

## Potential risk of cross-infection during peripheral-venous access by contamination of tourniquets

*M Golder, C L H Chan, S O'Shea, K Corbett, I L Chrystie, G French*

**We found that a high proportion of reusable tourniquets are contaminated with blood and bacterial pathogens. Their use contravenes hospital cross-infection control protocols and we therefore recommend the use of disposable tourniquets.**

Venous-blood sampling and intravenous cannulation are the most common invasive procedures in hospitals. The usual technique for providing venous stasis is the application of a reusable tourniquet to the patient's limb. The use of such tourniquets, carried between many patients and wards, contravenes basic principles of infection control. The aim of our study was to examine whether reusable tourniquets could act as fomites for microbial pathogens, thus posing a potential cross-infection risk.

77 tourniquets were collected from a London teaching hospital and two large district general hospitals in the UK. They were randomly collected from intensive-care units, and from obstetric, renal, paediatric, orthopaedic, oncology, cardiothoracic, and general surgical and medical wards. All types of reusable tourniquet were sampled. Wearing sterile gloves, we examined 50 tourniquets (group A) for visible bloodstains and then transported the tourniquets to the laboratory in sterile plastic bags. Using aseptic techniques, we pressed each tourniquet three times onto the blood-agar plate which was then incubated at 37°C in air. Plates were examined after 48 h, and purity plates were produced from morphologically different colonies on each plate by standard techniques. Areas of blood contamination were confirmed with the Haemocult test for faecal blood (ImmunoStics, NJ, USA). An additional 27 tourniquets with visible bloodstains (group B) were tested for HIV-1 RNA and HBsAg. For HIV, three spots of visible blood were cut from each tourniquet, added to 900 µL lysis buffer (Organon Teknika, Cambridge, UK), and eluted.<sup>1</sup> 300 µL samples of each eluate were pooled in groups of three and tested for HIV-1 RNA by nucleic acid sequence-based amplification (NASBA QL, Organon Teknika). For HBsAg testing, samples were prepared as for HIV-1, but blood was eluted into phosphate-buffered saline. All 27 samples were tested separately with a microparticle EIA (Abbott AxSYM HBsAg V2 assay).

25 of 50 tourniquets in group A had visible bloodstains, confirmed with the Haemocult test, on the area corresponding to that in contact with the patient's skin. Cultures from all 50 tourniquets grew heavy skin flora including: coagulase-negative staphylococci, coryneform bacteria, micrococci, *Acinetobacter* spp, and candida and non-candida fungi. Bacterial pathogens were cultured from 17 of 50 tourniquets. These comprised: meticillin-sensitive *Staphylococcus aureus* (12), gram-negative bacilli (two *Escherichia coli*, one *Pseudomonas aeruginosa*, and one *Stenotrophomonas maltophilia*) and *Enterococcus faecalis* (one). Neither HIV-1 RNA nor HBsAg was detected on any of the 27 group B tourniquets.

This study showed a substantial reservoir of potentially pathogenic bacteria on reusable tourniquets. This reservoir exists in areas of hospitals where critically ill, injured, immunocompromised, and postoperative patients are being treated. These organisms can be transmitted from patient to patient on staff hands, and for this reason, handwashing between treatment of patients is emphasised as an essential component of hospital cross-infection control. However, despite adherence to local cross-infection control protocols, there is often difficulty in control of meticillin-resistant *S aureus* infection in patients.<sup>2</sup> Some of this cross-infection has been attributed to the "housestaff--patient transfer circuit".<sup>3</sup> Reusable tourniquets have been shown to be potential fomites.<sup>4</sup> Although 50% of the tourniquets we examined were bloodstained, neither HIV-1 RNA nor HBsAg could be detected. Nevertheless, in areas of high HIV-1 or hepatitis B prevalence such as inner London, there remains a potential risk of viral transmission from tourniquets to patients across areas of broken skin such as venous

access and monitoring sites, open wounds, eczema, cuts, and abrasions. Inoculation could potentially occur in both staff and patients. The potential risk of cross-infection is obvious, since, in the average district general hospital of 600 beds, 400 blood samples are taken and 300 cannulations are done each day. In general, however, cross-infection policies ignore this risk. Since it is impossible to disinfect reusable tourniquets, we recommend the use of disposable tourniquets.

1 O'Shea S, Mullen J, Corbett K, Chrystie I, Newell ML, Banatavala JE. Use of dried blood spots for quantification of HIV-1 RNA. *AIDS* 1999; **13**: 63031. [[PubMed](#)]

2 Barrett SP, Teare EL, Sage R. Methicillin-resistant *Staphylococcus aureus* in three adjacent health districts of South East England 1986-91. *J Hospital Infect* 1993; **24**: 31325. [[PubMed](#)]

3 Haley RW, Hightower AW, Khabbaz RF, et al. The emergence of methicillin-resistant *Staphylococcus aureus* in the United States hospitals: a possible role of the house staff-patient transfer circuit. *Ann Intern Med* 1982; **97**: 297308. [[PubMed](#)]

4 Berman DS, Shaeffler S, Simberkoff MS, Tourniquets and nosocomial methicillin-resistant *Staphylococcus aureus* infections. *N Engl J Med* 1986; **315**: 51415. [[PubMed](#)]

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*Department of General Surgery, Kent and Canterbury Hospital, Canterbury (M Golder FRCS, C L H Chan FRCS), and Departments of Microbiology and Virology, Guy's and St Thomas' Hospital Trust, St Thomas' Hospital, London SE1 7EH, UK (S O'Shea PhD, K Corbett BSc, I L Chrystie PhD, Prof G French FRCPath)*

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*Correspondence to: Dr S O'Shea*