

Daily Bathing with Chlorhexidine in the ICU to Prevent Central Line–Associated Bloodstream Infections

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Abstract

- **Objective:** To describe a quality initiative to reduce central line–associated bloodstream infections (BSIs) and acquisition of multidrug-resistant organisms by using chlorhexidine wipes for daily bathing of intensive care unit patients.
- **Methods:** Staff nurses developed a bathing procedure that identified bathing technique, frequency, compatibility with other products, contraindications, and required documentation. An education process for peers, patients, and family members was implemented.
- **Results:** BSI rates decreased from 3.6/1000 patient days to 1/1000 patient days 6 months after implementation of the chlorhexidine bath procedure. The rate of MRSA/VRE colonization was 3.6/1000 patient days prior to the implementation of the chlorhexidine daily baths and was reduced to 1/1000 patient days following implementation.
- **Conclusion:** The use of chlorhexidine baths reduced BSIs and resistant organism acquisition rates at our hospital.

Every year in the United States 80,000 patients in intensive care units (ICUs) develop central line–associated bloodstream infections (BSIs), at an average cost of \$40,000 per patient [1–3]. Many of these infections are preventable. Further, they are included among the preventable conditions for which Medicare will no longer reimburse hospitals if they develop after admission. Studies show that using chlorhexidine gluconate wipes in the ICU reduces risk of infection [1,3,4–6]. We implemented a quality initiative to reduce BSIs and the acquisition of multidrug-resistant organisms by using chlorhexidine wipes for daily bathing of all ICU patients in place of traditional bathing procedures.

Setting

Emory University Hospital is an academic medical center

in Atlanta, Georgia, with 93 ICU beds and 9 specialty ICUs. Emory University Hospital is a principal hospital of Emory Healthcare which is part of a 4-hospital system. The medical staff is comprised of full-time faculty physicians. Quality and Patient Safety are integral to the operations of Emory Healthcare. Several times each year leadership staff meet with all employees to determine important initiatives to undertake using the PDSA (Plan, Do, Study, Act) methodology to achieve departmental goals.

In December 2007 the cardiovascular surgery ICU used chlorhexidine cloths for bathing as preoperative skin care in the cardiac surgery population, resulting in a reduction in postoperative sternal wound infections. At a 2008 Medical ICU summit attended by interdisciplinary teams from 5 hospitals in the area, the decision was made to institute daily baths with 2% chlorhexidine cloths in the medical ICUs. The nursing leaders of the medical and cardiovascular ICUs decided to collaborate in this improvement project. This joint quality initiative was undertaken in an effort to reduce BSIs and resistant organism infections.

Intervention

In February 2008 a team of ICU staff nurses developed a plan for instituting the daily baths. A bathing procedure was developed that identified bathing techniques, frequency, compatibility with other products, contraindications, and required documentation (Figure 1). The team was coordinated by experienced clinical nurse specialists (CNSs) and included ICU medical directors, infection control practitioners, bedside staff nurses, technicians, and patient care assistants. The plan was implemented in April 2008.

Engagement

Incorporating bedside staff from the various units was necessary to ensure the success of the project. Staff buy-in was essential, and their participation in developing the

