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**Investigating the effect of preparation for and participation in a hand sanitizing relay on nursing students' ability to recall the WHO six-step hand hygiene technique.**

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### **Abstract**

This study explored whether preparation for a hand-sanitizing relay effected nursing students' ability to recall the WHO six-step Hand Hygiene technique 12 months later. There was no significant difference in recall between those who participated in the relay with those who did not ( $p=0.736$ ). The most frequently missed step was Step 3 (palm to palm with finger interlaced). Our results suggest that regular feedback may be an important additional component in future interventions.

## **Investigating the effect of preparation for and participation in a hand sanitizing relay on nursing students' ability to recall the WHO six-step hand hygiene technique.**

Effective hand hygiene (HH) is the primary intervention for preventing transmission of infections, thereby reducing healthcare-associated infection and consequentially minimizing the threat of antimicrobial resistance.<sup>1</sup> HH is particularly important for nurses, since they represent the largest healthcare professional group that engages in direct patient care.<sup>2</sup> The six-step HH technique endorsed by the World Health Organization (WHO)<sup>1</sup> has been found to be effective in reducing hand bacterial load when compared to its three-step counterpart.<sup>3</sup> However, evidence shows that compliance rates and recall of the recommended six steps for HH are suboptimal in healthcare professionals.<sup>4-6</sup>

First year nursing students attending a Scottish university are taught the six-step HH technique via a process of lecture, demonstration, and feedback. In November 2015, 417 out of 419 students performed the six-step technique correctly, breaking the Guinness World Record (GWR) for the largest number of participants in a hand-sanitizing relay. In preparation for the relay, and in addition to their standard training, participants were prompted to practice the six-step HH technique regularly for two weeks prior to the activity. These reminders constituted a variety of posters and text-based prompts regarding the importance of the HH technique distributed via the students' online learning platform. Following the GWR relay students' hand hygiene practice would have continued during clinical skills training, until December. Subsequent clinical placements started in January, 2016. The aim of this study was to explore whether preparation for and participation in a hand-sanitizing relay had any effect on nursing students' ability to recall the WHO six-step HH technique 12 months later.

### **Methods**

This cross-sectional, observational survey compared the abilities of nursing students who participated in the GWR attempt to recall the WHO six-step HH technique 12 months later with those of students who did not. Twelve months following the GWR attempt, the same cohort of students, now in their

second year, were invited to take part in the study. Data collection took place during timetabled clinical skills sessions. Prior to the study, students were informed that the project would explore the effect of participating in the GWR relay and they would complete a 'hand hygiene-related task' but no further details were provided. This was to prevent opportunities for practice prior to participation over and above their normal university or clinical activities. During the study, students were asked to demonstrate the six-step HH technique as if using alcohol-based hand-rub. Eight researchers were involved in visually observing and recording students' ability to recall the six steps. A standardized tool was used for data collection and all observers received training on the correct technique and sequence using technology provided by 'SureWash' to ensure researcher competency and consistency in data collection. The main outcome variable was a correct sequence of HH actions as per WHO guidelines (i.e. all six-steps performed in the correct order, with bilateral steps being performed on both sides). Descriptive statistics highlighted number and percentage of participants' ability to recall the six steps in the correct sequence. Between-group comparisons were made between the control group (participants that did not attend the GWR attempt) and the intervention group (those that did attend the GWR attempt) using Chi-Squared ( $X^2$ ) tests with the use of SPSS statistics software (version 22).

This study was approved by the Ethics Committee at the respective university. Ethical considerations included voluntary participation of students with class facilitators (independent of the researchers) distributing the information about the study and an invitation to participate. Researchers ensured that each participant understood the provided information, and obtained written consent before data collection began.

