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A Comparative Analysis between the New and the Conventional Method for Recapping of Needles Processing for Patient

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Abstract

The needle stick injury is a common and serious event despite training and education and preventive strategies. The common form of the needle stick among health care workers can be occurred while recapping of needle and it is important because of the risk of transferring infectious strains. With aim of reducing the needle stick injury we compared the results of a new recapping method as high dropping cover to a needle and then try to fix it for frequency of needle stick injury and impending to injury among a sample of nurses. One hundred and fifty nurses from different hospital wards participated in the study. Both conventional method (holding syringe with needle attached in one hand, slip needle into the cap with using other hand) and the new method (high drop of cover over needle without slip with hand) were performed by each nurses (each one for 10 times) consecutively as rapidly possible under observation.

Keywords: Needle Processing, AIDS, Virus, Health, Method, Accidental Blood, Body Fluids.

1. Introduction

Needle stick injury is a common and serious event defined as the accidental puncturing the superficial tissue may leading the unintended contact with blood or body fluids during an intervention (Sharma, Rasania, Verma & Singh, 2010; Yang & Mullan , 2011). The common form of the needle stick among health care workers can be occurred while recapping of needle that may result in the needle stick injury and thus transferring infectious strains via injured skin to blood stream (Galougahi, 2010; Colombo, Masserey & Ruef, 2011). It has been estimated the risk of infection by the hepatitis B virus, hepatitis C virus, and human immunodeficiency virus within needle stick injury as 40%, 10%, and 0.5%, respectively, these infections may be resulted in acquired immune deficiency syndrome (AIDS), cirrhosis and its complications (Beltrami, Williams, Shapiro & Chamberland, 2000; Cainelli, 2013; Bouare et al., 2013; Nasiri et al., 2010). The most common cause of needle stick injury is recapping followed by wound closure in a surgery, during biopsy, ending-up an uncapped needle in bed linen or surgery clothing, and taking an unsheathed used needle to the waste container. In this regard, recent guidelines have emphasized to avoid recapping and re-sheathing and instead the use of a rigid puncture-proof container is strongly recommended (National Clinical Guideline Centre, 2012). Despite recent recommendations, the incidental recapping and thus its adverse consequences are now likewise reporting especially in healthcare centers in developing countries. According to the world health organization report (2002), of 35 million healthcare

workers in the world, two million may experience percutaneous exposure to infectious diseases because of inappropriate recapping of needle in each year (World Health Organization [WHO], 2002; National Clinical Guideline Centre, 2012). As in the literature, there was no any study on the rate of the needle stick injury per capping of needle in the conventional method, However, in a study on Iranian nurses in a referral hospital, the case incidence of needle stick injury was 63.3% that the causal devices in 92.1% were hollow-borne needles and the main causes of percutaneous injuries with hollow-bore needles were recapping reported in 32.4% (Ebrahimi & Khosravi, 2007). In another study by Galindez and Haiduven (2006) in Venezuelan public hospital, the most frequently circumstances of needle stick occurred within recapping of needles, while according to the USA Occupational Safety and Health Administration (OSHA) Blood borne Pathogens Standards (1996) recapping a needle is completely prohibited. It seems that the main reasons for continuing the use of the conventional recapping method are including stressful or lack of awareness and attention of hazard, lack of training, inadequate or short staffing, hand-to-hand exchange of sharp instruments, Lack of access to use of sharps containers. Therefore, to minimize needle stick injury among healthcare workers, the first step is the efforts to eliminate the practice of recapping needles, through education and proper placement of puncture-resistant containers in order to the disposal of used sharps (Rogowska-Szadkowska, tanisławowicz & Chlabicz, 2010). In addition, in mandatory setting for recapping, there is no an alternative except for introducing new methods for recapping of needle with the lowest probability of the needle stick injury. In contrast to the old recapping method as recapping directly, the present study attempted to test and compare the results of the new recapping method that is high dropping the cover to needle with conventional methods and then try to push the cover on the needle, with regard to the frequency of the needle stick injury and also impending to injury among a sample of Iranian nurses. Also other aim of study is to determine the rate of the needle stick injury per recapping of needle by nurse.

