Empowering the Surgical Patient: A Randomized, Prospective Analysis of an Innovative Strategy for Improving Patient Compliance to the Preadmission Shower Protocol

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Introduction

Surgical site infections (SSIs) are responsible for significant morbidity, mortality and excess utilization of healthcare resources.1,2 The preadmission antiseptic shower is accepted as an effective strategy for reducing the risk of SSI.3,4 The following study analyzes the benefit of an innovative electronic patient identification system (EAS) for enhancing compliance to a preadmission showering protocol with 4% chlorhexidine gluconate (CHG).

Materials and Methods

The present investigation was reviewed and approved by the Institutional Human Subjects Review Board (IRB).

Following informal consent 80 healthy volunteers were randomized into one of 4 skin antisepsis showering groups (N=20 per group): Group A — 4% CHG Two Shower Arm (evening/ morning) 1. A1: EAS group (SMS-text, email or voicemail), N = 20 2. A2: Non-EAS group, N = 20 Group B — 4% CHG Three Shower Arm (2 consecutive evenings/ morning) 1. B1: EAS (SMS-text, email or voicemail), N = 20 2. B2: Non-EAS group, N = 20

Study volunteers were instructed to apply the 4% CHG-soap (StªCleanse, CareFusion, Leawood, KS) to their body using a sponge applicator provided in the kit, covering all body surface areas, excluding the face and scalp.

All subjects were instructed to report back to the investigator's laboratory. The timing and return for determination of CHG skin surface concentrations was staged to occur 10 to 14 days after informed consent, randomization and receiving study supplies.

The volunteers were asked their preference for receiving an electronic alert prior to each showering event (SMS-text message, email or voicemail).

The CHG skin surface concentration assay is based on an adaptation of a United States Official Monograph for the identification of chlorhexidine gluconate solution and previously described.50

The sites tested included a 3 cm2 area on the right lateral antecubital fossa, abdomen and right-left popliteal fossae.

The principle investigator was blinded to all randomization codes until the final volunteer was processed at which point the code was broken and individual groups analyzed by Analysis of Variance (ANOVA) and paired t-tests (MINITAB Statistical Program, MINITAB Inc., State College, PA).

Results

No adverse events were noted in the study. Eighty percent (32/40) of study volunteers preferred to receive a SMS-text message as alert prior to showering, while 4% (15/320) and 2% (6/320) volunteers preferred to be prompted by email or voicemail, respectively.

Figure 1 documents the mean skin surface concentrations of 4% chlorhexidine gluconate (CHG) in subjects who showered twice (group A, evening/ morning).

Figure 2 documents the mean skin surface concentrations of chlorhexidine gluconate (CHG) in those individuals who were instructed to shower three times (group B, 2 consecutive evenings/morning).

In those volunteers who did not receive an electronic alert there was a 65% and 67% reduction, respectively, in the mean composite skin surface concentration of CHG in the 2 and 3-showering group.

Table 1 documents the subgroup analysis of the amount of unused CHG returned by men, women and all volunteers in groups A1, A2, B1, B2.

Male volunteers were more likely to return a larger volume of unused CHG than female study subjects in groups A2 and B2 (non-auto-grouped).

Conclusions

The present investigation suggests that use of an electronic alert system was highly effective in elevating skin-surface skin concentrations of CHG in patients assigned to showering twice or three times compared to non-alerted subjects (p<0.007). It is important to note that the composite mean skin surface concentration of CHG in those subjects who showered three times was essentially identical to the composite mean concentration measured in volunteers who showered twice.

While these findings dovetail from a previous study published in 2008.11 The authors suggest that an opportunity for maximum skin surface concentration of CHG can be achieved if institutions embrace an 11-point standardized preadmission showering regimen (Table 2).

Final Comment

Based upon the findings of this study an electronic alert system (SMS text messaging, email or voicemail) to remind patients of the need to complete a 2 or 3 shower regimen is a valid strategy for enhancing patient compliance, empowering them to become effective partners in their own healthcare experience.

Table 1

<p>| Subgroup Analysis, Rectal Axillary 4% CHG in Men, Women and All Study Subjects |
|-----------------------------------|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Study Groups</th>
<th>Mean Rectal CHG (%)</th>
<th>Mean Axillary CHG (%)</th>
<th>Mean All Study CHG (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A1</td>
<td>37.2 ± 8.9</td>
<td>20.3 ± 7.4</td>
<td>30.5 ± 10.0</td>
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<tr>
<td>Group A2</td>
<td>27.1 ± 6.6</td>
<td>20.3 ± 7.4</td>
<td>20.3 ± 7.4</td>
</tr>
<tr>
<td>Group B1</td>
<td>20.3 ± 6.4</td>
<td>20.3 ± 7.4</td>
<td>20.3 ± 7.4</td>
</tr>
<tr>
<td>Group B2</td>
<td>20.3 ± 6.4</td>
<td>20.3 ± 7.4</td>
<td>20.3 ± 7.4</td>
</tr>
</tbody>
</table>

Table 2

| Standardization of the CHG Preadmission Shower Regimen |
|-----------------------------------|-----------------|-----------------|-----------------|
| The following components should be included in preadmission CHG showering regimen, as a part of a coordinated surgical bundle preoperative program: |
| 1. Incorporate methods for reminding patients of the need to complete the preoperative antiseptic shower (e.g., text messaging, email, voice mail). |
| 2. Empower patients to participate in the preoperative infection control strategy. |
| 3. Provide both oral and written instructions to patients. |
| 4. Monitor both arm of CHG used and each shower: Double application. |
| 5. Limit the amount of CHG used and each shower: Single application. |
| 6. Use the amount of CHG used and each shower: Not to exceed 20 ml. |

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References