Letters to the Editor

Patient Injury From Flash-Sterilized Instruments

To the Editor:

The recommended use of flash sterilization is for the emergency sterilization of unwrapped, nonporous metal items in gravity-displacement sterilizer for 3 minutes at 132°C.[1,2] Flash sterilization commonly is used in the operating room for emergency sterilization of dropped or otherwise contaminated instruments, instruments unintentionally left out of a surgical tray or, inappropriately, to compensate for inadequate inventories of instruments or implantable devices.[3]

We report here two patients who received clinically significant burns during surgery from instruments that had been flash sterilized.

Patient 1, a 22-year-old female, underwent a right anterior cruciate ligament reconstruction. She suffered a partial-thickness burn to her right thigh when a hot instrument (a shaver housing) was placed on her leg after being flash sterilized. This instrument required flash sterilization so it could be used on this patient, who was the second case. Approximately 15 minutes had elapsed from the time the instrument was sterilized until it was placed on the patient. The burn occurred following attempts to cool the instrument. The nurse was able to hold the instrument in her hand, although it felt warm. Skin grafting was not required but the injury resulted in a permanent scar.

Patient 2, a 67-year-old female, underwent a right total hip replacement. Hands-free retractors with weights had been used on the first case of the day and were not immediately resterilized after that first case in preparation for this patient, who was the second case. She suffered a full-thickness burn after a weight that had been flash sterilized was placed on her thigh. The surgeon placed the weight on her skin and after a few minutes, when he realized that the weight was still hot, he immediately placed a wet, cold towel over the area. Erythema was noted at the site of the weight in the operating room. The patient presented 2 weeks later with full-thickness burns to two areas on the thigh; one area measured 2 cm in diameter and the other 5 cm in diameter. Skin grafting was not required, but the injury resulted in permanent scars.

After these incidents, the following corrective actions were undertaken. First, additional surgical instruments were purchased to reduce the need for flash sterilization. Second, a policy was instituted requiring that all instruments be cooled following flash sterilization prior to use by the surgeon. This was accomplished by either air cooling or immersion in sterile saline. Third, all staff were educated regarding the need to cool flash-sterilized instruments prior to use. No additional burns have occurred in the year since these incidents.

We believe that this is the first report of clinically important burns in patients following the use of flash-sterilized instruments. We recommend that all healthcare facilities that use flash sterilization develop policies and educate staff to prevent the use of instruments hot enough to cause clinical burns. The use of flash sterilization should be limited to recognized indications.[4]

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Environmental Sampling of *Acinetobacter baumannii:* Moistened Swabs Versus Moistened Sterile Gauze Pads

To the Editor:

The ability of the genus *Acinetobacter* to persist on hospital surfaces for several days is well known and contributes to the development of hospital outbreaks.[1] However, in large and sustained outbreaks, sources of *Acinetobacter baumannii* may remain obscure, and environmental studies may fail to find a common source of infection. In these endemic settings, rates of contamination have differed widely from one study to another, from 0% to 18%, probably depending on several factors such as the magnitude of the outbreak, the type of items sampled, and the technique used.[1]

In 1992, an epidemic due to multidrug-resistant *A baumannii,* centered in the four intensive-care units (ICUs), was noted in our 1,000-bed tertiary-care teaching hospital. From 1992 to 1996, most *A baumannii* strains were related by pulsed-field gel electrophoresis (PFGE) to a major clone that was susceptible only to imipenem, sulbactam, and polymyxins.[2] Several studies showed colonized or infected patients to be a major reservoir of infection.[2,3] Environmental cultures using moistened swabs showed rates of positive samples reaching 19%, similar to other reports.[1] From 1992 to 1996, isolation precautions were not enough to control the outbreak, and the infections became endemic, leading us to consider that some environmental reservoirs might remain unrecognized using the swab technique.