2. Using of Methods and Materials

In this study, two new and conventional methods of recapping were considered. In this comparative study, 150 nurses from different hospital wards at Rsoul-e-Akram Hospital in Tehran, Iran, participated in the study after completing the written consent form. The study was approved by the ethics committee of Iran University of Medical Science. A form containing the rate of needle stick injury and impending to injury and time of performing the recapping for two methods was prepared and a medical internist observe the needle recapping and fill the form. A 5cc sterile syringe with the needle diameter of 2.5 cm was given to each of the nurses in different wards. Each nurse recapped needle by conventional method ten times as rapidly possible and then after a short training needle recapping experienced by the same nurse again ten times as rapidly possible under observation of an internist. The steps for conventional method were: 1) holding the syringe with the needle attached in one hand and cap with the other hand; 2) holding the syringe with the needle attached in one hand, slip the needle into the cap with using the other hand; and then 3) push the capped needle onto the base of the needle firmly using two hands (Figure 1).

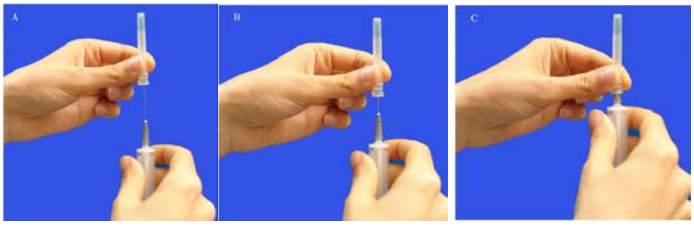

Figure 1: Using of Conventional Method Processing.

A, Step 1: Holding the syringe with the needle attached in one hand and cap with other hand.

B, Step 2: Holding the syringe with the needle attached in one hand, slip the needle into the cap with using the other hand.

C, Step 3: Push the capped needle onto the base of the needle firmly using two hands.

Also, the steps for the new method included: 1) holding the syringe with the needle attached in one hand and cap with the other hand; 2) holding the syringe with the needle attached in one hand, high drop of cover over the needle without slip with the hand; and then 3) push the capped needle onto the base of the needle firmly using two hands (Figure 2).

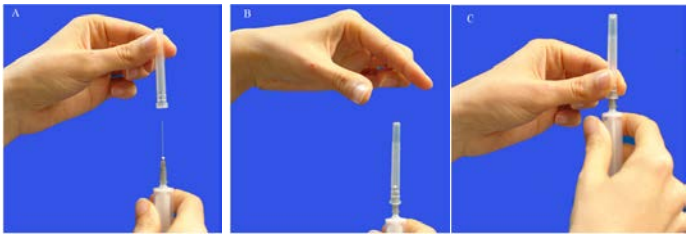

Figure 2: using of New Method processing.

A, Step 1: Holding the needle with the syringe attached in one hand and cap with other hand.

B, Step 2: Holding the needle with the syringe attached in one hand, high drop of cover over the needle without slip with hand.

C, Step 3: Push the capped needle onto the base of the needle firmly using two hands.

The study endpoint was to compare frequency of the needle stick injury and also impending to injury between two methods. The needle stick injury was defined as puncturing the skin by a needle. The impending to injury was also defined as an occurring error in recapping leading the necessity for repeating the recapping. Results were presented as mean ± standard deviation (SD) for quantitative variables and were summarized by absolute frequencies and percentages for categorical variables. Quantitative variables were also compared with T test or Mann- Whitney U test. For the statistical analysis, the statistical software SPSS version 22.0 for windows (SPSS Inc., Chicago, IL) was used. P values of 0.05 or less were considered statistically significant.

3. Results

In total, 150 nurses (142 women and 8 men) were included into the study. The average of age and experience time was 32 and 8.6 years respectively. The mean time for performing recapping was significantly shorter in the conventional method than in the new method as shown in Table 1.

Table 1. Comparison of mean time of recapping between new method and conventional method.

Variable	New method	Conventional Method	Predictive value
Time of recapping (Sec)	13.79 ± 3.54	12.32 ± 3.38	< 0.001

Needle stick injury and impending to injury were occurred 0-1 and 0-3 time per 10 recapping in each method respectively. Also, the rate of the needle stick injury by nurses was 12 and 4 per 1500 recapping of needle in conventional and the new method respectively. Table 2 compares the rate of needle stick injury and impending to injury between two methods. The needle stick injury was higher in the conventional method compared to the new method. Also, compared to the new method, using the conventional method was accompanied with the higher rates of impending to injury. In total, using the new method could reduce the risk for impending to injury 1.8 times in comparison with the conventional method.

