Effectiveness of Education and Problem Solving Work Group on Nursing Practices to Prevent Needlestick and Sharp Injury

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Objectives: *To examine the effect of an education program and problem solving work group on nursing practices for prevention of needlestick and sharp injury.*
Material and Method: *A quasi-experimental study design with a control group was conducted at the emergency and labor rooms in Sermngam Hospital, Lampang. All healthcare workers (HCWs) in the emergency and labor room were randomly assigned to the experimental and control group from April 17, 2002 to September 3, 2002. Data collection included demographics, a participatory problem solving plan, and safety nursing practice observation recording form. The present study was divided into a two months observation period, followed by a one month intervention period and a two month post-intervention observation period. Interventions included education and posters to promote safe nursing practices, peer reminders to avoid unsafe nursing practices, providing devices for recapping needles and small-sized trays to facilitate one-handed recapping, and making a hole in the lid of a sharp container. Nursing practices on prevention of needlestick and sharp injury were prospectively monitored.*
Results: *Twelve HCWs (12/24; 50%) were randomly assigned to the experimental group and 12 (12/24; 50%) were assigned to the control group. There was no difference with respects to demographic and safety nursing practices on prevention of needlestick and sharp injury during the pre-interventional period among these groups. Compared to the pre-interventional period, significant improvement on safety nursing practices for all nursing practice categories were observed in the experimental group after the intervention (P=0.001). Compared to the control group, all safety nursing practice categories were performed more often in the experimental group (p=0.001).*
Conclusion: *The educational and problem solving work group on nursing practices to prevent needlestick and sharp injury were effective and should be considered as an intervention to reduce needlestick and sharp injury in emergency and labor rooms at Sermngarm Hospital.*

Keywords: *Education, Problem solving work group, Needlestick injury, Sharp injury, Prevention, Occupational health*

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Occupational exposures to bloodborne pathogens occur regularly in diverse settings and pose a serious threat to healthcare workers (HCWs). Healthcare workers in developing countries face an even higher risk because of the higher prevalence of hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV)[1-3]. The Centers for Disease Control and Prevention estimated in 1995 that 600,000 to 800,000 percutaneous injuries occurred

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per year, with an average rate of 30 injuries per 100 hospital beds each year[4]. A more recent estimate surggested more than 385,000 injuries per year[5]. Significant differences exist in injury rates and patterns among different types of hospitals. While the average annual injury rates were higher in larger hospitals, an increased proportion of injuries occurred in the emergency department, operating room, and ICU were observed more often in small hospitals[6].

Methods to reduce exposures initially focused on barrier strategies and educational intervenitons, but have more recently focused on the use of safety devices[1,6]. Limited studies were performed to evaluate these strategies on prevention of needlestick and sharp injury in developing countries. The authors performed a quasi-experimental study with a control group to examine the effect of an educational programme and problem solving working group on nursing practices to prevention needlestick and sharp injury in a 30-bed hospital in Lampang.

Material and Method

A quasi-experimental study with a control group was perfromed from April 17, 2002 to September 3, 2002. All HCWs working in the emergency and labor room were randomly assigned to the experimental (N=12) and control group (N=12). The plan for the present study included 1) a two months observational period (April 17, 2002 to May 31, 2002); 2) a one-month interventional period (June, 2002); and 3) a two months post-interventional observation period (July 1, 2002 to September 3, 2002). Data collection included HCWs demography, a participatory problem solving plan, and safety nursing practice observation record forms for all safety nursing practice categories including administration of parenteral fluids, injection of medications, suture and blood sample drawing. For the experimental group, three separate meetings were held during the interventional period; 1) to provide knowledge and to encourage safety nursing practices for the prevention of needlestick injury; 2) to analyze data and feedback to the experimental group; 3) to discuss on the most appropriate interventions to reduce needlestick and sharp injury. Interventions included education and posters to promote safe nursing practices, peer reminder to avoid unsafe nursing practices, providing recapping needle devices and small-sized trays to fascilitate one-handed recapping, and making a hole in the lid of a sharp container to prevent needlestick injury. There was no meeting or interventions developed for the control group during the same periods. Nursing practices to prevent needlestick and sharp injury were prospectively followed and compared with the control group during the pre- and post-interventional period.

Data analysis was performed using SPSS Version 10.0 (SPSS, Chicago, IL). Categorical variables were compared using Chi Square Test or Fisher Exact Probability Test, as appropriate. Continuous variables were compared using the Wilcoxon Rank Sum Test. All p values were two tailed; $p<0.05$ was considered statistically significant.

Results

Twenty four HCWs at the emergency and labor rooms were enrolled in the present quasi-experimental study. Twelve HCWs (12/24; 50%) were enrolled in the experimental group and 12 HCWs (N=12/24; 50%) were enrolled in the control group. The majority of participants were female (23/24; 95.8%), had working experience of less than 10 years (17/24; 70.8%), and had been exposed to needlestick and sharp injury (17/24; 70.8%). Demographic data of patients between pre- and post-interventional period is summarized in Table 1. There was no significant difference with respect to patient's demographic and safety nursing practices among the experimental and control group during the pre- and post-interventional period (Table 2).

