



Bacterial Meningitis After Intrapartum Spinal Anesthesia—New York and Ohio, 2008-2009

MMWR. 2010;59:65-69

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IN JUNE 2007, THE HEALTHCARE INFECTION Control Practices Advisory Committee (HICPAC) recommended for the first time that surgical masks be worn by spinal procedure operators to prevent infections associated with these procedures.¹ HICPAC made the recommendation in response to several reports of meningitis following myelography procedures. In September 2008, three bacterial meningitis cases in postpartum women were reported to the New York State Department of Health (NYSDOH); in May 2009, two similar cases were reported to the Ohio Department of Health. All five women had received intrapartum spinal anesthesia. Four were confirmed to have *Streptococcus salivarius* meningitis, and one woman subsequently died. This report summarizes the investigations of these five cases, which determined that the New York cases were associated with one anesthesiologist and the Ohio cases were associated with a second anesthesiologist. In Ohio, the anesthesiologist did not wear a mask; wearing a mask might have prevented the infections. The findings underscore the need to follow established infection-control recommendations during spinal procedures, including the use of a mask and adherence to aseptic technique.

Case Reports

New York

In September 2008, a healthy woman aged 24 years (patient A) was admitted in active labor to a New York City hospital. She received combined spinal-

epidural anesthesia from anesthesiologist A, and delivered a healthy baby. Approximately 22 hours after receiving anesthesia, patient A experienced headache, back pain, rigors, nausea, vomiting, and disorientation.

Within 1 hour of patient A's admission, a second healthy woman aged 31 years (patient B) was admitted to the same hospital in active labor. Patient B also received combined spinal-epidural anesthesia from anesthesiologist A and delivered a healthy baby. Approximately 21 hours after initiation of anesthesia, patient B experienced headache, back and neck pain, and nausea. Cerebrospinal fluid (CSF) and blood cultures collected from both patients before the administration of antibiotics resulted in no growth. *S. salivarius* was identified in patient A's CSF by polymerase chain reaction (PCR) with primers used to identify various genera of bacteria by 16S rDNA sequence analysis at the NYSDOH Wadsworth Center. Both women recovered without complications.

To determine whether other cases of health-care-associated bacterial meningitis had occurred, the hospital conducted a 6-month retrospective review among postpartum patients who received combined spinal-epidural anesthesia. A third case was identified in a woman aged 37 years (patient C) who received anesthesia from anesthesiologist A in July 2008. Patient C experienced headache, lethargy, confusion, and a possible seizure approximately 19 hours after initiation of anesthesia. *S. salivarius* was cultured from her CSF.

Two days after symptom onset for patients A and B, the hospital and NYSDOH conducted an investigation, which included a site visit, active case finding, cultures of two bags of anesthetic medication for epidural infusion prepared using sterile technique under a laminar flow hood by the hospital pharmacy on the same date as the medication administered to patients A and B during their procedures, onsite review of combined spinal-epidural anesthesia procedure

protocols, and interviews with the pharmacist and members of the medical staff and labor and delivery nursing staff. Anesthesiologist A reported routine use of masks during spinal anesthesia procedures. A nasopharyngeal swab from anesthesiologist A grew coagulase-negative staphylococci. Samples of the anesthetic medication were negative for bacteria by culture and 16S rDNA sequence analysis. Staff members reported that the presence of unmasked visitors in the room during spinal anesthesia procedures was common. Subsequently, the hospital reinforced policies and procedures to enhance hand hygiene and maintenance of sterile fields, and required the use of masks, gowns, and sterile gloves for staff members performing spinal anesthesia procedures. In addition, the hospital instituted new policies to minimize visitors and require masks for all persons in the room during spinal anesthesia. The hospital also initiated a program to monitor compliance with these policies.

Ohio

In May 2009, a healthy woman aged 26 years (patient D) was admitted to a hospital in active labor. She received spinal anesthesia from anesthesiologist B and delivered a healthy baby. Approximately 15 hours after receiving the spinal injection, patient D experienced fever, nausea, and severe headache; a blood culture and diagnostic lumbar puncture were performed. The patient became lethargic and unresponsive and was airlifted to a tertiary-care hospital approximately 6 hours after symptom onset. She subsequently recovered.