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CHLORHEXIDINE BATHS

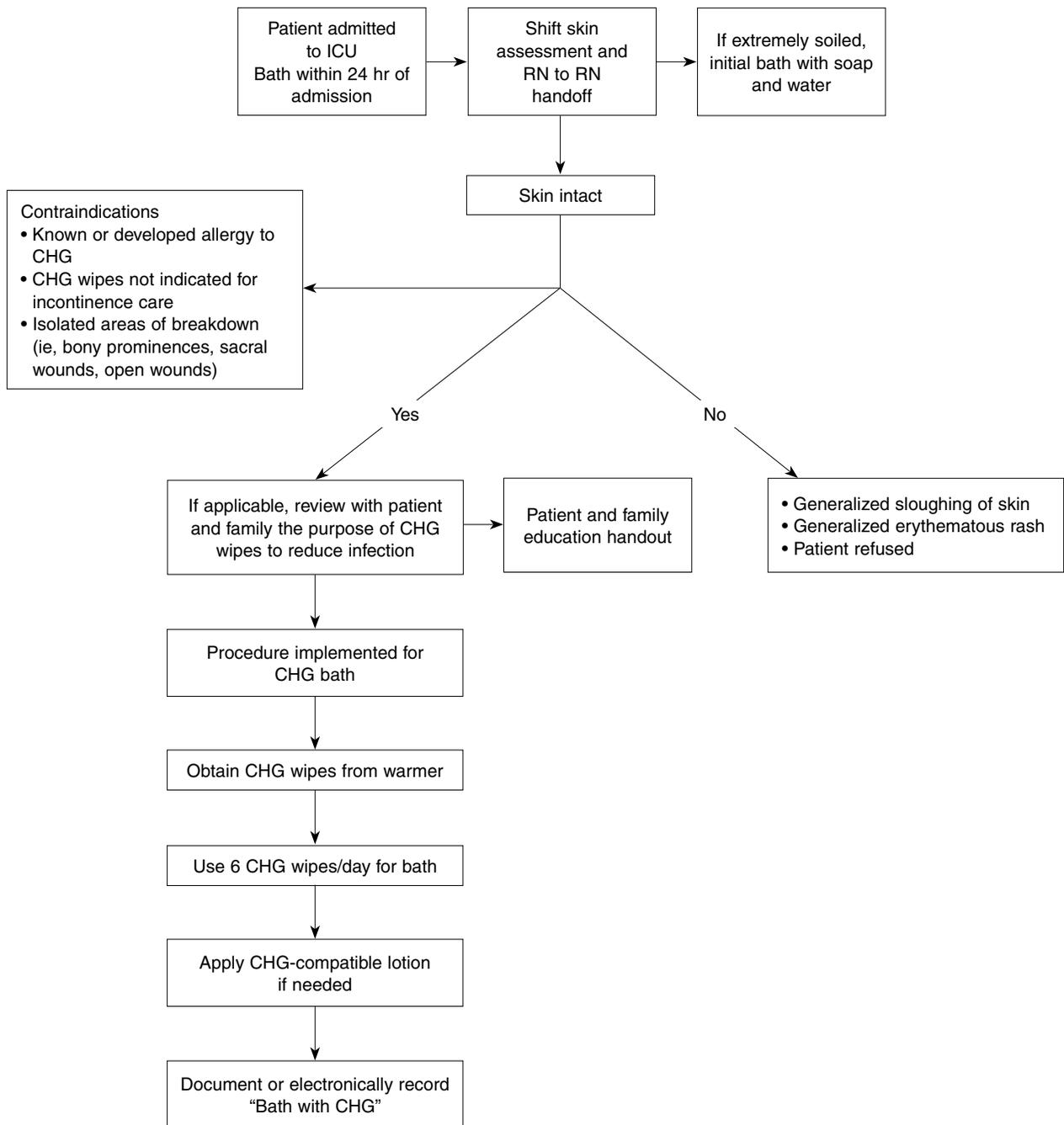


Figure 1. Daily bathing flow chart. CHG = chlorhexidine.

procedures, outlining the plan for implementation, and conducting unit huddles (informal staff gatherings) to review the outcomes of these steps was key to the success of this project. Staff nurses were instrumental in the education process for peers, patients, and family members. The staff emphasized the benefits of the new process, which included

ease of doing the bath and being able to complete the bath in a shorter period of time. Data were reviewed with staff on a regular basis so they could see the results of their work. The frequent reviews were presented at staff meetings, via email, and as postings on unit bulletin boards.

