Creutzfeldt-Jakob Disease: Management of Accidental Contamination of Neurosurgical Instruments, Pathology Equipment, and Solutions

To the Editor:

We describe the measures taken to identify, triage, and decontaminate equipment and solutions following a brain biopsy on a previously unidentified case of Creutzfeldt-Jakob disease (CJD). Immediately after the neuropathologist notified the Infection Control Department of the positive histopathology for CJD, the Sterile Supply Department and Neurosurgical Operating Room staff reviewed the operating room records and determined that a ventriculogram set and a craniotomy set (including the Midas-Rex drill and bits and Roton dissectors) had been used. The washed equipment was located, along with other neurosurgical items, on a cart washer, awaiting sterilization. All potentially contaminated neurosurgical equipment processed with the CJD case was labeled "CJD Precautions," autoclaved at 134°C for 18 minutes, and isolated pending a decision regarding its fate.

The tissue had been processed as a routine neurosurgical specimen. Contaminated solutions from the machine were decanted into containers for disposal, and the microtomes were decontaminated with 2 N sodium hydroxide (NaOH). All other equipment (cutting boards, scissors, scalpels, and forceps) from the tissue preparation areas were placed in biohazard boxes. The CJD biopsy specimen was decontaminated with formic acid and isolated with previous CJD specimens. Hundreds of other surgical specimens had been processed with CJD-contaminated solutions, and it was decided to label these as a biohazard and notify the pathology staff as to the situation.

Neurosurgical cases were rescheduled to allow resterilization of equipment between cases, and arrangements were made to obtain additional neurosurgical instruments. Additional Sterile Supply Department staff were required to accommodate the rapid turnaround time required for same-day processing.

After considerable research and discussion, the decision was made to incinerate all potentially contaminated neurosurgical instruments that had entered dura. Operating room staff, Sterile Supply Department personnel, and a member of the infection control team reviewed and triaged all neurosurgical equipment washed and processed with instruments from the contaminated case. Equipment was grouped into two categories: (1) instruments that never entered the brain (eg, towel clips) and that could be decontaminated with NaOH and autoclaving at 134°C for 18 minutes, and (2) instruments that entered the brain and were potentially contaminated, or that could not withstand NaOH treatment; such instruments were sent for incineration.

The operating room booking of the case was reviewed, as it was inconsistent with the hospital protocol. A review procedure for all brain biopsies prior to surgery was implemented, and it was stressed that there was to be no deviation from the protocol for brain biopsies for dementia of unknown origin.

Neurosurgical equipment for suspect cases was to be limited to a perforator, a burr for the burr hole, and a few neurosurgical instruments (using disposable equipment wherever possible). The instruments would be quarantined until neuropathology results were back, and, if positive for CJD, the instruments would be incinerated.

Disposal of contaminated instruments and equipment was problematic. There were no local incineration facilities for the contaminated instruments. Liquid waste was a mixture of solvents and biohazardous waste and presented a risk of combustion if incinerated or combined with solidifying agents. After some months, arrangements were made for their disposal outside the province.

The appearance of a new CJD variant,[1,2] and recent data questioning the efficacy of traditional recommendations for sterilization of potentially contaminated equipment,[3,4] has resulted in reassessment of the handling of known or suspected CJD cases. However, the development of guidelines is hampered by insufficient information on the risks of transmission,[5,6] lack of a simple diagnostic test that detects early disease,[7] and differing views as to what constitutes reasonable versus "unrealistic" precautions.[3,4,8,9] In addition, opinion on the appropriate handling of contaminated equipment varies and includes the traditional recommendation of a porous load cycle of 134°C to 138°C for 18 minutes, 1 to 2 N NaOH for 1 to 2 hours, two sequential decontamination methods wherever possible, or incineration of known contaminated equipment.[4,8,9]

All of these dilemmas were encountered at our institution following the break in protocol and subsequent contamination of neurosurgical instruments with CJD. In the interest of patient safety, we elected to follow the most conservative course and assume that the risk was substantial enough to warrant removal of the implicated instruments and pathology solutions from circulation. The incident highlighted deficiencies and led to revisions in the way the protocol was interpreted, neuropathological specimens were handled, instruments quarantined and processed, and communication occurred. Although the final result has been a more comprehensive policy for all involved areas, its development did not occur under ideal conditions. The authors hope that this letter provides impetus for individual institutions to review their current CJD policies under less harried circumstances and to consider carefully how contaminated solutions will be disposed.