A second healthy woman aged 30 years (patient E) was admitted to the same hospital in active labor 3 hours after patient D. Patient E also received spinal anesthesia from anesthesiologist B and delivered a healthy baby. Approximately 13 hours after receiving the spinal injection, patient E experienced a severe headache, fever, confusion, and lethargy, and later became un-

responsive. Blood cultures were drawn. Approximately 6 hours after symptom onset, she was airlifted to the same tertiary-care hospital as patient D; she died 7 hours later. The cause of death was determined by autopsy to be suppurative meningoencephalitis caused by *Streptococcus salivarius*. CSF was collected on autopsy.

Blood and CSF cultures collected from both patient D and patient E revealed *Streptococcus salivarius*. Isolates from patients D and E were indistinguishable by pulsed-field gel electrophoresis at CDC's Streptococcal Laboratory.

On the day after symptom onset in the two Ohio patients, the hospital, the local health department, the Ohio Department of Health, and CDC initiated an investigation. Investigators cultured one opened anesthetic medication vial and three unopened vials, interviewed the hospital infection preventionist and medical director, and reviewed hospital intrapartum spinal anesthesia procedure protocols. Anesthesiologist B was found to be the only health-care provider involved in the spinal procedures for both patients D and E. As a result of initial concern that patients D and E potentially had meningococcal meningitis, anesthesiologist B had been given ciprofloxacin as postexposure prophylaxis approximately 12 hours after the patients' symptom onset. Cultures performed on swabs subsequently obtained from the oropharynx, buccal mucosa, and tongue of anesthesiologist B resulted in no growth, but *S. salivarius* was identified using PCR methods. Culture and PCR of the medication vials revealed no evidence of contamination. Interviews with staff members revealed that anesthesiologists at the hospital did not typically wear masks while performing bedside spinal procedures, despite a hospital policy requiring masks. Anesthesiologist B did not wear a mask while administering spinal anesthesia to patients D and E. Subsequently, the hospital reinforced its policy requiring all staff members to use surgical masks when performing spinal anesthesia procedures.

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CDC Editorial Note: This report describes two clusters of meningitis among women who received spinal anesthesia during labor. Four of the cases were confirmed to be infections with *S. salivarius*, a bacterium that is part of the normal mouth flora. Features common to all five cases included rapid onset (<24 hours) of meningitis after anesthesia in previously healthy women and the association of each cluster with a single anesthesiologist who performed the procedures (anesthesiologist A in the three New York cases and anesthesiologist B in the two Ohio cases). In both clusters, *S. salivarius* most likely was transmitted directly from the anesthesiologist to the patients, either by droplet transmission directly from the oropharynx or contamination of sterile equipment.

In the Ohio cluster, the anesthesiologist did not wear a mask during the procedures, making direct droplet transmission most likely. The two patients were infected with *S. salivarius* with indistinguishable PFGE patterns. A PFGE pattern could not be determined for the *S. salivarius* carried by the Ohio anesthesiologist because the bacteria were identified by PCR instead of culture. In the New York cluster, *S. salivarius* was not isolated from the anesthesiologist, so a comparison could not be made with the bacteria identified from two of the three patients. However, the anesthesiologist was the only common exposure identified in the three cases. The occurrence of meningitis caused by normal mouth flora after spinal injection procedures performed by a common provider suggests a breach in aseptic technique. Retrospective review of the procedures with the anesthesiologist did not reveal obvious breaches in aseptic technique; however, certain breaches

What is already known on this topic?

Bacterial meningitis is a rare complication of spinal injection procedures performed in health-care settings; normal mouth flora carried by health-care providers frequently are identified as the cause.

What is added by this report?

Two small clusters of bacterial meningitis caused by *S. salivarius* after spinal anesthesia occurred during 2008-2009, despite the release of recommendations in 2007 to prevent bacterial infections related to droplet transmission.

What are the implications for public health practice?

Health-care facilities and health departments should promote adherence to established guidelines (e.g., wearing masks) among health-care providers performing spinal injection procedures.

(e.g., not wearing a mask properly during the procedure) might be difficult to identify retrospectively.

