REDUCTION OF MRSA TRANSMISSION IN A GERIATRIC SETTING FOLLOWING THE IMPLEMENTATION OF DAILY BATHS WITH DISPOSABLE 2% CHLORHEXIDINE GLUCONATE CLOTHS

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Many chronic care facilities and nursing homes contend with endemic rates of methicillin-resistant *Staphylococcus aureus* (MRSA) colonization among residents. Risk factors for MRSA acquisition in chronic care patients include prior treatment in an acute care facility, prolonged hospitalization, complexity of co-morbidities, administration of multiple antibiotics, intravenous therapy, multiple wounds, and the presence of a gastric tube.[1,2] Studies have indicated that colonized residents in nursing home settings are six times more likely to develop an infection than are non-colonized patients, thereby potentially increasing the risk of mortality.[3] Few studies have been conducted investigating control measures to prevent MRSA transmission among elderly residents in chronic care facilities or nursing home settings.[4]

Over a 3-year period, 21% of all nosocomial MRSA cases at Baycrest Geriatric Health Care System originated within a single Acute Care and Transition (ACT) unit. Given the condition of residents and the multiple-bed ward rooms present in this unit, there was an urgent need to implement an infection prevention and control intervention to limit MRSA transmission. An interrupted time series design was used to evaluate the effectiveness of daily bathing with 2% chlorhexidine gluconate (CHG)–impregnated disposable cloths on all patients in the ACT unit to reduce the incidence of MRSA.

Methods

The study was approved by the research ethics board at Baycrest. The requirement for written informed consent was waived. The study was conducted in a 27-bed ACT unit at Baycrest, from October 2008 to October 2009. Two patient groups were included in this study: the pre-intervention period included all patients on the unit from October 2008 to March 2009; the post-intervention period included all patients on the unit from May 2009 to October 2009. During the 1-month washout period, between pre- and post-intervention time periods, unit staff were educated in the use of 2% CHG bathing cloths.

Patients on the ACT unit were >65 years of age, with an average age of 87 years. The ACT unit is an alternative to preventing an admission to an acute care hospital for elderly patients with subacute or chronic disabilities requiring assessment and treatment interventions. Patients are admitted from other Baycrest units, the community, acute care hospitals, emergency departments and other chronic care facilities.

Colonization pressure (CP) was calculated to verify that the reservoir of MRSA was similar for both study periods. CP was calculated monthly pre- and post-intervention (Number of MRSA Patient-Days × 100 ÷ Total Number of Patient Days).[5] MRSA patient days on the ACT unit were counted starting with first day a patient was identified as MRSA positive until that patient's death or discharge.[5]

To assess MRSA transmission on the ACT unit, Baycrest policy is to collect swabs within 48 hours of admission and on discharge. An MRSA point prevalence survey was performed on the first and last days of the post-intervention period. Compliance with timely MRSA swab collection was monitored pre- and post-intervention. Pooled swabbing technique (multiple swabs from the same patient processed in one broth culture) was used to test specimens from the nares, perianal area, and any wounds or indwelling devices. Results were available within 24–48 hours of specimen collection. MRSA-colonized or -infected patients were placed on contact precautions pre- and post-intervention.

The intervention consisted of nurses providing daily baths with disposable 2% CHG cloths (Sage Products Inc., Cary, Illinois) for all patients on the ACT unit. All other bathing products (basins and non-rinse bath products) were removed from the unit to ensure compliance with the intervention. Consistent compliance with the

Table 1. Patient Demographics for the Pre-intervention and Post-intervention Study Periods after Admission to the ACT Unit

Demographic Variables	Pre-intervention	Post-intervention	*p* Value
No. of MRSA cases acquired	19	2	.0002*
Average MRSA incidence (per 1,000 patient days)	4.99	0.56	.0002*
Patient days	3,811	3,598	.55
MRSA patient days	450	389	.56
CP (%)	11.8	10.8	.79
Admissions	169	168	.98
Discharges	166	173	.79
Deaths	30	27	.78
Average LOS (days)	20	16	.21
Occupancy (%)	77	72	.47
Median age, in years (IQR)	89 (83–93)	88 (83–90)	.17
Average Braden Scale score†	16.1	16.7	.20

ACT = Acute Care and Transition; CP = colonization pressure; IQR = inter-quartile range; LOS = length of stay; MRSA = methicillin-resistant *Staphylococcus aureus*.
*Statistically significant result ($p < .05$).
†Braden Scale assesses a patient's risk of developing a pressure ulcer by examining six criteria: sensory perception, moisture, activity level, mobility, nutrition, and friction and shear. An adult with a score of 18 or less is considered at risk for developing pressure ulcers.

bathing protocol and product availability was enforced. Patients were bathed with 2% CHG cloths as per package instructions, avoiding all mucous membranes and facial areas. There were no other changes in practice on the unit (e.g., environmental cleaning, indwelling device maintenance, etc.).

The main outcome measure was the incidence of new ACT-acquired MRSA. Data were analyzed using the SPSS program (SPSS Inc., Chicago, Illinois). We considered p values <.05 to be statistically significant. MRSA acquisition rates during the two study periods were compared using a chi-square test. The t test was used to compare demographic data pre- and post-intervention.

