



Effect of a Face-to-Face Education Program Versus an Official-Imperative Method on Needle-Disposal Behavior of Nurses Working in Kashan, Iran

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ARTICLE INFO

Article type:
Original Article

Article history:
Received: 10 Jul 2012
Revised: 20 Jul 2012
Accepted: 15 Aug 2012

Keywords:
Continuing Education
Needlestick Injuries
Continuous Quality Management
Behavior

ABSTRACT

Background: Education, universal precautions, using protective glasses and a standard method of used needle disposal, are the most important strategies for preventing blood-borne infections.

Objectives: The aim of this study was to compare the effect of a face-to-face education program with the effect of an official-imperative circular, on the needle-disposal behavior of nurses working in the Shahid Beheshti Hospital, Kashan, Iran.

Patients and Methods: This was a quasi-experimental study. We randomly selected eight wards from the hospital and educated all of the 120 staff nurses working in those wards about universal precautions. After one month, we communicated an official-imperative circular. A monetary penalty was given for non-adherence to the circular's procedural advice. We used the SPSS 11.5 software for data management and analysis.

Results: The educational program increased the proportion of recapped needles from 60.7% to 62.3%. However, this increase was not statistically significant ($P = 0.346$). After implementing the official-imperative method, this proportion decreased significantly from 62.3% to 11.1% ($P = 0.001$).

Conclusions: Education, per se, is not effective in increasing nurses' adherence to universal precautions; rather, strict supervision and obligatory regulations should be implemented following education.

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► Implication for health policy/practice/research/medical education:

Our findings may be used by hospital managers and nurse supervisors to reduce nurses' needle recapping behavior.

► Please cite this paper as:

Dianati M, Mirbagher Ajorpaz N, Heidari-Moghaddam S, Heidari M. Effect of a Face-to-Face Education Program Versus an Official-Imperative Method on Needle-Disposal Behavior of Nurses Working in Kashan, Iran. *Nurs Midwifery Stud.* 2012; 1(1): 3-6. DOI: 10.5812/nms.7910

1. Background

Blood-borne infections are a worldwide healthcare challenge which occurs mostly through contact with infected blood (1). The most prevalent blood-borne pathogens

are; hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) (2). Healthcare professionals, including physicians, surgeons, dentists, dentist assistants, nurses, operating room technicians,

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paramedics, and students, are at greater risk from blood-borne infections (3). More than 80% of exposures to blood-borne pathogens among healthcare professionals occur through needle-stick and sharp injuries. Studies have shown that nurses, compared to other healthcare professionals, are at greater risk of blood-borne infections (2, 4). Recapping used needles is responsible for approximately 25-30% of needle-stick injuries. Askarian *et al.* reported that needle-stick injuries are very common in healthcare students. They recommended that educational materials should be provided in terms of; ways blood-borne infections are transmitted, standard precautions, and preventive strategies (5). Whitney *et al.* in a study of 100 Australian nurses found that educating nurses significantly increases the rate of reporting needle-stick injuries from 6.9 cases to 15.4 cases per year (6). Linnemann *et al.* reported that strategies such as educational programs, using safety boxes and emphasizing the need for universal precautions had a significant effect on the reduction in needle-stick injuries. They recommended that future researchers should investigate the effects of other preventive strategies, such as educational programs, to decrease rates of needle-stick injuries (7). These programs usually employ direct or indirect face-to-face or media-mediated methods to provide educational materials (8). Despite the importance and considerable prevalence of needle-stick injuries, we found that a great number of used needles disposed in safety boxes in the Shahid Beheshti Hospital, Kashan, Iran, had been recapped. This phenomenon questioned the rationale for using such boxes. We then contacted the hospital nursing managers and supervisors. They reported that despite communication of the 'Managed Care Directive number 14', by the Health Deputy from the Health Ministry, and related continuing education programs, many staff nurses were still recapping used needles. Therefore, we conducted this study to re-educate the staff nurses in terms of needle-stick injuries.

2. Objectives

The aim of this study was to compare the effect of such education with the effect of an official-imperative circular on the needle-disposal behavior in nurses working in the Shahid Beheshti Hospital, Kashan, Iran.

3. Patients and Methods

A pre-test, post-test single-group quasi-experimental study was conducted at the Shahid Beheshti Hospital, Kashan, Iran, during a 6-month period, ie, from September 2009 to May 2010. We randomly selected eight hospi-

tal wards and registered all of the 120 staff nurses working in those wards for participation in the study. Initially, we collected all of the safety boxes from those wards and counted the recapped and non-recapped needles deposited in the boxes. All types of needles, including angio-catheters, needles used for sub-cutaneous or intra-venous injection, and needles used for obtaining blood samples, were included and counted separately. In the next step, we educated all of the participants in groups of ten staff nurses in a 15-minute face-to-face verbal educational session. Educational materials included a review of blood-borne infections, their methods of transmission, and the importance of avoiding recapping in the prevention of those infections. All subjects received the same education session. After one month, we again counted the recapped and non-recapped needles disposed in the boxes collected from the aforementioned wards. The next step was to extract some parts of the 'Managed Care Directive number 14,' which concerned the correct method of disposing of the used needles, and distribute this information to the wards. The hospital nurse managers had stated in the circular that disregarding the circular contents would result in a monetary penalty. In other words, we combined education with an official obligation. One month after circulation of this official-imperative circular, we collected the safety boxes from the aforementioned wards and recounted the contained recapped and non-recapped needles. Following completion of these two stages, we calculated the recapped-to-total proportion for each step and used version 11.5 of the Statistical Package for Social Sciences (SPSS, 11.5) and a chi-square test. We compared the nurses' level of adherence to the universal precautions after implementation of the education program and distribution of the official-imperative circular to compare the proportions of each intervention. This study was approved by the Research Council and Research Ethics Committee of Kashan University of Medical Sciences. We explained the aim and design of the study to all of the subjects and they also signed a written informed consent form.