To improve the capacity to detect contamination, we modified the recommended swab technique by using moistened sterile gauze pads rather than the cotton applicator swab. The gauze was immersed, using sterile gloves, in a screw-cap container with 10 mL of brain-heart

TABLE
POSITIVE ENVIRONMENTAL CULTURES FOR MULTIDRUG-RESISTANT *ACINETOBACTER BAUMANNII* COMPARING MOISTENED SWABS VERSUS MOISTENED GAUZE PADS

	ICU A		ICU B		ICU C		ICU D		Total	
	S	G	S	G	S	G	S	G	S	G
Colonized or infected patients/total patients*	2/12		6/12		7/12		1/10		16/46	
Items in a cleaned room										
Monitor	1/1	0/1	0/2	0/2	0/1	0/1	0/1	1/1	1/5	1/5
BPG	0/1	0/1	0/2	0/2	—	—	0/1	1/1	0/4	1/4
Lamp	0/2	0/2	0/2	0/2	0/1	0/1	0/1	0/1	0/6	0/6
Mattress	0/1	0/1	0/2	0/2	0/1	1/1	0/1	0/1	0/5	1/5
Window blind	0/1	0/1	0/2	0/2	0/1	0/1	0/1	0/1	0/5	0/5
Total	1/6	0/6	0/10	0/10	0/4	1/4	0/5	2/5	1/25	3/25
Items in use in the unit										
Table	0/1	1/1	1/2	1/2	0/1	1/1	1/1	1/1	2/5	4/5
Cupboard	0/2	0/2	0/2	0/2	0/2	1/2	0/2	1/2	0/8	2/8
ECG	0/1	0/1	0/1	1/1	—	—	0/1	0/1	0/3	1/3
Cart	—	—	0/1	1/1	1/1	1/1	1/2	2/2	2/4	4/4
Crane	0/1	0/1	0/1	1/1	0/1	1/1	—	—	0/3	2/3
Telephone	—	—	—	—	0/1	1/1	—	—	0/1	1/1
BGM	—	—	—	—	—	—	0/1	1/1	0/1	1/1
Total	0/5	1/5	1/7	4/7	1/6	5/6	2/7	5/7	4/25	15/25
Total	1/11	1/11	1/17	4/17	1/10	6/10	2/12	7/12	5/50	18/50

Abbreviations: BGM, blood glucose meter; BPG, blood pressure gauge; ECG, electrocardiograph; G, gauze; ICU, intensive-care unit; S, swab.
* The proportion of patients colonized or infected by *A baumannii* admitted to the unit at the time when environmental cultures were performed.

infusion broth (Ovoid, Hampshire, England) supplemented with 0.5% beef extract, wrung out, and used to rub the surface to be sampled. The gauze was returned to the container, gloves removed, and hands washed.

In July 1996, a comparison between the two techniques was conducted, selecting 50 different ICU items for sampling: 25 belonging to an empty room awaiting a new patient, sampled after terminal routine cleaning, and 25 items in the units that were commonly shared by healthcare workers. Cultures were obtained first with swabs and immediately thereafter with gauze. Negative control cultures were obtained after each series of six items sampled by following the above mentioned procedures but, after wringing out the swabs and gauzes, returning them to the container without contacting any items. After 24 hours of incubation at 37°C, swabs, gauzes, and controls immersed in brain-heart infusion broth were sampled onto MacConkey agar plates supplemented with 8 µg/mL of gentamicin and 5% sheep-blood agar and incubated aerobically at 37°C for 48 hours. Isolates were identified as *A baumannii* by standard biochemical reactions and ability to grow at 44°C. Susceptibility testing was performed by the microdilution method according to the National Committee for Clinical Laboratory Standards recommendations,[4] and clonal typing by PFGE.[2]

Results (Table) suggested the sterile gauze technique to be a more sensitive method than the currently accepted moistened swabs (36% yield vs 10%; $P<.05$). All controls were negative, and all cultures positive for multidrug-resistant *A baumannii* belonged by PFGE to the major clone responsible for the outbreak. In September 1996, barrier methods were reinforced, cleaning protocols revised, and monthly environmental surveillance instituted using sterile gauze, focusing on four groups of items that should be free of contamination: group 1, those belonging to rooms free of patients sampled after terminal cleaning; group 2, those placed inside the units commonly shared by personnel; group 3, those that daily move patient-to-patient, such as electrocardiographs or radiographs; and group 4, those placed in an ICU storage room while waiting for new patients, such as mechanical ventilators.

