versed in the 'art' of scrubbing.

Others have investigated the effect of wearing jewellery on micro-organism counts in theatre and concluded that there is an increase in the bacterial counts both *in situ* and especially after removal of the jewellery.²

It can be seen clearly from the results that, in only one case, was bacteria cultured from the swab taken from the internal circumference of the ring; indeed, this was a woven band as opposed to the remainder of the wedding rings which were a simple band. This would suggest that, after scrubbing, the ring is not a significant source of micro-organism contamination, but how much of this is due to scrubbing satisfactorily with anti-microbial agents or, perhaps, to release of toxic metal ions from gold alloys?⁵ What can be seen from these results is that there appears to be no difference between numbers of organisms grown from each hand once the ring has been removed following a surgical scrub. Obviously, numbers are very small and results from statistical analysis need to be interpreted with this in mind; however, as a preliminary finding, these results would seem to suggest that the wearing of traditional band wedding rings following a satisfactory surgical scrub is not a significant source of microbial contamination. Further studies are required to study atypical wedding rings and costume jewellery.

Conclusions

Although more evidence is required before formal guidelines can be compiled with regards to the wearing of wedding rings during surgical procedures, this study adds to the evidence that the wedding ring is not a significant source of microbes sufficient to warrant its removal prior to any surgical procedure, providing that an adequate surgical scrub is performed.

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