## **Results**

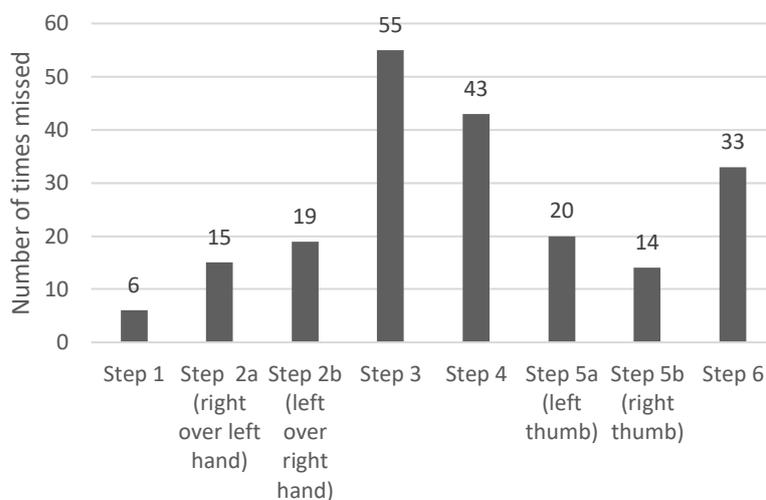
170 nursing students were recruited. Incomplete data for seven participants reduced the sample size to 163. Many of the students had been involved in the relay ( $n=119$ , 73%) and were female ( $n=146$ , 90%). Of the 163 participants, only 27 (17%) were able to carry out all six steps in the correct sequence with an equal number recalling the six-steps correctly but not the sequence order (Table 1).

**Table 1: Nursing students' ability to recall the six-step hand hygiene technique**

Hand hygiene steps and sequence	Nursing Students	
	n	%
All six-steps/Correct sequence	27	17
All six-steps/Incorrect sequence	27	17
Some six-steps/Correct sequence	25	15
Some six-steps/Incorrect sequence	84	51
<b>Total</b>	<b>163</b>	<b>100</b>

In the intervention group, nineteen students (16%) performed their HH correctly (all six-steps/correct sequence) compared to eight (18.2%) in the control group. Ability to recall the six-step technique correctly did not significantly differ between the groups ( $\chi^2=0.114$ ,  $df=1$ ,  $p=0.736$ ).

Additionally, Figure 1 illustrates the number of times each individual step was missed. The most frequently missed step was Step 3 (palm to palm with finger interlaced)



**Figure 1: Individual hand hygiene steps missed**

## **Discussion**

Our findings show that almost the entire student cohort performed the six-step HH technique correctly at the time of the relay. However, it may have been the educational preparation for the relay and/or participation in the event itself that contributed to this success. As demonstrated by Grayson and colleagues, nurses and allied health professionals are more concerned about group rather than individual outcomes, and are more likely to comply with an intervention involving emotions and relationships.<sup>7</sup> This could partially explain our short-term success. Perhaps having a shared goal to break the GWR, motivated students to learn and practice the correct HH technique. Moreover, performing an activity as a group of students can be considered as a social activity that involves fun, amusement, interpersonal relationships and is associated with positive emotions, which could have further contributed to the students' success.<sup>7</sup>

However, our study showed that ability to perform the six-step HH technique was not sustained over a 12-month period. This could be explained by the concept of skill decay. Literature shows that acquired skill deteriorates if not used regularly, with the rate of skill loss being positively associated with the length of time during which the skill is not being used or practiced.<sup>8</sup> Students continued to perform hand hygiene during clinical skills training and clinical placements during the 12 months following the GWR attempt but would not have received feedback. Lack of regular feedback could be the factor that influenced skill decay in our study, as multimodal interventions incorporating feedback were previously shown to result in sustained improvement in HH compliance.<sup>9</sup>

With relation to the strengths of the study, data collectors were trained in order to enhance reliability. Furthermore, validity was improved by not informing participants of the detail of what was required of them until immediately prior to data collection. Nevertheless, the generalizability of the study is limited by voluntary sampling and the variability in the students' clinical placements and experience in the 12 months following the hand-sanitizing relay.

This study demonstrated that skill decay occurs despite student nurses performing HH on a regular basis in both simulated and clinical contexts and suggests that it may be necessary to supplement practice with feedback on their ability to recall the six-step technique.

Conflicts of interest: none to report.

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