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Effect of Infection Control Team-Led Intervention to Promote Compliance with Hand Hygiene Practices in Ward Pharmacists †

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Abstract: Hand hygiene is the most effective preventive measure against the spread of nosocomial infections; however, pharmacists' compliance with hand hygiene practices is lower than that of other healthcare workers. This study evaluated the effect of an infection control team-led intervention on hand hygiene compliance among ward pharmacists. In September 2018, ward pharmacists started carrying portable alcohol-based hand sanitizers that could be used immediately anywhere within the hospital. In January 2020, a training session was conducted for ward pharmacists to improve their compliance with hand hygiene practices. The pre-training and post-training evaluations of the ward pharmacists, who were unaware of the assessment, were undertaken in December 2019 and February 2020, respectively, by pre-trained pharmacy students who directly observed hand hygiene compliance, and the compliance rates significantly improved for "after room in and before room out" (62% vs. 95%, $p < 0.001$ and 64% vs. 95%, $p < 0.001$, respectively). Regular direct observations by infection control link nurses continued during the study period, and there was a significant improvement in compliance from 35% to 78% between July 2018 and January 2021 ($p < 0.001$). These findings suggest that our interventions may contribute to the improvement of hand hygiene practices among ward pharmacists.

Keywords: compliance with hand hygiene; infection control team; ward pharmacist; pharmacy student

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1. Introduction

Transit pathogens can colonize the patient's skin and cause environmental contamination. Microorganisms are transmitted through the hands of healthcare workers when they touch contaminated patients and their surroundings, leading to healthcare-associated infections (HAIs) [1]. HAIs are associated with poor outcomes, such as increased duration of hospital stay and higher mortality rates in hospitalized patients [2,3]. The clinical outcomes of patients can be improved by preventing HAIs. Because alcohol can effectively reduce a variety of bacteria and viruses, proper alcohol-based hand hygiene is effective in reducing the spread of HAIs [4,5]. Previous evidence suggests that improving compliance with hand hygiene practices can lead to a reduction in the rate of acquisition of pathogens on hands and the transmission of infections [6,7]. However, pharmacists' compliance with hand hygiene practices is lower than that of other healthcare workers (such as nurses and physicians) [8]. In our hospital, the compliance rate of pharmacists to hand hygiene was low; therefore, we started an intervention to improve hand hygiene

compliance among ward pharmacists and evaluated the effect of infection control team-led intervention at a university hospital.

2. Methods

2.1. Study Setting

This study was conducted at a 934-bed tertiary care university hospital in Japan. Twenty-eight of the 33 ward pharmacists underwent training sessions in January 2020. Eighteen pharmacy students were included in the study.

2.2. Infection Control Team-Led Intervention

In September 2018, ward pharmacists started carrying portable alcohol-based hand sanitizers. In January 2020, ward pharmacists held a training session to provide information on the importance and timing of hand hygiene and the problems associated with non-adherence to these practices. The following four key moments were designed as appropriate timings for hand hygiene for ward pharmacists:

Improved key moments for ward pharmacists

(1) after room in
(2) before room out
(3) before touching a clean area
(4) after touching a patient and patient's surroundings.

Pharmacy students were trained in December 2019 to assess the ward pharmacists' compliance. We provided feedback to staff who practiced poor hand hygiene to promote good hand hygiene throughout the study period.

2.3. Assessment of Hand Hygiene Compliance

Of the four improved key moments, pre-trained pharmacy students observed three key moments ("after room in, before room out, and after touching a patient and patient's surroundings") while assessing ward pharmacists' compliance with hand hygiene. In December 2019 and February 2020, the compliance of ward pharmacists was directly observed by pre-trained pharmacy students who were evaluated before and after a training session. Infection control link nurses regularly observed compliance with pharmacists throughout the study period. These observations were not informed in advance and were conducted without ward pharmacists being aware of the assessment.

