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Better effect of the use of a needle safety device in combination with an interactive workshop to prevent needle stick injuries

Henk F. van der Molen [a,*], Koos A.H. Zwinderman [b], Judith K. Sluiter [a], Monique H.W. Frings-Dresen [a]

[a] Academic Medical Center, University of Amsterdam, Department: Coronel Institute of Occupational Health, P.O. Box 22700, 1100 DE Amsterdam, The Netherlands
[b] Academic Medical Center, University of Amsterdam, Department: Clinical Epidemiology and Biostatistics, P.O. Box 22700, 1100 DE Amsterdam, The Netherlands

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ABSTRACT

Objectives: This study compares the effectiveness of two types of interventions with no intervention on the prevention of needle stick injuries (NSIs).
Methods: Health care workers, who were at risk for NSIs, were eligible for this three-armed cluster randomized controlled trial. In total, 23 hospital wards were randomly assigned to 1 of 2 intervention groups, which were given either a needle safety device and a workshop (NW; 7 wards, $n = 267$) or a workshop only (W; 8 wards, $n = 263$), or to a control group (C; 8 wards, $n = 266$). The primary outcome was the half-year incidence of NSIs, which was measured through questionnaires and official notification at the occupational health service at baseline (T0), 6 months (T1) and 12 months (T2) after baseline. Analysis were done by intention to treat. This study is registered as a prospective randomized trial, number NTR1207.
Results: A statistically significant difference was found between the groups for the half-year incidence of NSIs ($p = 0.046$) on the basis of questionnaire data with ORs for reported NSIs for the NW group compared with the control group of 0.34 (95% CI: 0.13–0.91) and 0.45 (95% CI: 0.19–1.06) for the W group compared with the control group. The officially registered NSIs during the study period showed no statistical differences between the groups.
Conclusions: The combined intervention of the introduction of needle safety devices and an interactive workshop led to the highest reduction in the number of self-reported NSIs compared to a workshop alone or no intervention.

1. Introduction

Worldwide, needle stick injuries (NSIs) are frequently reported as occupational injuries among health care workers (Leigh et al., 2008; EU-OSHA 2008). Twelve-month NSI incidences of 26–80% are reported among health care workers (Askarian et al., 2007; Smith et al., 2006). The health effects of a NSI can be significant when blood-to-blood contact occurs from patient to health care worker. Particularly reported in this respect are the transmission of bloodborne pathogens such as human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) (Davanzo et al., 2008). Infection by these viruses can lead to serious and even fatal illnesses (Kuruuzum et al., 2008). Since there is currently no vaccine or cure for HIV/AIDS, a course of post-exposure prophylaxis is recommended as soon as possible after occupational exposure (Peate, 2004; Young et al., 2007). HBV infection is preventable by vaccination, but no vaccine against hepatitis C is available (Puro et al., 2005).

Unsafe procedures, difficult working conditions and unsafe devices (Wicker et al., 2008) as well as lack of knowledge, training and enforcement (Zungu et al., 2008) and fatigue (Fisman et al., 2007) are reported as causes for NSIs. Wicker et al. (2008) recommended the introduction of safety devices as one of the main starting points to prevent NSIs. Additional preventive measures, such as training in safe working routines (Wicker et al., 2008) and personal protective equipment (Berguer and Heller, 2005) are expected to further improve safe work conditions.

The objective of this study was to evaluate whether the number of NSIs decreased among health care workers at risk in the wards of a Dutch academic hospital due to: (i) the introduction of injection needles with safety devices in combination with an interactive workshop or (ii) an interactive workshop only.

2. Methods

2.1. Study design and participants

In a cluster three-armed randomized controlled trial (RCT), 23 hospital wards, which were stratified within four managerial

* Corresponding author. Tel.: +31 20 566 78 57.
E-mail address: h.f.vandermolen@amc.nl (H.F. van der Molen).

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hospital divisions, were randomly assigned to an intervention group that was subjected to the use of a 'Needle safety device plus a Workshop' (NW group; seven wards, $n = 267$), to an intervention group that was subjected to a 'Workshop only' (W group; eight wards, $n = 263$) or to a 'Control group' with no intervention (C group; eight wards, $n = 266$). Health care workers from the hospital wards were followed in the NW group ($n = 267$), in the W group ($n = 263$) and in the C group ($n = 266$) for 12 months and their half-year incidences of NSIs were compared.

2.2. Interventions

2.2.1. Workshop

The intervention 'workshop' consisted of a one-hour interactive PowerPoint presentation where participants of one ward were informed and information was exchanged with each other about the prevalence, causes, consequences and prevention of NSIs in their hospital wards. Each workshop was performed by two trainers: one person guided the process and one person, experienced in working with different types of hospital needles, actively involved all participants. One trainer wrote a short report of the interactive discussion during the workshop. The workshops were carried out in the coffee or meeting room of the wards during the change between the morning and evening shifts (15:00–16:00 h). At each ward, the workshop was offered two to three times between February and May 2007. Feedback on awareness and attitude to risks, best practices and possible improvement with respect to the prevention of NSI was given to the head nurse of every ward by means of a short leaflet after finishing all workshops.

2.2.2. Needle safety device & workshop

The intervention 'needle safety device & workshop' consisted of workshops (see paragraph above) followed by the introduction of a new injection needle with a safety device (BD Eclipse™). This injection needle with a safety device (see Figs. 1a and 1b), which was selected by the occupational health service of the academic hospital, was introduced through the supplier of this device. The supplier demonstrated the new working method for the injection needles with safety devices after the last workshop and during the official breaks of that day at each ward. The day after the demonstration, all of the existing injection needles on the ward were replaced by the new injection needles with the safety device. Appointments concerning stock control were made with a contact person at each ward.

Fig. 1a. Injecting needle with open safety device.

Fig. 1b. Disposal of injection needle with closed safety device.

2.3. Measurement instruments

Questionnaires and an official hospital notification registry were used as measurement instruments at three time points: baseline (T0) in December 2006, 6 months follow-up (T1) and 12 months follow-up (T2). The questionnaire was developed using an existing questionnaire for monitoring Dutch safety projects (Rigo, 2005). The questionnaire contained questions relating to:

- Personal and job characteristics: age, gender, profession (nurse or physician), managerial tasks (yes/no), type of employment (fixed or temporary), contractual hours.
- Needle stick injuries: frequency of NSIs during the previous 6 months.
- Behavioral process measures: knowledge, attitude, motivation, skills, facilitation for safer work with needles and safety culture at the ward.
- Implementation and appreciation of the interventions (at 6 months follow-up).

The pre-existing official hospital register for reporting NSIs was used as second measure of the frequency of NSIs during the previous 6 months.

2.4. Outcome measures

2.4.1. Primary outcome measures

The primary outcome variable was the number of NSIs within a 6 months period. On an individual level, all workers at risk for NSI were questioned on the occurrence of NSIs during the previous 6 months on an ordinal scale (no; yes, once; yes, more than once). On the cluster level, all officially registered NSIs of the study wards were retrieved from the official hospital database during the same measurement period as the individual level with questionnaires.

2.4.2. Behavioral change measures

Behavioral change (Grol, 1997) for the prevention of NSIs was evaluated among the health care workers at risk. Six process measures were constructed to determine the behavioral change at the individual and department levels in the three groups for the workers at the wards. Knowledge (Cronbach's alpha at baseline: 0.47) was assessed by means of four questions about the prevalence and consequences of NSIs ('right', 'not right' or 'don't know'); a sum score (0–4) of the right answers across these four questions was calculated. Attitude (Cronbach's alpha at baseline: 0.78) was