Table 2. Comparison of needle sticks injury and impending to injury between new method and conventional method.

Rate of events	New method in %	Conventional method in %	Total	Predictive value
Needle stick injury	4 (2.9)	12 (8.0)	150 (100)	0.047
Total Impending to injury	25 (18.0)	44 (29.3)	150 (100)	0.024
One time	18 (12.9)	23 (15.3)	150 (100)	0.048
Two times	6 (4.31)	15 (10.0)	150 (100)	
Three times	1 (0.7)	6 (4.0)	150 (100)	

4. Discussion

Primarily in 1991, OSHA issued some standard rules and guidelines to prevent occupational exposure to blood borne pathogens and inhibiting needle stick injuries. These rules aimed to decrease the risk for viral infections in the course of healthcare works (Singru & Banerjee, 2008). The safer medical devices such as needleless systems could reduce effectively accidental injuries. One of the main components of OSHA guideline is to prohibit the use of recapping. However, in several societies, recapping is now applying that can be leading increased risk for viral infections in healthcare personnel. In this study, some personnel used the conventional method for recapping that might predispose them to blood borne infections. In this regard, we tried to introduce a new technique with the lower direct exposure to the needle stick to minimize risk for these infections. In this study the rate of the needle stick injury by nurses was reported per 1500 recapping of needle in conventional and the new method. In review of literature there is a study reported the rate of needle stick injury was 6.9 per 100,000 disposable syringes in a university hospital over a 10-month period (Jagger, Hunt, Brand-Elnaggar, & Pearson, 1988). However, the actual number of needle stick injuries and method of recapping remains unknown due to under-reporting. According to our study, the use of this method based on high dropping cover over the needle without slip with hand led to lower needle stick injury as well as lower number of impending to injury. In fact, the conventional method can be replaced by the new method in mandatory setting of recapping; however, the use of sharps containers is certainly superior to the method used in some clinical wards. In line with our method, some studies introduced other methods for recapping with the different efficacy and accessibility. In a study by Weese and Faires (2009), 79% of technicians reported that they always or usually recapped a needle manually. In other study, only 14% usually or always used a “one-handed scoop” method to replace the needle cap while only 0.4% usually or always replaced the cap using forceps (Weese & Jack, 2008). Also, 10% individuals usually or always placed the needle directly into a sharps container without recapping and only 1.3% technicians reported using the needle removal device on sharps containers. In another study by Weese and Jack (2008), it has been introduced the method of “one-handed scoop method” that involves placing the cap horizontally on a flat surface, inserting the needle into the cap while only holding the syringe, and pressing the cap firmly onto the needle by pressing down on the surface. The cap is not touched until after it is firmly attached. Another method involves holding the cap with an instrument such as forceps. Needle cap replacement devices are also available. It has been also shown that using a portable recapping device can reduce the needle stick injuries about fourfold; however, introduction of such equipment is not

widely accepted due to add a cost and administrative effort needed for implementation (Porteous & Terezhalmy, 2004). Another approach was related to a change in the recapping method without the need for any new device. As shown by Anderson et al. in 1991, the gravity-re-sheathing method was newly described where the sheath is placed over the tip of a needle and dropped into the place (Anderson, Blower, Packer & Ganguli, 1991). Another suggestion described by the same authors is the scooping-re-sheathing or single-hand re- sheathing method. It seems that describing such techniques and procedures can significantly reduce the incidence of these injuries (Panlilio et al., 2004). In this regard, the new method described in this study can be also used along with the previous safer methods in our healthcare centers.

5. Conclusion

In this study that describes a new method for recapping based on method based on high dropping cover over the needle without slip with the hand seems to be superior to the conventional method leading lower needle stick injury and also lower impending to injury as an occurring error in recapping leading necessity for repeating this action. Despite more safety in the new method for recapping, our recommendation is to prohibit the use of recapping and replaced by sharps containers.

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