2.3. Statistical Analysis

Categorical variables were analyzed using the chi-square test. We determined the association between the terms and each data point using a single regression analysis. The threshold for statistical significance was set at $p < 0.05$. All parameters were analyzed using EZR (Saitama Medical Center, Jichi Medical University, Saitama, Japan).

3. Results and Discussion

The WHO encourages the following five key moments for hand hygiene to minimize the transmission of pathogens in healthcare facilities [9]: (1) before touching a patient, (2) before cleaning procedures, (3) after body fluid exposure, (4) after touching a patient, and (5) after touching the patient's surroundings. However, these five moments are slightly complex and difficult to remember for pharmacists; therefore, we amended them to four moments to improve the pharmacists' compliance.

Previous studies have reported that educational intervention led to extended knowledge of practices and improved good hand hygiene compliance [10,11]. In January 2020, the infection control team conducted a training session with the ward pharmacists. The content of the training session included the appropriate timing of alcohol-based hand hygiene, which is our improved key moment, the risk of pathogens being transmitted

through the hands of healthcare workers [12], and how HAIs exacerbate economic burden and reduce clinical outcomes [2,3]. In our study, the percentage of pharmacists who answered, "I can answer all of the questions" or " I would rather say yes" to the question "Can you answer the appropriate timing of hand hygiene?" increased from 57% to 100% after training (Table 1). Furthermore, the percentage of pharmacists who answered, "I understand and can explain" or "I mostly understand" to the question "Do you understand the importance of hand hygiene?" increased from 89.6% to 100% after the training session (Table 2). Infection control team-led training sessions have a high educational effect on the knowledge and understanding of hand hygiene practices.

Table 1. Answers to the question, "Can you answer the appropriate timing of hand hygiene?".

	Before Training Session		**After Training Session**	
I can answer all of them	0	(0)	10	(37)
I would rather say yes	16	(57)	18	(63)
I would rather say no	11	(39)	0	(0)
I cannot answer one of them	1	(3.6)	0	(0)

Data are presented as n (%).

Table 2. Answers to the question, "Do you understand the importance of hand hygiene?".

	Before Training Session		**After Training Session**	
I understand and can explain	1	(3.6)	16	(56)
I mostly understand	24	(86)	12	(44)
I don't understand much	3	(11)	0	(0)
I don't understand	0	(0)	0	(0)

Data are presented as n (%).

Figure 1 showed that according to the observations of the pre-trained pharmacy students, the compliance rates significantly improved for "after room in and before room out" [62% (48/77) vs. 95% (99/104), $p < 0.001$ and 64% (50/78) vs. 95% (98/103), $p < 0.001$, respectively] but did not change for "after touching a patient and patient's surroundings" [0% (0/39) vs. 6% (2/35), $p = 0.43$]. Compliance varied for each key moment, with high compliance being observed after room in and before room out, while low compliance was observed after touching a patient and patient's surroundings. These results are consistent with previous studies that have shown that opportunities occurring after touching a patient's surroundings are associated with the lowest levels of compliance [13,14]. Our results might be because pharmacists in the wards have few opportunities to contact patients directly, such as physical assessment; therefore, they may miss performing hand hygiene practices.

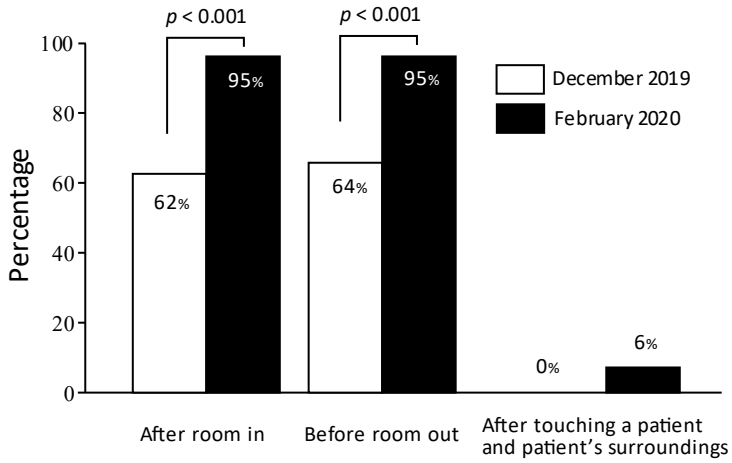

Figure 1. Compliance with hand hygiene in each moment (%).

