

## Effectiveness of Motivational Interviewing in Promoting Hand Hygiene of Nursing Personnel

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### ABSTRACT

**Background:** Motivational interviewing (M.I.) is an option for modifying an individual's behavior. It is used as an educational method in recent years. The aim of our study was to indicate whether or not education, using lecture alone and lecture with M.I., would affect the performance of nursing personnel regarding their hand hygiene. If so, which of these two methods were most effective for this purpose?

**Methods:** This was an interventional study conducted in Bahrami Pediatric Hospital in Tehran. The study population consisted of all nursing personnel in the hospital. Considering the responsibilities of different nurses and their educational status, we divided them into three classes. The participants of each class were randomly assigned to either the control or experiment groups training lecture alone or lecture with M.I., respectively. We used Independent-t, Paired-t, Mann-Whitney U and Wilcoxon signed ranks tests for analysis.

**Results:** Education using lecture alone improved the hand hygiene performance of nursing personnel only in the first and third classes ( $P = 0.002$  and  $P = 0.001$ , respectively). Similarly, lecture combined with M.I. improved the hand hygiene performance of personnel in the first and third classes ( $P < 0.001$  and  $P = 0.004$ , respectively). The latter method was more effective compared to lecture alone in the first and third classes ( $P < 0.001$  and  $P = 0.013$ , respectively).

**Conclusions:** Education based on lecturing improves hand hygiene performance among nursing personnel. It will be more effective if combined with M.I.

**Keywords:** Hand washing, health education, interview, lectures, nursing staff

### INTRODUCTION

According to the 2005 report of the World Health Organization (WHO), over 1.4 million people suffer from nosocomial infections worldwide. In developed countries, about 5-10% of patients admitted to hospitals contract nosocomial infections, which is 25% in developing countries. Studies conducted in countries with average income indicate that an annual sum of 8 billion dollars is

spent every year to resolve nosocomial infections. Therefore, WHO has developed different strategies, most importantly hand hygiene as reflected in the motto, "Clean care is safer care, and clean hands are safer hands".<sup>[1]</sup> Interventions such as educational programs influence the function of healthcare personnel. In order to improve the function of personnel, it is better to utilize cognitive, behavioral and emotional methods. On the other hand, it is established that hand hygiene is the most important procedure for preventing infection transmission; nevertheless, this simple procedure is largely ignored by healthcare personnel.<sup>[2,3]</sup> Compliance with the principles of hand hygiene is particularly important in pediatric hospitals.<sup>[4-6]</sup>

M.I. is an option for modifying an individual's behavior. It was developed by Miller to treat patients with alcoholism issues and then completed by Miler and Rollnick.<sup>[7]</sup> M.I. is a directive, client-oriented approach to improve an individual's internal motives for modifying behavior; it facilitates behavioral modification through helping the person identify his/her doubts regarding behavior modification and overcome them. Expressing empathy, developing discrepancy, avoiding argumentation, rolling with resistance, and supporting self-efficacy are the clinical principles of M.I.<sup>[8]</sup>

The present study attempted to indicate whether or not education, using lecture alone and lecture with M.I., would affect the performance of nursing personnel regarding their hand hygiene. If so, which of these two methods were most effective for this purpose?

## METHODS

### Study design and setting

This was an interventional study conducted in Bahrami Pediatric Hospital, affiliated to Tehran University of Medical Sciences in 2010. The objective of lecture-based education is to introduce the protocol of hand hygiene and its importance in controlling nosocomial infection to study units. The educational material dealing with hand hygiene was prepared by the researcher and confirmed by the physician in charge of hospital's infection control (subspecialist in pediatric infectious diseases and faculty member of our university's pediatric department) and a

specialist in infectious disease (faculty member of our university's infectious disease department). Hand hygiene education was performed by an infection control nurse via a 2-h lecture; the lecture session was repeated a few times in such a way as to cover all the personnel working in different shifts. In addition to the lecture, individuals in the experiment group participated in M.I., conducted by a health psychology specialist (faculty member of the psychology department, University of Tabriz). Five sessions of interviewing were held, with a maximum of 15 participants and duration of 90 min.

