Effect of Hand Hygiene Education on the Number of Bacterial Colonies in Care Helpers’ Hands

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Abstract. This study is quasi-experiment research based on nonequivalent control group non-synchronized design assessed the effect of hand hygiene education on the number of bacterial colonies on the hands in care helpers. Subjects of this study were 45 care helpers who work at an elderly care center in Seoul. Hand hygiene education was restructured by the author based on the hand hygiene education and training proposed by WHO Multimodal Hand Hygiene Improvement Strategy. The data were collected between September 1, 2015 and November 6, 2015, and analyzed by using IBM SPSS 21.0. The result of this study, the numbers of bacterial colonies was found Significant difference as a result of the group and time interaction (F=3.75, p=0.029)

Keywords: Hand Hygiene, Care Helpers, Hygiene, Education, Bacterial colonies

1 Introduction

Population aging in South Korea has been accelerated. In 2012, the population aged at least 65 accounted for 11.8% of the entire South Korean population and is expected to increase continuously to 24.3% in 2030, and 37.4% in 2050 to have one of the oldest populations[1]. In addition, such a rapid population aging has caused constant increase in the elderly medical cost. And the number of the elderly who require care and help would surge steeply. In this situation, the South Korean government introduced the Long Term Care Insurance in July, 2008, with a view to help improve elderly health and livelihood stabilization while easing the burden of their families[2]. Care helpers perform the job of providing physical assistance and housework services for elder people with difficulty in performing daily routine independently due to dementia, stroke, and other geriatric illnesses at elderly care or home care facilities[3]. They provide direct services to receivers of the Long Term Care Insurance scheme.

Main causes of infection in elderly care facilities include the decreased immune function of care facility residents, nutrition deficiency, poor medical environment and
lack of infection preventive education program[4]. However, in South Korea, there is no report investigating the infection control situation in elderly care centers or tolerance status, excluding few that reported the infection control status at general hospitals with at least 300 beds, infection control status of smaller hospitals and antimicrobial use[5]. As such, study on infection control at elderly care facilities is insufficient in the country and its infection control is also deemed less than satisfactory.

In this recognition and consideration of the vital role of care helpers nursing the elderly vulnerable to infection, this present study provided education to care helpers and investigated the educational effect in order to build the basic materials for infection prevention.

2 Research method

2.1 Research subjects

This study examined 52 care helpers working at elderly care facilities in Seoul, South Korea. For each group, 26 subjects were sampled and the total number of subjects is 52. Seven of them, however, dropped in the middle of the study experiment for some individual reasons. The final number of research subject is 45 persons including 25 in the experiment group and 20 in the control group.

2.2 Research tool

• Hand medium culture inspection

For the test of bacterial colony numbers, this study used hand medium for culture test (E-Checker TPC, Hamil Komed, Korea). The subjects washed their hands and contacted the medium with the palms of their hands for 5~10 seconds. Then it was cultured in medium at 35±2°C for 18~24 hours. When Escherichia coli and Staphylococcus aureus are cultured, the color is changed. So bacterial colonies therein were counted at this point of time to produce results.

• Hand hygiene education

The researcher of this study re-organized the contents on hand hygiene education and training of the Multimodal Hand Hygiene Improvement Strategy by the WHO[6]. In consideration of the working condition of care helpers, a total of 2 rounds of education were provided after consulting with facility heads.

2.3 Data collection method and process

For this research, data were collected from September 1 to November 6, 2015 in the following specific process;
• The control group washed their hands and received a preliminary hand medium culture examination.
• After 1 week, the control group was instructed to wash their hands; received the 1\textsuperscript{st} hand medium culture inspection.
• The experiment group, to prevent experimental spread, was instructed to wash their hands after completing the control group inspection, in the identical process to that for the control group.
• The researcher performed 2 rounds of hand hygiene education to the experiment group with a 1-week interval for 50 minutes each. After 1 day from the hand hygiene education, the experiment group was instructed to wash their hands; received the 1\textsuperscript{st} post-intervention hand medium culture inspection; and were surveyed on hand hygiene knowledge and perception.
• The 2\textsuperscript{nd} post-intervention examination was conducted in 6 weeks from completing the 2\textsuperscript{nd} education of the experiment group. The researcher instructed the control group and experiment group to wash their hands and immediately inspected the hand medium culture (Fig. 1).