Results

During the pre-intervention period from October 2008 to March 2009, 169 patients were admitted to the ACT unit and there were a total of 3,811 patient days. Post-intervention, May 2009–October 2009, there were 168 admissions and a total of 3,598 patient days. Swab collection compliance on admission and at discharge was 95% for both pre- and post-intervention. Demographics of patients for both study periods were similar (Table 1).

The CP pre- and post-intervention did not differ significantly ($p = .79$, t test), with average colonization being 11.8% and 10.8%, respectively. We do recognize that during June of the post-intervention period, the CP was much lower than in other months; however, this did not affect the significance between study periods.

Following the implementation of disposable 2% CHG cloths for bathing on the ACT unit, the incidence of MRSA decreased significantly, from 4.99 pre-intervention to 0.56 post-intervention per 1,000 patient days ($p < .001$, chi-square analysis). Overall, this represented an 89% reduction in ACT unit–acquired MRSA transmission (Figure 1).

Discussion

Daily bathing of geriatric patients on an ACT unit with disposable 2% CHG-impregnated cloths resulted in an 89% relative decline in incidence of MRSA. Previous studies have examined the utility of disposable 2% CHG bathing cloths as a preoperative skin preparation and as a daily bathing regimen in such settings as medical intensive care, general medicine, and trauma units.[6–9] To our knowledge, there are no studies that have investigated the effect of daily bathing with 2% CHG cloths in a geriatric setting.[4]

It has been well established that length of stay in a healthcare facility, especially a nursing home, is a risk factor for MRSA acquisition.[4] Many geriatric facilities struggle with controlling MRSA transmission.[4] Interventions focusing on reducing MRSA incidence have been largely behavioural based, and results are generally not sustained over time.[10] By implementing daily bathing with disposable 2% CHG cloths, a non-behavioural intervention, the reduction in MRSA transmission was sustained over time. This is valuable in chronic care, where lengths of stay can last from months to years. Our study has led to Baycrest implementing the use of daily 2% CHG bathing cloths as a standard of care on the ACT unit.

We acknowledge that there may have been specific patient-related risk factors rendering patients more susceptible to MRSA acquisition;

Key Point

Daily bathing with 2% chlorhexidine gluconate cloths significantly reduced the incidence of methicillin-resistant Staphylococcus aureus *in a geriatric setting from 4.99 to 0.56 per 1,000 patient days, representing an 89% reduction.*

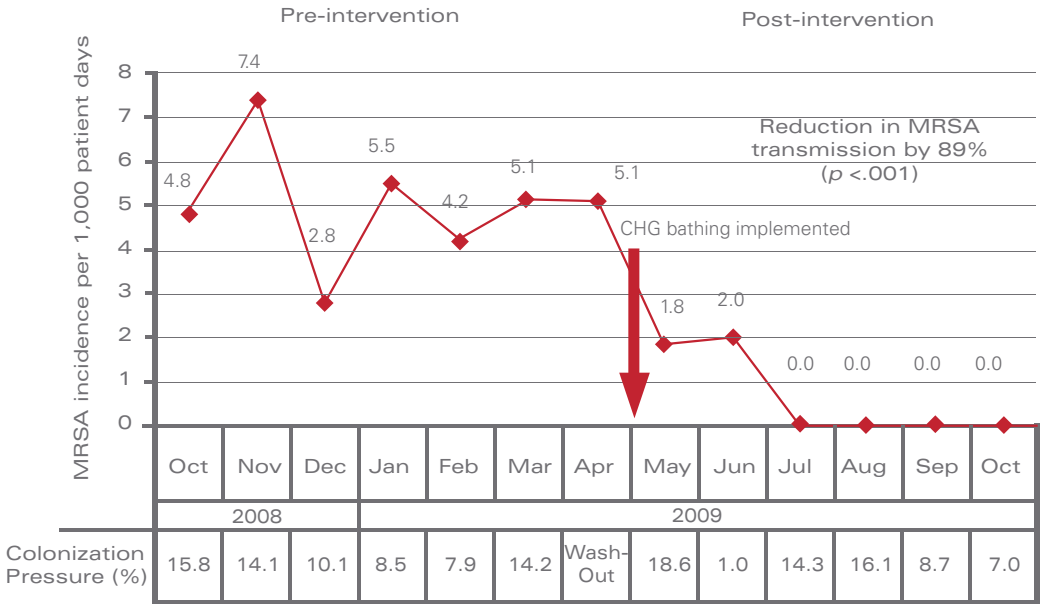

Figure 1. Results of an interrupted time-series study: methicillin-resistant *Staphylococcus aureus* (MRSA) transmission rates and colonization pressure.
Baycrest Acute Care and Transition Unit–acquired MRSA transmission rates before (October 2008 – March 2009) and after (May – October 2009) the implementation of a daily bathing regimen using disposable cloths impregnated with 2% chlorhexidine gluconate (CHG). Colonization pressure (%) by month is indicated at the bottom of the figure.

however, patient demographics (see Table 1) appeared similar for both the pre- and post-intervention periods. Although this interrupted time series design was useful, we recognize that a randomized control trial is the most robust method for controlling for confounding variables.

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