In our hospital, hand hygiene had to be implemented in the patient's room; however, hand sanitizers were placed at the front of the room or in the hallways, but not in the patients' rooms. As a result, the opportunity to perform hand hygiene when needed was missed in the patient's room. Therefore, in September 2018, ward pharmacists carried portable hand sanitizers so that they could use them anywhere in the hospital. As shown in Figure 2, infection control link nurses directly observed the compliance of ward pharmacists and assessed the long-term trend, which showed a significant increase in compliance during the study period ($p < 0.001$). In particular, the introduction of portable hand sanitizers and the implementation of a training session greatly improved compliance.

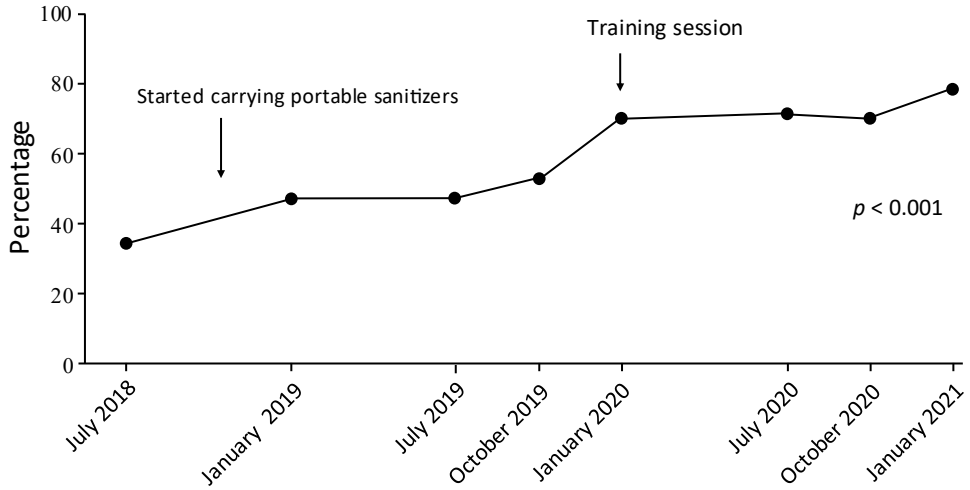

Figure 2. Compliance with hand hygiene during the study period (%).

When participants are aware of being observed, the observation has a Hawthorne effect on compliance [15]. However, in this study, the Hawthorne effect was considered to be small because the observations were made without prior notice and the participants were not aware that they were being observed. We provided feedback to ward pharmacists with low compliance rates to ensure proper hand hygiene. Other randomized controlled trials have shown that feedback interventions can improve compliance with hand hygiene among healthcare workers [16], and this may have contributed to improvements during the study period.

In Japan, coronavirus disease 2019 (COVID-19) spread throughout the country, and a state of emergency was proclaimed three times during the study period. However, even during the COVID-19 pandemic, improvements in hand hygiene levels were not necessarily sustained and declined significantly over time after the interventions were discontinued [17–19]. The impact of the COVID-19 pandemic in our study was likely limited.

4. Conclusions

The infection control team introduced portable hand sanitizers, improved key moments, and held a training session for ward pharmacists. With the addition of feedback to staff who poorly practiced hand hygiene and assessment by pre-trained pharmacy students, these interventions may contribute to the improvement of hand hygiene practices in ward pharmacists, even in the long term.

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