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Prevention of Surgical Site Infection: Sterility of the C-Arm and Drapes

By David Provenzano, MD
President, Pain Diagnostics and Interventional Care
Pittsburgh, PA

Background
Recently, surgical site infections (SSIs) have been receiving a great amount of attention from the health care community. Approximately 22% of all healthcare-associated infections are surgical site infections (SSI),[1] and the majority of SSIs are thought to be acquired during surgery.[2] Preoperative, intraoperative, and postoperative factors influence the risk of surgical site infection.

Infection rates associated with spinal cord stimulation systems have been reported in the range of 3.4% to 4.6% from two large systematic reviews.[3,4] Kumar et al.[5] in a multicenter randomized clinical trial comparing spinal cord stimulation versus conventional medical management for neuropathic pain, reported an 8% infection/wound breakdown complication rate.

It is of paramount importance that pain physicians who manage implantable pain therapies (spinal cord stimulation and intrathecal drug delivery systems) have a strong understanding of SSI prevention and control. This continuing series will provide practitioners with information on risk reduction techniques for perioperative infection. In the first part of this review, we will focus on fluoroscopy device (C-arm) sterility.

How sterile are draped C-arms?
Intraoperative fluoroscopy is utilized during the implantation of spinal cord stimulation and implantable drug delivery systems. During the surgical case, the fluoroscopy device is covered with a sterile cover with the goal to maintain sterility. In a prospective study, Biswas et al.[6] evaluated the sterility of 25 C-arm drapes placed with aseptic technique after their use during spine surgery. Culture swab samples were obtained at the completion of the surgical operation from 5 locations on the C-arm drapes: 1) the center of the C-arm, 2) directly underneath the image intensifier, 3) the front lower half of the image intensifier, 4) the front top half of the image intensifier, and 5) the superior end of the image intensifier. The average number of times that the C-arm was moved into the lateral position was 1.8 ± 1.2 times. The average time for C-arm drape duration was 101 ± 66 minutes. A control group consisting of 25 C-arm drapes was
established by sampling the sterile C-arm drapes immediately after they were applied to the fluoroscopy unit.

Compared to the control group, C-arm drapes used during surgery were found to be contaminated at the end of the surgical case. Bacterial growth occurred at all 5 locations of the C-arm. The front top half and the superior end of the image intensifier were associated with the highest contamination rates, 28% and 56% (in comparison to control, \( P < 0.05 \)) respectively. Only 4% of the control drapes were found to have bacterial contamination.\[6\]

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Although the above study focused on spine surgery, the information reported is relevant to implantable therapies for pain management. The average time for C-arm drape duration in the study approximates the surgical time associated with spinal cord stimulator and implantable drug delivery systems. In addition, the C-arm is moved in the lateral position for both of these surgeries. Based on the results of the Biswas et al.\[6\] study, the C-arm drape should not be considered sterile, and contact should be avoided by surgical personnel in an effort to prevent intraoperative contamination. The upper portions of the image intensifier exhibited the greatest rates of bacterial contamination.

**References**