2.4 Data analysis method

For this research data analysis, the IBM SPSS 21.0 statistical program was utilized. The repeated measure ANOVA was used to examine the differences in bacterial colony numbers according to the time gap of bacterial culture inspections.

Fig. 1. Hand medium culture
3 Results

In the 1st inspection, the number of hand bacterial colonies measured after 1 day from the hand hygiene education was 138.96±108.66 in the experiment group and 234.25±141.80 in the control group. So the experiment group showed more significant decrease than the control group ($t=-2.52$, $p=.016$).

In the 2nd inspection, the number of hand bacterial colonies measured in 6 weeks from the education was 164.76±95.11 in the experiment group and 178.33±91.45 in the control group. The experiment group showed larger reduction than the control group but without any statistical significance ($t=0.43$, $p=.671$).

Significant difference was found as a result of the group and time interaction ($F=3.75$, $p=.029$) <Table 1>.

Table 1. The effect of hand hygiene education on number of bacterial colonies

<table>
<thead>
<tr>
<th>number of bacterial colonies on washed hands</th>
<th>pretest M ± SD</th>
<th>1st posttest M ± SD</th>
<th>2nd posttest M ± SD</th>
<th>F(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exp. (n=25) M ± SD</td>
<td>222.20±120.43</td>
<td>138.96±108.66</td>
<td>164.76±95.11</td>
<td>0.60 (.565) 0.18 (.677) 3.75 (.029)</td>
</tr>
<tr>
<td>Cont. (n=20) M ± SD</td>
<td>200.50±185.00</td>
<td>234.25±141.80</td>
<td>178.33±91.45</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>t</th>
<th>0.48</th>
<th>-2.52</th>
<th>-0.43</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>.637</td>
<td>.016</td>
<td>.671</td>
</tr>
</tbody>
</table>

4 Discussion & Conclusion

The hand hygiene education was found to affect the number of bacterial colonies in care helpers’ hands, which was measured after hand wash. Prior to the hand hygiene education, the number of hand bacterial colonies after hand wash was 222.20±120.43 in the experiment group and 200.50±185.00 in the control group. In the 1st post-intervention inspection in 1 day from the hand hygiene education, the experiment showed reduction by 84 to 138.96±108.66 while the control group showed increase by 34 to 234.25±141.80. This finding indicates that the hand hygiene education decreased the number of bacterial colonies significantly. This finding is consistent with the finding in the study on the hand wash performance rate of medical staff at 1 general hospital[7]. They conducted hand medium culture inspections randomly for 3 years, selected those with poor performance of hand wash, provided them with hand wash education, and found a significant decrease in the number of bacterial colonies.
However, in the 2nd inspection 6 weeks after the hand hygiene education, the experiment group showed 164.76±95.11, decrease by 58 from the preliminary investigation and the control group, 178.33±91.45, decrease by 22, showing no significant difference. In preceding studies[8], [9], it was found that hand hygiene education helped enhance hand hygiene performance ratio and reduce medical service-led infection in 1 week thereafter but in 3~4 weeks, the hand hygiene performance dropped. Longer effect of hand hygiene education is, of course, important. Still, regular and repeated hand hygiene program is also necessary instead of one-off provision. In this consideration, repeated study will be necessary to investigate if there exist continued educational effect after a certain period from the education in order to provide the ground for determining the time point of re-education.

References

2. Long-term Care Insurance, http://www.longtermcare.or.kr