After an 18-month surveillance period, 265 (42%) of 629 items were found contaminated: group 1, 135 (39%) of 349; group 2, 77 (45%) of 173; group 3, 38 (54%) of 70; and group 4, 9 (39%) of 23. Furthermore, 6 (43%) of 14 articles of clothing of personnel who had been touching colonized patients were positive. Monthly rates of contamination remained stable during this survey period. To what extent these results really reflect the inefficacy of control measures is difficult to assess, because our method was qualitative only, and density of contamination was not determined. However, that monthly rates of newly colonized or infected patients also remained stable during this period probably indicates that low levels of contamination can result in cross-transmission. Thus, as has been reported in vancomycin-resistant enterococcal or methicillin-resistant *Staphylococcus aureus* outbreaks, ICU personnel can contaminate their hands or clothes by touching items that may appear to be clean.[5,6]

Currently, all ICUs have been sequentially closed for decontamination, handwashing facilities placed in

most rooms, and cleaning procedures strictly revised by an infection control nurse who performs weekly environmental cultures, focusing on the above-mentioned four groups of items. Furthermore, information on contamination rates and outbreak evolution are given regularly to ICU personnel. The evolution of the endemic over the next months will determine whether further drastic measures, such as a global structural redesign of our ICUs, must be carried out to control the outbreak.

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Is the European Interhospital Clonal Spread of Serotype O12 *Pseudomonas aeruginosa* Related to the Patients' Prolonged Carriage Duration?

To the Editor:

It has now been over 10 years since, officially, every French hospital has established its own Nosocomial Infection Control Committee (NICC), as well as its own Antiinfectious Chemotherapy Control Committee (AICCC). One of the main objectives of these mandatory creations was to limit the spread of infections with multidrug-resistant (MDR) bacteria. Quite simple and basic measures can help in reaching this objective: hand washing by healthcare providers before and after all patient contacts; screening, signaling, and isolating of MDR bacteria carriers, regardless of their symptoms; rational use of antibiotics; adequate sterilization of materials; etc.[1] Over this last decade, the diffusion in our hospital of an MDR clone of serotype O12 *Pseudomonas aeruginosa* (*P12*)[2] might illustrate the difficulties that our NICC and AICCC are meeting in the application of these basic measures.[3]

In the Table, I indicate some ecological characteristics pertaining to the 1,046 *P aeruginosa* isolates that have been obtained from clinical specimens in our hospital over the last 7 years (June 1991-October 1998), as recorded in our computerized epidemiological expert system (SIR, I2A, Montpellier, France). The particular ecological characteristics of *P12* in our hospital (Table) must be interpreted in light of the following facts: (1) Almost all of the *P12* isolated in our hospital (and in some other hospitals in our neighborhood)[2] are indistinguishable from the MDR European clone of *P12* that seems to have spread throughout many different,[2] but not all,[4] European hospitals. (2) In our hospital, our NICC and AICCC have not, so far, succeeded in convincing all of the wards (particularly, but not only, the long-stay wards) that the aforementioned basic measures must be systematically applied[3] (in our opinion, it cannot be excluded that this reluctance might be a consequence of a "feudal system" possibly found in certain French medical institutions),[5] and a similar situation is likely to be the case in some other hospitals in our area.[2]

Because the epidemiological mechanisms possibly responsible for the clonal European interhospital spread of MDR *P12* are not clearly understood at this time,[2,4] we advise colleagues from affected hospitals to publish their own ecological data. Such reports (easily done with the help of SIR or any computerized expert system of this sort)[3] might confirm (or not) our own ecological data, help in the designing of future intra- and interhospital epidemiological studies of *P12* infections in hospitals where *P12* has clonally spread, and thus perhaps eventually confirm (as has been suggested by others)[2] that infected or colonized patients might be the primary reservoirs of the multiresistant European clone of *P12.*

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TABLE

PSEUDOMONAS AERUGINOSA ISOLATES BY SEROTYPE: NUMBER OF LONG-STAY WARD AND SUPERFICIAL PUS ISOLATES, NUMBER OF PATIENTS, AND OVERALL CARRIAGE DURATION (CALCULATED ON THE WHOLE POPULATION OF PATIENTS)

	Isolates	LSW Isolates	SP Isolates	Patients	Carriage Duration
O12	152/1,046 (15%)	34/147 (23%)	36/146 (25%)	91/815 (11%)	68±254 d
Non-O12	894/1,046 (85%)	113/147 (77%)	110/146 (75%)	724/815 (89%)	18±119 d
P		<.001	<.001	<.0001	<.005

Abbreviations: LSW, long-stay ward; SP, superficial pus.