4. Results

In total, 120 nurses were educated, of whom 82% were female and 12% were male. As shown in *Table 1*, the rate of recapped-to-total needles was 60.7% before the intervention. This rate increased to 62.8% after face-to-face education ($P = 0.346$). *Table 2* shows that the proportion of recapped needles decreased significantly after implementation of the official-imperative method ($P < 0.001$) (*Table 2*).

Table 1. Comparing the Number and Proportion of Recapped and Non-recapped Needles Before and After Face-to-Face Education.

	Recapped, No. (%)	Non-Recapped, No. (%)	Total, No. (%)	P value
Before education	892 (60.7)	577 (39.3)	1469 (100)	0.346
After education	1433 (62.3)	896 (37.3)	2329 (100)	

Table 2. Comparing the Number and Proportion of Recapped and Non-Recapped Needles Before and After the Official-Imperative Method.

	Recapped, No. (%)	Non-Recapped, No. (%)	Total, No. (%)	P value
Before official-imperative method (ie, after education)	1433 (62.3)	896 (27.3)	2329 (100)	< 0.001
After official-imperative method	157 (11.1)	1256 (8.9)	1413 (100)	

5. Discussion

The aim of this study was to compare the effect of face-to-face education with the effect of an official-imperative circular on needle-disposal behavior in nurses working in the Shahid Beheshti Hospital, Kashan, Iran. Although study subjects had already received education in terms of needle-stick injuries and universal precautions, their needle-disposal behavior still posed a significant hazard. Previous studies have confirmed the importance of implementing all of the universal precautions components in preventing blood-borne infections. However, the results of an epidemiologic study showed that 500000 cases of needle-stick injuries occur annually in Germany, mostly during the disposal and recapping of used needles. The authors of this study concluded that implementing comprehensive preventive programs such as; avoiding recapping, using safety boxes, wearing protective gloves, and using safe devices, may decrease the number of such injuries (9). In the Geneva National Nursing Association study, the effect of occupational exposure preventive interventions such as; hepatitis B vaccination, limiting unnecessary injections, implementation of universal precautions, avoiding recapping, and immediate disposal of used needles in safety boxes, was investigated and they showed that such interventions decreases the risk of blood-borne infections by 80% (10). Although recapping used needles is a known cause of blood-borne infections, in our study we found that more than half of the used needles had been recapped even after the implementation of the educational program. This fact implied that education does not contribute significantly to nurses' needle-disposal behavior. Rather, the contributing factors may be lack of motivation in workers (affective domain of learning) or the managers' supervising style. In our study, the educational program did not significantly affect the nurses' needle-disposal behavior. However, using the official obligatory style supervised by the hospital educational manager decreased the number of recapped needles significantly. No previous study has undertaken to investigate the effect of education through counting recapped and non-recapped needles. However, an Australian study has shown that despite hospital policies and regulations, nurses did not use modern safety facilities and continued to recap used needles despite universal precautions (10). Srikrajang *et al.* conducted a quasi-experimental study to investigate the effect of education on needle-stick preventive skills among nurses. They found that education was effective in decreasing the number of

needle-stick injuries in nurses (11). This finding is contrary to our findings and may be related to a lack of motivation in our subjects or insufficient supervision. We found that after implementing the official-imperative intervention, the proportion of the recapped needles decreased significantly. It seems that identification and elimination of barriers to apply the received knowledge, combined with a strict management system, is the recommendation. Several previous studies reported that education and emphasizing preventive strategies were effective in reducing the incidence of needle-stick injuries (6, 7). Perhaps the supervision system, in which those studies were conducted, could have differed from our supervising style. The present study showed that the official-imperative method was effective in reducing nurses' needle recapping behavior. Therefore, in addition to the education of universal precautions, strict managerial supervision is also needed in order to minimize the number of needle-stick and sharp injuries in clinical settings. Investigating the effect of implementing all of the universal precautions on nurses' needle-disposal behavior is recommended in future studies. Staff turnover was one of this study's limitations. We had asked the hospital nursing managers to minimize the number of such turnovers during the study period. Another limitation of the study was that the face-to-face education probably had some effect on the results of the official-imperative method. In order to minimize this limitation, we included a one month wash-out-period between the two interventions. In addition, it is possible that all of the counted needles were not used by nurses, as other members of the health care team may have played a role in needle disposals.

Acknowledgements

This study was funded and supported by the Deputy of Research, Kashan University of Medical Sciences (KAUMS), Grant No. 8719. We would like to gratefully thank all of the workers and nurses affiliated to the Shahid Beheshti Hospital who actively participated in this study.

Authors' Contribution

Mansour Dianati was responsible for study conception and design, data collection and analysis and participated in preparing the first draft. Neda Mirbagher Ajorpaz contributed in drafting the manuscript. Heidari-Moghadam and Mohammad-Ali Heidari participated in the process of data collection.

Financial Disclosure

The authors declare that they have no competing interests.

Funding/Support

None declared.

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