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Disinfection of Hospital Laundry Using Ozone: Microbiological Evaluation

To the Editor:

We investigated a hospital laundry system that uses ozone gas as a disinfection agent. Ozone is a powerful oxidizing agent that has been used as a chemical disinfectant for water treatment in Europe since 1893.[1,2] The use of ozone has increased in medicine lately due to the number of microorganisms resistant to chlorine.[3]

The process used for washing highly contaminated hospital linen can be summarized as follows: (1) execution of one washing cycle with conventional chemical products (humidification and pre-wash), (2) one washing cycle with ozone (4 mg/L) for 15 minutes, and (3) a softening cycle. Water samples were collected using sterile 20-mL syringes. Pre-wash samples were taken after 2 minutes of agitation without any additives. Post-wash samples were collected similarly, following the final cycle with ozonized water. The samples were evaluated for the most probable number of total coliforms and *Escherichia coli* using the chromatogenic defined substrate test method (Colilert; Idexx Laboratories, Westbrook, ME).

The most probable numbers (±SD) per 100 mL of *E coli* and of total coliforms were $1.3\pm0.3\times10^4$ and $3.74\pm1.8\times10^5$ pre-wash, and were reduced to 0.1 ± 0.1 and 1.24 ± 1.13, respectively, post-wash (each $P<.0001$). Thus, despite intense contamination of the rinsing water, ozone at 4 mg/L proved able to control the tested microorganisms.

Some studies have shown that many species, ie, *E coli, Streptococcus,* and *Bacillus,* can be inactivated by 30 seconds of exposure to an aqueous solution of ozone (0.2 mg/L).[4]

In the current study, we demonstrated that ozone used in a laundry processing system reduced by five logs the total number of coliforms and *E coli* present in hospital laundry rinsing water. However, comparative studies testing different conventional disinfectant agents are still necessary to establish the efficacy of ozone as a laundry disinfectant agent.

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Impact of Nosocomial Infections on Outcome: Myths and Evidence

To the Editor:

In the editorial of the June 1999 issue (1999;20:392-394) of *Infection Control and Hospital Epidemiology,* regarding the impact of nosocomial infections on outcome, Dr. Jordi Rello concludes that ". . . current evidence is providing a new perspective on the myth that its effect is decisive."[1] In obtaining that conclusion, Dr. Rello cites the publication of Dr. Lilia Soufir et al, in the same issue, regarding catheter-related bloodstream infection.[2] These articles are good pieces of evidence-based medicine, but I think Dr. Rello missed two points: (1) the impact of catheter-related bloodstream infection is debated, and thus this is a bad example to apply to other nosocomial infections; and (2) not every bacteremia is the same.

It is true that most reported bloodstream infections have been traced to catheter contamination; but, those are the reports from institutions that publish their results, which usually have research units and good nursing standards. Most reports of bacteremia from developing countries involve mainly *Klebsiella* and *Enterobacter,* organisms related to more extrinsic infusion contamination than to catheter contamination,[3] as they are able to grow in parenteral fluids at room temperature. An endemic level of parenteral infusion contamination could exist in many hospitals throughout the world, because high-volume fluid bottles are being used to load burettes of different patients, bottles are left at room temperature for later use after initial manipulation, disposable syringes are used to inject different administrations sets, and vials of drugs designed to be used once are being used for multiple dosing. Some of these lapses in aseptic techniques could exist also for the growing number of patients receiving infusion therapy at home in developed countries.[4]

In our experience culturing in-use infusion fluids in Mexico, extrinsic contamination is common in many hospitals.[5,6] Because of bias toward accepting publications from research-oriented hospitals, this type of problem has received little attention, and an immense international problem could be underestimated. *Klebsiella* and *Enterobacter* bacteremia is a disease of bigger impact on morbidity and mortality, particularly in neonatal units.

Thus, I consider that it is too soon to conclude that the study of the impact of bloodstream infection belongs in the field of mythology. We have observed a dramatic fall in mortality in a hospital after controlling infusate contamination, but have not made a comparative study.[6] In this process of considering any defendant