Pre- and Post-operative Participation of Orthopedic Patients and Surgical Staff in a Novel Intervention to Reduce Staphylococcus aureus Infection

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Abstract

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BACKGROUND

Staphylococcus aureus (S. aureus), of both antibiotic-sensitive and resistant strains, is a major cause of surgical site infections. Potential sources of S. aureus in the patient environment includes nasal carriage and contaminated skin of the patients themselves, as well as the hands and anterior surfaces of surgical and nursing staff with whom the patient will interact. The presence of these sources within the environment, along with surfaces and other fomites, increase the environmental bacterial burden and the risks for both S. aureus transmission and infection in surgical settings. Growing concerns for the contributions of universal decolonization to bacterial resistance and the unacceptability of regular antibiotic use to reduce nasal carrier states of risk greatly limit the usefulness of mupirocin in increasing the effectiveness of Infection Prevention decolonization strategies.

With the goal of reducing S. aureus SSIs infection rates in our orthopedic surgical facility, a trial was conducted in our spine surgery patients to see if nasal decolonization using a non-antibiotic, alcohol-based nasal antiseptic would be effective when added to the existing practice of pre-operative skin decolonization using chlorhexidine gluconate bathing and body wipes. In addition to patient nasal decolonization carried out by the staff during the pre-operative preparation, pre-op nurses, the surgical staff, including nurses, technicians and the surgeon, and the post-anesthesia care unit nurses agreed to participate through self-application of the nasal antiseptic.

The Baylor Orthopedic and Spine Hospital at Arlington (BOSHA) is an orthopedic treatment and surgical center with 23 beds in one- or two-bed rooms. Surgical and treatment specialty areas include spine and joint.

METHODS

Adoption Process: A series of meetings was held during which the rationale for the change in existing Infection Prevention and Control protocols was vetted and the proposed integration of an alcohol-based nasal antiseptic into existing infection control protocols was proposed and approved. These meetings involved members of the hospital administration and representatives of all staff stakeholders, including the Chief Nursing Officer, Operating Room Supervisor, Infection Control Specialist and surgeons. In addition to in use in patients, agreement was reached regarding voluntary self-application of nursing and surgical staff in members of the spine group to which the required antiseptic nasal decolonization protocol would be applied. The finalized plan with regard to patient decolonization was implemented through a change in BOSHA Infection Control Policies and Guidelines.

Education and Training: Programs were scheduled to enable education regarding the actions and use of the alcohol-based antiseptic and hands-on application training in all involved members of the BOSHA staff. These were carried out by the manufacturer’s representatives in the weeks prior to initiating the IC policy change.

Policy: The approved policy stated that, upon arrival on the day of surgery, each patient will follow a protocol of alcohol-based nasal antiseptic administration as trained pre-op staff prior to entering the OR. Following surgery, the patient will fall into the regular daily cycle of nasal antiseptic application in the Post-Anesthesia Care Unit (PACU) and/or Post-Surgical Unit (PSU). Application by staff will continue in the Post-Surgical Unit (PSU) up to the time of discharge and instructions will be given to the patient/family with encouragement to continue applications at home for an additional 5-7 days.

Procedure: Applications of the nasal antiseptic were made to the patients using a cotton swab and a multi-dose dispensing dropper bottle at three times (30 sec each) during the period between intake and transport to the OR.

- The patient’s assigned and labeled bottle traveled with the chart to the Post-Surgical Unit.
- After leaving the OR, additional applications were made at 3:00 pm and/or 9:00 pm on the day of surgery, depending upon the time of arrival in the PACU.
- On each subsequent day in the hospital, the nasal antiseptic was applied to the patient by trained Post-Surgical Unit staff at 9:00 am, 3:00 pm and 9:00 pm.
- Record of all applications were kept on a form in the patient’s chart.
- At discharge, patient/family home care instructions included an information brochure and encouragement to use the bottle and swab to continue applications for 5-7 days.

Nasal Decolonization Compliance: The individual chart record of applications to the patients by staff were monitored with compliance to the protocol. Staff compliance with the self-application guidelines were estimated from self-recorded daily tally sheets in the pre- and post-op units. An additional effort to foster compliance by the OR staff was lead by the surgeon during the inter-case “time-outs” by querying new members of the team and encouraging self-application.

Determination of Infection Rates: On a monthly basis, SSIs in patients whose surgeries fell within the previous 30-day period and were a part of the nasal antiseptic decolonization protocol were identified and those culturing S. aureus were tallied. Quarterly infection rates were calculated as the number of relevant infections per 100 surgeries for the period.

RESULTS

Data were collected from a total of 803 spine surgery patients, 399 during the 9-month baseline period and 404 during the 9-months of nasal antiseptic use. Table 1 describes the general characteristics of the two cohorts, which were very similar in age, sex and length of stay post surgery for those who remained for at least one night. The average numbers of patients in each reporting quarter were identical in the two groups. Figure 1 shows the S. aureus infection rates for the three quarters of the baseline and nasal treatment periods. The mean rate during the reference period was 1.76 infections per 100 surgeries. This rate was reduced to 0.55 during the subsequent 9-month period of nasal antiseptic use in our protocol. This 69% decrease in Staph infections in our spine group was statistically significant (P = 0.04).

The success of this on-going effort has led to an expansion of its adoption by other surgical groups within BOSHA. Critical to its success has been the leadership and motivation provided by key members of the nursing and surgical teams and the enthusiasm of the participating staff.

SUMMARY

1. An infection control protocol was initiated that involved both patient and key surgical and nursing staff participation in nasal decolonization with an alcohol-based antiseptic.
2. The addition of nasal antiseptic to our standard procedures for reducing skin colonization carried resulted in a marked and significant decrease in S. aureus SSIs.

CONCLUSIONS

We have found the alcohol-based nasal decolonizing antiseptic to be a highly effective and acceptable method for use in both patients and medical staff to reduce infection rates in our orthopedic surgical facility.

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