

[別紙 1]

Abstract

Assessment of an interventional education program to prevent bloodborne infections among medical students in Fujian Province, in China

中国福建省における臨床医学実習生を対象とする
血液媒介感染の予防教育プログラムの有効性について

指導教員 黒岩 宙司 准教授

東京大学大学院医学系研究科
平成 18 年 4 月進学
博士課程
国際保健学専攻

Zhuo ZHANG
張 卓

Background

Previous studies have shown medical students have a higher risk of occupational exposure to sharps injuries than registered clinical personnel in hospitals. Lack of experience and technical expertise is related to risk of needle stick injuries. Promotion of bloodborne pathogen prevention and blood safety programs in medical school curricula might lower the risk by protecting students against bloodborne pathogen infections.

In China, little information has been published about the protection of medical

students, though educational programs in some countries have been shown to produce positive changes in knowledge leading to safety protocols. No published studies have evaluated the duration of the effects of standard precaution training on medical students' knowledge related to the prevention of transmission of bloodborne pathogens and follow-up procedures subsequent to sharps injuries during clinic training courses in mainland China. Only HIV/AIDS guidelines set a policy on bloodborne pathogen prevention. This situation motivated the current research which focused on three needs: need for more comprehensive bloodborne pathogen prevention guidelines, need for effective bloodborne pathogen prevention programs, and need for epidemiologic data on sharps injuries.

Therefore, this study's objectives were two-fold: to estimate changes in knowledge of bloodborne pathogen prevention between intervention and control groups before and after an educational intervention among medical students, and to assess the trend in incidence of sharps injuries among medical students between intervention and control groups.

Methods

The author/chief investigator conducted a cluster randomized controlled trial among medical school students during their hospital training course in the final academic year in Fujian Medical University, Fujian province, China, from March 2007 to March 2008. Consent forms and 25-item questionnaires were anonymously sent to all 350 registered medical students at Fujian Medical University from 2007 to 2008. The students were assigned to either the control or the intervention groups, as follows: first, their student identification numbers were used to randomly assign

each student to one of the eight hospitals; second, the even and odd numbers on a six-sided die were used to randomly assign each hospital-based group of students to either the control or the intervention. All students were informed that their assignment to the control or the intervention would be done randomly. All eight teaching hospitals were tertiary hospitals. At 3 months, medical students (147 in 5 hospitals for intervention and 128 in 3 hospitals for control) who were enrolled in the baseline survey and who were enrolled in the 3-month survey were included in final data analysis. At 9 months, medical students (184 in 5 hospitals for intervention and 73 in 3 hospitals for control) who were enrolled in the baseline and in the 9-month survey were included in the final data analysis.

The nature of the research was briefly explained orally to teachers, staff and students in hospitals and at Fujian Medical University. Informed consent forms were sent to all medical students; 188 in the intervention group (5 hospitals) and 149 (3 hospitals) in the control group gave their informed consent at baseline. Ethical approval was granted by the University of Tokyo, Japan, and by Fujian Medical University, China.

A bloodborne pathogen program providing a 45-minute lecture and a guideline handbook developed by the chief investigator were given to the intervention group after the baseline survey on June 2007. The questionnaire was improved to be more logical and easier for respondents to follow by conducting a pilot study with teachers and students at Fujian Medical University. Efficacy was analyzed in all students on an intention to treat basis and in all students who were treated by per-protocol analysis. Students were not included in the per-protocol analysis if there was a protocol violation. The chief investigator adhered to the principles outlined in the

revised CONSORT (Consolidated Standards of Reporting Trials) statement for reporting randomized controlled trials. The internal consistency of the knowledge scale was assessed using Cronbach's alpha. Pearson's chi-squared test, the Kruskal-Wallis test, or the Mann-Whitney U test were used to define the difference between the intervention and control groups. All statistical tests were performed with SPSS 13.0 for Windows. P values < 0.05 were considered to be statistically significant.

Results

All medical students responded at baseline including 188 (94.0%) in the intervention group and 149 (74.5%) in the control group, 147 of 188 (78.2%); 128 of 149 (85.9%) at 3 months, and 184 of 188 (97.9%); 73 of 149 (49.0%) at 9 months responded, respectively. There were no significant differences between the intervention and control groups in changes in knowledge regarding routes of bloodborne pathogen transmission, first-aid management, and post-exposure prophylaxis at baseline, 3 and 9 months. There was no effect on incidence between intervention and control group by one-time intervention. Twenty two (15.0%) medical students in the intervention group had 29 sharps injuries at 3 months and 9 (7.0%) medical students in the control group had 12 sharps injuries; 56 (63.6%) medical students in the intervention group had 118 sharps injuries and 55 (52.0%) medical students in the control group had 100 sharps injuries at 9 months. Most sharps injuries affected the hands, with no deep cut or profuse bleeding during cutting or recapping in the outpatient clinic or patient room. Underreporting and incomplete HBV vaccination is common.

Discussion

Knowledge was not improved by the one-time prevention program. There were no significant improvements in knowledge between the intervention and the control group after the educational program. First, the most important reason may be due to Cronbach's alpha coefficients as low as 0.37-0.65 during the survey timeline in this study. This may be because the individual items were not related to the overall construct in the questions whose items are not inter-related. Second, clinical practices in the training hospitals provided sufficient information on occupational safety for both intervention and control group. Third, the intervention of this study might not affect students' lack of hands-on skills-training in a way that could bring positive changes in students' knowledge of the kind seen in other bloodborne pathogen prevention programs. Fourth, medical students (74.8%) in the intervention group at 3 months requested more information from the chief investigator and more lectures to follow the single lecture. However, the study's prevention program focusing on bloodborne infections was not included in any school curriculum or hospital training program.

The incidence of sharps injuries among medical students was higher in the intervention group than in the control group. This shows the intervention's lack of efficacy, but other interpretations are possible. The reason may be due to a lack of reporting of minor injuries, which is consistent with previous studies. The importance for bloodborne pathogen prophylaxis of reporting any exposure was covered in the intervention program. Thus, it is possible that students who attended the lecture and followed the guideline reported more sharps injuries in the

questionnaire. In this study, a higher incidence of sharps injuries (68.6%) was observed among Chinese students, who suffered from at least one sharps injury at 9 months, than among medical students in the USA, the UK, and Denmark. The high rate of sharps injuries involving mainly the hands during cutting and injection in an outpatient clinic or operating room may be due to the fact that needles were frequently recapped among 20 (15.3%) students in the intervention group and seven (15.2%) in the control group, similar to the finding in a previous paper. Surgical interventions under local anesthesia such as arterial blood sampling and other unskilled medical procedures are commonly performed in the operating room, which might contribute to this finding. Another factor to consider is that outpatient clinics serving the catchment area had numerous patients, so students were very busy and faced a high risk of occupational exposure.

Conclusion

Intervention in the form of a one-time bloodborne pathogen prevention program had no effect on knowledge and incidence for an intervention group and control group consisting of students in hospital training courses in Fujian Province. A repeated intervention program using hands-on-training as part of the medical school curriculum is needed. The intervention (guideline handbook) and hospital practice should be upgraded focusing on weak points of knowledge. Financial support should be sought and a reporting system should be implemented. Furthermore, a new standardized bloodborne pathogen prevention national guideline that combines HIV, HBV, and HCV prevention guidelines in China must be established.