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## Tourniquet Contamination in Helicopter Emergency Medicine Services in Germany

*To the Editor*—Problems with infection control policies regarding tourniquets, such as visible bloodstains and contamination with methicillin-resistant *Staphylococcus aureus*, have been reported in the past<sup>1</sup> and colonization of reusable tourniquets with multidrug-resistant organisms has been discussed as a potential source of transmission in hospitalized patients.<sup>2</sup>

As part of our quality assurance program we assessed the reprocessing procedure and the bacterial contamination load on reusable tourniquets at 23 helicopter stations of the German Helicopter Emergency Medical Services operated by DRF Luftrettung gAG.

The tourniquet in use during the day was collected at the end of the shift (from sunrise to sundown) and sampled with RODAC (replicate organism detection and counting) plates, and a questionnaire about its use and reprocessing standards was distributed and collected. RODAC plates were used in accordance with microbiology procedure quality standards<sup>3</sup> and results are given in colony-forming units per RODAC plate.

Table 1 shows the results for the 21 data sets that were included in the final analysis; 2 data sets could not be used because in one case the tourniquet could not be sampled and in one case the questionnaire was incomplete.

We did not find any multidrug-resistant organisms although the helicopters are frequently used for interhospital transfer of critically ill patients colonized with multidrug-resistant organisms; however, tourniquets are rarely used for these patients. Colonized tourniquets showed mostly regular environmental and skin organisms in low to moderate numbers. Only one sample had 200 colony-forming units of coagulase-negative staphylococci and 5 samples showed 1–5 colony-forming units of mold. There was no correlation between duration of use, mode of storage, or frequency of use and the total count of colony-forming units. Reprocessing

protocols were heterogeneous, with most stations using disinfection wipes after each use. The best microbiologic results were observed in stations using disinfection wipes after every use and daily machine washing at 60°C.

Leitch et al<sup>4</sup> reported contamination with methicillin-resistant *S. aureus* of tourniquets of phlebotomists but also observed lapses in hand hygiene compliance. They observed no change in tourniquet contamination when polyurethane strips were used as an additional barrier and concluded that the contamination of tourniquets is via phlebotomists' hands and not directly from patient's skin. This could explain why we mostly found normal environmental and skin flora in our probes despite partially inadequate and nonstandardized reprocessing practices. The out-of-hospital emergency medicine setting might also be different from the inpatient setting, where studies frequently show contamination of tourniquets with *S. aureus* and methicillin-resistant *S. aureus* but also lack of standardization of cleaning procedures of the used tourniquets.<sup>5</sup>

In conclusion, tourniquets used in the German Helicopter Emergency Medical Services do not seem to be a relevant vector of transmission of pathogenic or multidrug-resistant organisms. However, there is potential for improvement and a need for standardization of cleaning procedures after use. A combination of using disinfecting wipes after each use and daily machine washing at 60°C seems to yield the best results.

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TABLE 1. Overview of Microbial Contamination, Storage Conditions, and Usage Characteristics for Tourniquets Used by 21 German Emergency Medical Service Helicopter Stations

Station- No.	Microorganisms detected in colony forming units (CFU) per RODAC-plate										Storage condition		Time in use at sampling				Reprocessing mode			Exchange to new one		Frequency of use		
	Total CFU	coagulase neg. Staph.	Bacillus spec.	Micrococcus spec.	Nonfermenter	Escherichia coli	Mold	Proteus mirabilis	Pantoea agglomerans	Paracoccus yeei	open	packaged	1-3 months	3-6 months	6-12 months	>12 months	Disinfection wipes	60°C washing machine daily	Alcoholic hand rub	No protocol	if visibly soiled	if broken	<5 times/ week	>5 times/ week
1	47	41	5	1							x		x							x	x	x		x
2	12	2	10								x				x			x			x			x
3	25	24	1							x		x								x	x	x	x	
4	9	6	3								x	x					x				x	x		x
5	15	9	1			5				x		x								x	x	x		x
6	0									x				x			x				x	x		x
7	35	10	25							x		x		x			x				x	x		x
8	23	8	8	7						x		x						x			x	x		x
9	47	45	2							x			x				x				x	x		x
10	1					1				x			x				x				x			x
11	6		5				1				x			x			x				x			x
12	10		8	2						x	x			x			x				x			x
13	18	15	2			1					x				x		x				x	x		x
14	5	2	2	1							x			x			x				x	x		x
15	43	35	6					2		x				x			x				x			x
16	12	7		5							x			x						x		x		x
17	5		5								x		x				x				x	x		x
18	43	26		10		4			3		x				x		x				x	x		x
19	80	42	11	24	3					x		x					x				x			x
20	>200	200	8	18		1					x	x					x				x	x		x
21	7	3	3	1						x		x					x	x			x	x		x

NOTE. RODAC, replicate organism detection and counting.

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