The intrathecal space is entered during several diagnostic and therapeutic spinal procedures, including lumbar puncture, myelography, and spinal anesthesia, and can occur inadvertently during epidural anesthesia. Cases of meningitis have been reported after all of these procedures, although most published cases have involved spinal anesthesia.² The actual incidence of meningitis after these procedures is not known. In Sweden, one case of purulent meningitis occurred per 53,000 episodes of spinal anesthesia during 1990-1999.³ A literature review identified only 179 cases of post spinal procedure meningitis reported worldwide during 1952-2005²; in contrast, approximately 300,000 diagnostic lumbar punctures were performed on inpatients in the United States in 2007 alone.⁴ Post spinal procedure meningitis causes serious infections; in one case series, one third of cases resulted in death.⁵

Potential sources of bacterial introduction into the intrathecal space during spinal procedures include intrinsic or extrinsic contamination of needles, syringes, or injected medications; inadequately decontaminated patient skin; inadequately cleaned health-care provider hands; a contaminated sterile field; and droplet transmission from the health-care provider's upper airway. *S. salivarius* and other viridans group streptococci, which are normal mouth flora, are the most commonly identified etiologies of meningitis after spinal procedures, accounting for 49% and 60% of cases in two literature reviews.^{2,6} Droplet transmission of oral flora has been suggested as the most likely route of transmission in reports of clusters associated with a single health-care provider.^{7,8}

Although occurrence of meningitis after spinal anesthesia is not new, the cases described in this report occurred after the June 2007 release of recommendations for the prevention of such infections,¹ in which HICPAC recommended that surgical masks be used by health-care providers who were either placing a catheter or injecting material into the spinal canal or epidural space.¹ In 2006, the American Society of Regional Anesthesia and Pain Medicine also had recommended the use of surgical masks during regional anesthesia procedures.⁹ In addition to the wearing of masks, HICPAC also recommend that providers perform all invasive procedures, such as the ones described in this report, in accordance with safe injection practices. These practices include consistent use of aseptic technique, including using new sterile needles and syringes when accessing multidose vials and using single-dose vials whenever possible.

Health-care providers who perform spinal procedures should be familiar with and follow the recommendations for use of masks, proper aseptic technique, and safe injection practices. Facilities at which these procedures are performed should raise awareness of

these recommendations among staff members and assess compliance with the recommendations by performing periodic audits. Local and state health departments are in a position to help health-care facilities identify and investigate cases or clusters of health-care-associated meningitis and ensure adherence to infection-control recommendations.

Acknowledgments

This report is based, in part, on contributions by R Gallo and R Garg, New York State Dept of Health.

REFERENCES

9 Available.

Jimsonweed Poisoning Associated With a Homemade Stew—Maryland, 2008

MMWR. 2010;59:102-104

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IN THE EARLY MORNING HOURS OF JULY 9, 2008, six adult family members were admitted to a hospital emergency department in Maryland with hallucinations, confusion, mydriasis, and tachycardia of approximately 3-4 hours duration. Approximately 4-5 hours earlier, all six family members had shared a meal of homemade stew and bread. Subsequent investigation by the Montgomery County Department of Health and Human Services (MCDHHS) and the Maryland Department of Health and Mental Hygiene (MDHMH) determined that the stew contained jimsonweed (*Datura stramonium*), a plant in the nightshade family that contains atropine and scopolamine¹ and has been associated with anticholinergic-type poisoning.¹ This report describes the poisoning incident, which resulted in six hospitalizations, and the subsequent multidisciplinary investigation. Health-care providers and public health

officials should be aware that jimsonweed poisoning can occur among many age groups, including younger persons, who typically consume the plant material for recreational purposes, or persons of any age group who might unknowingly ingest the plant. A prompt diagnosis of jimsonweed poisoning is complicated by the difficulties in eliciting exposure histories in persons with altered mental status and the variable presentations of affected persons. Consultation with horticulturalists, poison control centers, and specialized laboratories might be necessary to investigate cases and outbreaks.

The six affected persons came from one family and included three men and three women ranging in age from 38 to 80 years (median age: 42 years). All six shared a meal of homemade stew and bread at approximately 9:00 p.m. on July 8, 2008. No one else was at the home when the meal was eaten. Approximately 1 hour later, another relative arrived at the home and discovered the six affected family members laughing, confused, and complaining of hallucinations, dizziness, and thirst. One of the family members vomited. The unaffected relative called emergency medical services, and all six were transported to the hospital by ambulance.

On admission to the emergency department, two of the six patients were unconscious. The other four were awake and had altered mental status; complete history of meal preparation and food exposures could not be obtained. Physical examinations revealed tachycardia and dilated, sluggishly reactive pupils in five of the six patients. Temperatures ranged from 98.0°F (36.7°C) to 99.4°F (37.4°C). Respirations ranged from 17 to 22 breaths per minute.

During the next 6 hours in the emergency department, the six patients continued to experience tachycardia, mydriasis, and altered mental status. One remained unconscious. The others demonstrated confusion, aggression, agitation, disorganized speech, inco-