A Multidisciplinary Approach to the Elimination of Neurosurgical Site Infection

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Excela Health Hospitals are comprised of three facilities located in southwestern Pennsylvania. As a healthcare system, we serve a patient population approaching 420,000 individuals. Our system accounts for 654 acute care beds providing the full spectrum of primary and tertiary care services to our patients. We are over 5,000 employees and health care professionals who are dedicated to “Improving the health and well-being of every life we touch.”

A. Introduction
Surgical site infections (SSI) represent a significant cause of morbidity for patients, resulting in increased utilization of hospital resources and increased costs of healthcare. Over a 5-year period we noted a progressive rise in the incidence of inpatient neurosurgical SSI, peaking at 17 infections in CY 2010.

Baseline numbers for surgical site infection following spinal procedures at our hospital ranged from 3-6 per calendar year from 2002-2006, but increased to 8 per year in 2007 and 2009, with no definitive cause identified. An unprecedented number of 17 SSIs occurred in 2010 resulting in the formation of a multidisciplinary team to implement pre-operative interventions to reduce the risk of infection. This team also standardized post-operative wound care following spinal surgery and improved patient education and discharge instructions as integral components of the intervention process.

B. Implications
Surgical site infections result in:
- Negative Outcome for the Patient - patient experiences additional pain and suffering that delays return to functional status, as well as the ability to resume employment. The need for intravenous antibiotic in the home poses unanticipated challenges for both patient and family.
- Increased Length of Stay - SSI following spinal surgery is generally detected post-discharge, therefore, the patient requires readmission to the hospital for additional services.
- Additional Cost for Diagnosis and Treatment - there is significant cost associated with readmission for SSI attributed to diagnostic testing, return to surgery for wound debridement, and intravenous access for antibiotic therapy.
- Potential Loss of Revenue for additional services by third party payers.

C. Actions Taken
We sought to eliminate neurosurgical SSI at our hospital by utilizing:

1. **A multidisciplinary team** comprised of front line staff to lead the charge. The group provided insight on hidden barriers that could roadblock successful implementation of new processes that focused on reducing infections.
2. **Root cause analysis (RCA)** was conducted for all infections to identify possible opportunities for prevention.
3. **Patient education materials** were customized for spinal surgery. Tools were specific to both the pre and post-operative period.
4. **Extensive education of medical and nursing staff** focused on standardization of processes to identify risk factors.
5. **Pre-operative nares screening** for Staphylococcus aureus (both MSSA and MRSA).
6. **Mupirocin decolonization** for nasal carriers of Staph aureus.
7. **Chlorhexidine gluconate (CHG) bathing/showering, preferably x5** - liquid soap provided to physician office by Infection Prevention and Control for patient use.
8. **CHG cloths (disposable)** for back and hands/arms of patient in the pre-op hold area.
9. **CHG/alcohol for surgical prep in OR.**
10. **Weight-based antibiotic prophylaxis.**
11. **Monthly compliance review** of all inpatient cases for pre-op interventions.

D. Results
Over a period of one calendar year, we reduced neurosurgical site infections from 17 to 4. When analyzing the financial data based on readmissions compared to the minimal cost for the project interventions ($2520), the return on investment in readmissions alone was $82,990. Only 2 inpatient neurosurgical infections were identified from January through August 2012.

E. Lessons Learned
1. Multidisciplinary teams are essential.
2. Continuous surveillance of process improvement works.
3. “Low tech” solutions and continuous education can facilitate high volume outcomes.
4. Sustained elimination of neurosurgical SSIs is attainable.