### Measurement

Data were collected using hand hygiene checklist, developed by the researchers based on the protocols of the WHO and Center for Disease Control (CDC), Feldman criteria, and Fulkerson activity classification criteria, in 5 sections. The first section contained 8 statements about the participants' demographic data; the second section contained 6 statements about routine hand decontamination; the third section contained 10 statements about using alcohol rub products, the fourth section contained 12 statements about routine cases; and the fifth section contained 6 statements about evaluation of hand hygiene. Data were collected by the hospital's infection control supervisor who had received the required training about hand hygiene. Content validity of the tool was confirmed by infectious specialists. We used test re-test to evaluate the reliability of the tool on 30 nursing personnel. So, at first session, the observer completed checklist according to personnel's activities and scored them and 30 days later she repeated it on the same persons. In next step, we calculated correlation of data. The reliability was acceptable ( $r > 0.7$ ). These 30 individuals were eliminated from the final sample.

### Study sample

The study was conducted in Bahrami Pediatric Hospital and the study population consisted of all nursing personnel in the hospital. The participants were assigned to either the control or experiment groups using the table of random numbers. Considering the responsibilities of different nurses and their educational status, we divided them into three classes: The first one included nurses, operating room technicians, anesthesiology

technicians and nurse-aids; the second one included head nurses; and the third one included assistant nurse-aids. Since direct observation and the personnel's awareness of the hand hygiene checklist could affect their function, the infection control supervisor completed the checklists without notifying the personnel and during the routine nursing activities. Prior to training with lecture alone and lecture with M.I., the supervisor completed the checklist for each participant in the experiment and control groups; after training, the checklists were completed again by the same person for all participants. It should be noted that in order to prevent information exchange between the two groups, participants in the control group were first educated about hand hygiene and their checklists were completed; subsequently, participants in the experiment groups underwent lecture and M.I. and then had their checklists completed. Once the data were collected, data pertaining to each of the three classes of the control and experiment groups were analyzed separately.

### Ethical consideration

The informed consent was obtained from all participants. The study complied with current ethical considerations in accordance with the rules of the ethical review board of Tehran University of Medical Sciences.

### Statistical analysis

We used Independent-t, Paired-t, Mann-Whitney U and Wilcoxon Signed Ranks tests for analysis. Alpha was considered lower than 5%.

## RESULTS

A total of 128 individuals were selected for the study, with 64 in the experiment group and 64 in the control group. 12 (9.4%) were male and 116 (90.6%) were female.

### Experiment group

The mean age ( $\pm$  standard deviation) of the participants was  $35.83 \pm 7.184$  years. As for education, 6 (9.4%) were below diploma, 8 (12.5%) had high school diploma, 1 (1.6%) had an associate degree, and 49 (76.6%) had a bachelor's degree or higher. Regarding marital status, 11 (17.2%) were single and 53 (82.8%) were married. As for organizational position, there were 42 (65.6%)

nurses, 3 (4.7%) nurse aids, 1 (1.6%) operating room technicians, 1 (1.6%) anesthesiology technicians, 5 (7.8%) head nurses, and 12 (18.8%) assistant nurse-aids.

### Control group

The mean age ( $\pm$  standard deviation) of the participants was  $34.58 \pm 7.946$  years. As for education, 6 (9.4%) were below diploma, 9 (14.1%) had high school diploma, 3 (4.7%) had an associate degree, and 46 (71.9%) had a bachelor's degree or higher. Regarding marital status, 10 (15.6%) were single and 54 (84.4%) were married. As for organizational position, there were 41 (64.8%) nurses, 2 (3.1%) nurse aids, 2 (3.1%) operating room technicians, 2 (3.1%) anesthesiology technicians, 5 (7.8%) head nurses, and 12 (18.8%) assistant nurse-aids.

The mean  $\pm$  standard deviation of hand hygiene scores of first class of participants was  $13.55 \pm 2.59$  before intervention and  $14.8 \pm 3.36$  after intervention in the control group, and  $14.26 \pm 3.50$  before intervention and  $20.51 \pm 7.40$  after intervention in the experiment group. The hand hygiene scores of first class of participants in the control and experiment groups were significantly different before and after intervention [Table 1].

The mean ( $\pm$  standard deviation) of hand hygiene scores in second class of participants of the control group was  $14.4 \pm 0.89$  before intervention and  $16.6 \pm 4.77$  after intervention, whereas in the experiment group, it was  $14.4 \pm 1.34$  before intervention and  $14.6 \pm 1.14$  after intervention. The hand hygiene scores of second class of participants were not significantly different before and after intervention in head nurses of both control and experiment groups [Table 2].