The ICU practice councils took an active role in engaging

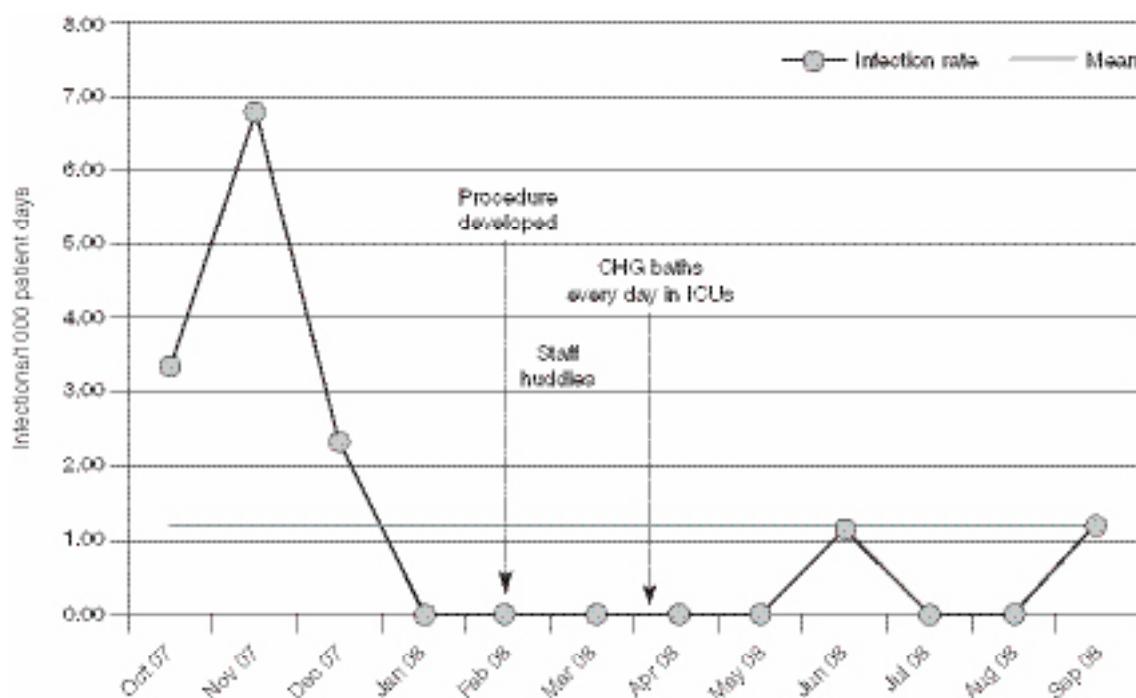


Figure 2. Central line-associated bloodstream infections.

staff in the process. Nursing department directors and nurse managers in the ICU were critical contributors. The ICU medical directors are vital in engaging fellow physicians to support changes needed to improve outcomes of care. A journal club presentation was provided by staff nurses to the hospitals in our system who enthusiastically shared the data and discussed the evidence behind daily bathing with chlorhexidine cloths.

Measurements

We measured rates of compliance with the new daily bathing procedure. Compliance was considered all or none. If the bath was not documented or was documented as “bath” only, it was measured as zero compliance with the process change. Documentation needed to clearly state “bath with chlorhexidine” in order to count as compliance. A data collection tool was developed and tested by staff nurses to assist them in monitoring for compliance. At least 30 patient days were monitored monthly during the first 6 months. The compliance rose from 40% to 98% within the first 3 months. Graphs showing BSI, methicillin-resistant *Staphylococcus aureus* (MRSA), and vancomycin-resistant enterococci (VRE) rates in the units involved in the quality initiative were produced by our infection control practitioners and shared with nursing staff. Outcome and process data were reviewed with staff monthly. Unit and bedside huddles were con-

ducted to focus on barriers to using the chlorhexidine baths throughout the process. Changes in the process were made based on staff feedback.

Results

BSI rates decreased from 3.6/1000 patient days (mean rate for the 6 months prior to the intervention) to 1/1000 patient days 6 months after implementation of the chlorhexidine bath procedure. The BSI rates decreased from 1.6 to 0.73 in the cardiovascular ICUs, from 4.39 to 0.83 in one medical ICU, and from 2.35 to 0.78 in the second medical ICU (Figure 2). The national benchmark for BSI in cardiac ICUs is 1.60/1000 catheter days, and for medical ICUs it is 2.90/1000 catheter days, according to the National Healthcare Safety Network, a CDC voluntary reporting system.

The rate of MRSA/VRE colonization was 3.6/1000 patient days prior to the implementation of the chlorhexidine daily baths. Six months following implementation, the rate was reduced to 1.0/1000 patient days (Figure 3).

The outcome of the project was reported in clinical leadership meetings to keep this group abreast of successes and plans for future implementation in ICUs across the system. The project was also presented at the infection prevention and control committee meeting, critical care team and nursing division meetings, and to key physician leaders and faculty from the quality training program.

CHLORHEXIDINE BATHS

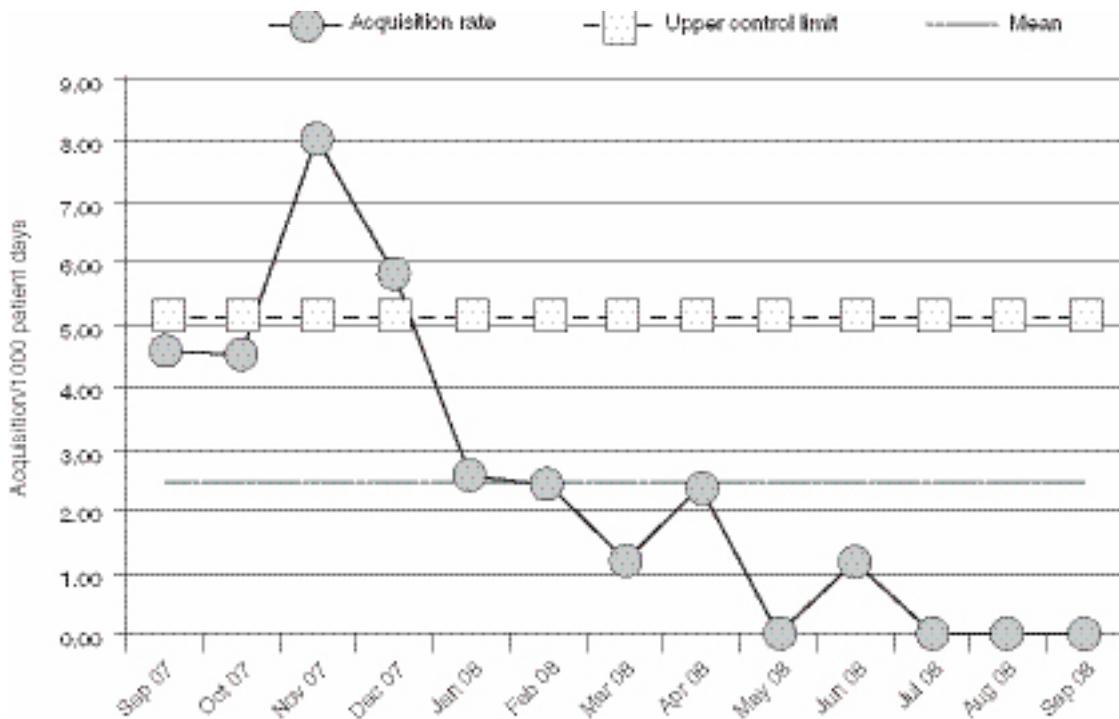


Figure 3. MRSA/VRE acquisition.

Barriers

Several barriers were encountered. The process of providing a daily bath with chlorhexidine wipes was a significant change compared with usual practice by the nursing staff and patient care assistants. Initial concerns raised by the staff included fear that the wipes would not make the patient feel “as clean” as they would with a typical bath with soap and water. With encouragement from the clinical nurse specialists (CNS), they tried the chlorhexidine wipes and feedback was positive. The nursing staff found that delivering a bath was less cumbersome since the wipes were the only supplies needed to clean the area of the body from the neck to the toes. The previous bathing technique required 3 steps: moistening the body, then cleaning with soap, then rinsing the soap. The chlorhexidine wipes required only 1 step, thus streamlining the process. The staff discovered that the wipes cleaned the patient as well as the standard procedure, and they were buoyed by the fact that the wipes could have such a positive impact on decreasing infections.

Initially, patient and family buy-in was a barrier. Several patients and families did not understand why the bathing process was changed and some even felt that baths were not given. In response, the CNSs created a patient education flyer that was posted in each room and used when explaining the benefits of using the chlorhexidine wipes. Once the

patients and families understood, they were appreciative of the ICU staff and supportive of the effort to decrease the potential for BSIs.

An additional barrier was finding a compatible lotion to use with the chlorhexidine wipes. Some skin care products and lotions were found to negate the impact of the chlorhexidine wipes. Working with members of our purchasing department and the scientific research department of the wipe manufacturer, products were identified that were compatible, cost-effective, and available. The new lotion was incorporated into our institutional purchasing contract, stocked in inventory, and placed on the supply carts in the ICUs.

Several situations of noncompliance were noted early in the project. It was discovered that this was due to nurses who were not regular staff and were unfamiliar with the change in procedure. Educational activities were then conducted for the interdepartmental staffing pool. If we identified individuals who were not using the chlorhexidine wipes for the bath, the manager or the CNS met one-on-one with staff members to identify barriers they were facing.

Cost Implications

Although the cost of the chlorhexidine cloths is greater than for the non-chlorhexidine cloths (\$5.50 vs. \$1.46 pk/patient), previously multiple packs were used. Six cloths are in a

package. The cloths are not used on the face; staff are taught to use them from the jawline down to the toes. The patients were given 1 bath (6 cloths/bath) each day. Though the cost per bath increased, savings were seen in staff time, which allowed staff to focus on other areas of patient care. Based on a 75% reduction in BSIs over 6 months, we calculated a projected cost savings of \$1.56 million per year if chlorhexidine baths were used in all of our hospital ICUs.

Current Status

A focus on improvement of reduction of central line-associated BSIs at our institution is being maintained. We continue to monitor our results monthly and quickly identify areas for improvement. An example of this would be the recent need to change our procedure for checking the chlorhexidine packet warmers. Staff were overstocking the warmers with the chlorhexidine cloths and several packs needed to be discarded daily. A red light is activated when the wipes have been in the warmer for more than 84 hours. The guidelines were written in greater detail, including information about not overstocking the warmer with more than 1 pack per patient per day. The staff were taught to use the ones with the green light first and then the ones with the flashing light meaning they had been in the warmer for 72 hours. Detailed guidelines on the warmer process were added to the procedure and were posted on the warmers in the ICUs.

Summary

The use of chlorhexidine baths has significantly reduced BSIs and resistant organism infections at our hospital. Staff found that the new method improved workflow efficiency

and decreased the time needed to administer the bath. Patients also verbalized satisfaction with the change. We have changed bathing practices in all of our ICUs to incorporate the chlorhexidine bath cloths across our health care system, leading to further reductions in BSIs.

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