The mean ( $\pm$  standard deviation) of hand hygiene scores in third class of participants of the control group was  $13.25 \pm 2.99$  before intervention and  $14.2 \pm 3.15$  after intervention, whereas in the experiment group, it was  $13.08 \pm 3.45$  before intervention and  $19.25 \pm 6.58$  after intervention. The hand hygiene scores of third class of participants were significantly different before and after intervention in both control and experiment groups [Table 3].

We compared the improvement in hygiene scores before and after the intervention (lecture alone and lecture with M.I. for the control and experiment groups, respectively) between first class of participants of the control and experiment

groups, and we found a statistically significant difference ( $P < 0.001$ ). Subsequently, we compared the improvement in hygiene scores before and after the intervention (lecture alone and lecture with M.I. for the control and experiment groups, respectively) between second class of participants of the control and experiment groups, and we found no statistically significant difference ( $P = 0.366$ ). In next step, we compared the improvement in hygiene scores before and after the intervention (lecture alone and lecture with M.I. for the control and

experiment groups, respectively) between third class of participants of the control and experiment groups, and we found a statistically significant difference ( $P = 0.013$ ) [Table 4].

## DISCUSSION

In this study, we compared the hand hygiene performance of three classes of hospital personnel before and after educating them in two different methods. Education using lecture alone improved the hand hygiene performance of nursing personnel

**Table 1:** Comparing hand hygiene scores before and after intervention in the two groups consisting of first class of participants

Group	Evaluation time and education type	Count	Mean	SD	Test statistics	P
Control	Before lecture alone	47	13.55	2.59	Paired $t=3.218$	0.002
	After lecture alone	47	14.81	3.36		
Experiment	Before lecture and M.I.	47	14.26	3.50	Z Wilcoxon signed ranks = -5.669	<0.001
	After lecture and M.I.	47	20.51	7.40		

M.I.=Motivational interviewing

**Table 2:** Comparing hand hygiene scores before and after intervention in the two groups consisting of second class of participants

Group	Evaluation time and education type	Count	Mean	SD	Test statistics	P
Control	Before lecture alone	5	14.4	0.89	Paired $t=1.123$	0.324
	After lecture alone	5	16.6	4.77		
Experiment	Before lecture and M.I.	5	14.4	1.34	Paired $t=1$	0.374
	After lecture and M.I.	5	14.6	1.14		

M.I.=Motivational interviewing

**Table 3:** Comparing hand hygiene scores before and after intervention in the two groups consisting of third class of participants

Group	Evaluation time and education type	Count	Mean	SD	Test statistics	P
Control	Before lecture alone	12	13.25	2.99	Paired $t=4.311$	0.001
	After lecture alone	12	14.2	3.15		
Experiment	Before lecture and M.I.	12	13.08	3.45	Paired $t=3.675$	0.004
	After lecture and M.I.	12	19.25	6.58		

M.I.=Motivational interviewing

**Table 4:** Comparing the improvement in hand hygiene scores before and after education between the two groups consisting of three classes of participants

Class	Group	Count	Mean	SD	Test statistics	P
First	Control	47	1.26	2.67	Z Mann-Whitney U=-5.054	<0.001
	Experiment	47	6.26	6.52		
Second	Control	5	2.2	4.38	Independent- $t=1.015$	0.366
	Experiment	5	0.2	0.45		
Third	Control	12	1.167	0.94	Independent- $t=-2.942$	0.013
	Experiment	12	6.17	5.81		

only in the first and third classes ( $P = 0.002$  and  $P = 0.001$ , respectively). Similarly, lecture combined with M.I. improved the hand hygiene performance of personnel in the first and third classes ( $P < 0.001$  and  $P = 0.004$ , respectively). It is noteworthy that the latter method (lecture combined with M.I.) was more effective compared to lecture alone in the first and third classes ( $P < 0.001$  and  $P = 0.013$ , respectively). We did not observe a significant improvement in hand hygiene scores of nurses in the second class with either method (all  $P > 0.05$ ), which is probably due to the small number of participants –5 in each of the control and experiment groups.

Education plays a pivotal role in establishment of hand hygiene and prevention of nosocomial infections. In addition, any plan for improving hand hygiene in healthcare personnel should focus on factors affecting the behavior of personnel regarding their hand hygiene; they should be trained about caring for patients while exposing him/her to the minimal risk of infection, and should be familiarized with the necessity of hand hygiene as an efficient method for reducing nosocomial infections. M.I. can be particularly helpful for this purpose. Hands of healthcare personnel can transmit pathogens from one patient to another or from the environment to patients.<sup>[9]</sup> Microorganisms are colonized on patients' skin or the environment (medical tools) and they can be transmitted on hands of personnel. Unless hands are sufficiently washed and sanitized, these microorganisms will survive and may be transmitted to the next patient or the tools. Previous studies indicated that healthcare personnel carry the patients' skin flora, as  $10^2$ - $10^3$  colony forming units (CFUs) of *Klebsiella* had been isolated from skins of nurses who cared for patients.<sup>[10,11]</sup> Some studies reported that personnel might acquire and carry Gram negative bacilli, *Staph. aureus*, *Enterococcus*, or *Clostridium difficile* from patients' normal skin. Repeated cultures indicated that 100% and 64% of healthcare personnel had carried Gram negative bacilli and *Staph. aureus*, respectively, at least once on their hands.<sup>[12-18]</sup> For this reason, the World Health Organization (WHO) has developed a number of strategies, with hand hygiene at the top, in order to ensure the protection of patients against infection in healthcare centers.<sup>[1]</sup>

Extensive studies have dealt with the issue of hand hygiene and the rate of compliance with

recommended guidelines; the majority of these studies indicate that the healthcare personnel have a low rate of compliance with hand hygiene protocols—often below 50%.<sup>[19,20]</sup> Teaching hand hygiene to healthcare personnel may improve their hand washing techniques.<sup>[21]</sup> Hand hygiene guidelines and training healthcare personnel influence their function.<sup>[22]</sup> A study by Conrad *et al.*, in 2010 demonstrated that short educational sessions of hand hygiene are negatively correlated with methicillin resistant *Staphylococcus*.<sup>[23]</sup> Lack of sufficient scientific information about the importance of hand hygiene by personnel will pose obstacles for achieving the goals of hand hygiene protocols, thus increasing the rate of nosocomial infections. In 2000, a Swiss university published the results of its policies implemented from 1993 to 1998 to promote the use of alcohol rub by healthcare personnel and preparation of educational materials and programs to improve hand hygiene and control nosocomial infections. These policies provided personal alcohol rub solutions for the personnel, containers of alcohol rub dispensers were placed next to patients' beds for convenience, the personnel were encouraged to carry the bottles of sanitizing solution in their pockets, and educational posters and reminders were hung in the environment. As a result, the efficiency of educations rose from 48% in 1994 to 66% in 1997 ( $P < 0.001$ ). Although hand washing with water and soap was still in use, the amount of alcohol rub used per 1000 patients/day increased from 3.5 L to 15.4 L ( $P < 0.001$ ). These studies indicated that better educational methods will result in better acceptance by personnel, and eventually reducing the risk of transmission of pathogenic microorganisms and nosocomial infections. The approach to hygiene improvement should address the issue through a variety of aspects, as most authors believe this method to be optimal for improving personnel commitment.<sup>[1,24]</sup> A study by Won *et al.*, in 2004 observed an improvement in commitment of personnel employed in a neonatal intensive care unit from 43% to 80% following hygiene improvement programs.<sup>[25]</sup>

M.I. is a method for modifying individuals' behaviors.<sup>[26-30]</sup> It is particularly suitable for modifying the behavior of individuals who resist the change.<sup>[31]</sup> Dilorio *et al.*, observed that M.I. improved the adherence of patients with AIDS

to antiretroviral therapy in 2003.<sup>[32]</sup> LaBrie *et al.*, demonstrated the effectiveness of M.I. in modifying the behavior of American students regarding their alcohol intake.<sup>[33]</sup>

### Study limitations and strength

Our research had some limitations. We studied only nursing personnel of a subspecialty pediatric hospital in capital of our country. So, the external validity of study was not high. Furthermore, although we achieved a randomized controlled clinical trial, we did not have any blinding.

## CONCLUSIONS

Our findings indicate that education based on lecturing improves hand hygiene performance among nursing personnel. Furthermore, we analyzed that education will be more effective if combined with M.I.

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