Significant improvement on safety nursing practices for all nursing practice categories, including administration of parenteral fluids and nutritions, preparation of intravenous injection, injection of medications, suture and blood drawing, were observed in the experimental group after the intervention (P=0.001). Compared to the control group, all safety nursing practice categories were performed more often in the experimental group (P=0.001). Details on these safety nursing practices during the pre- and post-intervention period (Table 3) and experimental and control group (Table 4) were compared.

Discussion

Reported factors promoting consistent adherence to safe needle precautions among hospital workers included infection control personnel hours per full-time-equivalent employee, frequency of standard precautions education, facilities providing personal protective equipment, facilities using needleless intravenous systems and management to support safety,[7-8] while negative predictors were use of "blood and body fluid precautions" isolation category and increased job demand[7-8]. Multifocused interventions, including administrative, work-place practice, and engineering con-

Table 1. Demographic data, knowledge, pattern of previous expsoure to needlestick and sharp injury

Data	Experimental group (N=12)	%	Control group (N=12)	%
Gender-Female	12	100	11	91.7
Age (yr)				
< 25	2	16.7	2	16.7
26-30	6	50	5	41.7
31-35	2	16.7	3	25
36-40	1	8.3	1	8.3
> 40	1	8.3	1	8.3
Working experience (yr)				
1-5	4	33.3	3	25
6-10	5	41.7	5	41.7
>10	3	25	4	33.3
Knowledge on safety nursing practices	11	91.7	12	100
Previous expsoure to needlestick and sharp injury	10	83.3	7	58.3
Frequency of needlestick and sharp injury				
< 1	7	70	4	57.1
> 1	3	30	3	42.9
Activities associated with needlestick and sharp injury				
Recapping	4	33.3	2	16.7
Administration of medication to intravenous fluid	3	25	2	16.7
Administration of intravenous fluid	2	16.7	1	8.3
Opening medicine vial	2	16.7	0	0
Administration of intravenous medications	0	0	1	8.3
Administration of intramuscular medications	1	8.3	3	25
Suture/disposal needle	2	6.7	2	6.3
Time of incidence				
Morning shift	1	7.1	1	9.1
Evening shift	6	42.9	7	63.7
Night shift	7	50	3	27.2

Table 2. Nursing practices among the experimental and control group during the pre- and post-interventional period

Nursing practices	Pre-interventional		Post-interventional		p value
	App (%) (N=94)	Inapp (%) (N=169)	App (%) (N=94)	Inapp (%) (N=169)	
Administration of medication to IV fluid	44 (40.4)	65 (59.6)	39 (39.4)	60 (60.6)	0.99
Administration of IV medications	24 (36.4)	42 (63.6)	26 (31.3)	57 (68.7)	0.93
Administration of IV fluid	14 (31.8)	30 (68.2)	14 (34.1)	27 (65.9)	0.99
Peripheral venous blood drawing	5 (31.3)	11 (68.7)	4 (26.7)	11 (73.3)	1.0
Suture	4 (16)	21 (84)	5 (26.3)	14 (73.7)	1.0

trols, has been shown to be effective in reducing sharp injuries[9]. Because these strategies are mainly derived from developed countries, it is difficult to apply these results to develop interventions in developing countries.

Although limited by sample size and long-term follow-up, the present study suggested a positive role of educational program and problem solving working group on nursing practices for prevention of needlestick and sharp injury in a developing country. The key to success was derived from an increased understanding and awareness of HCWs to perform appropriate safety nursing practices. Furthermore, administration support for these interventions remains a cru-

Table 3. Nursing practices for the experimental group during the pre- and post-interventional period

Nursing practices	Pre-interventional		Post-interventional		p value
	App (%)	Inapp (%)	App (%)	Inapp (%)	
Administration of medication to IV fluid	44 (40.4)	65 (59.6)	102(87.9)	14 (12.1)	<0.001
Administration of IV medications	24 (36.4)	42 (63.6)	65(91.5)	6 (8.5)	<0.001
Administration of IV fluid	14 (24.1)	44 (75.9)	47(90.4)	5 (9.6)	<0.001
Peripheral venous blood drawing	5 (31.3)	11 (68.7)	16 (84.2)	3 (15.8)	0.004
Suture	4 (25)	21 (75)	18 (85.7)	3 (14.3)	<0.001

Table 4. Nursing practices for experimental vs. control group during the post-interventional period

Nursing practices	Experimental group		Control group		p value
	App (%)	Inapp (%)	App (%)	Inapp (%)	
Administration of medication to IV fluid	102(87.9)	14 (12.1)	47(43.5)	61 (56.4)	<0.001
Administration of IV medications	65(91.5)	6 (8.5)	31(34.4)	59 (65.6)	<0.001
Administration of IV fluid	47(90.4)	5 (9.6)	17(35.4)	31 (64.4)	<0.001
Peripheral venous blood drawing	16(84.2)	3 (15.8)	6(31.6)	13 (68.4)	0.003
Suture	18(85.7)	3 (14.3)	9(31)	20 (69)	<0.001

cial component to its success. Although most percutaneous injuries occurred in inpatient wards in large hospitals; in small hospitals, percutaneous injuries were more common in emergency and operating rooms[6]. This pattern was particularly noticeable in small urban hospitals. In smaller hospitals, as in Sermngarm Hospital, targeting emergency and labor rooms as high-risk areas for intervention might have a greater effect than would interventions in inpatient wards.

The protection of HCWs in developing countries is largely neglected in national healthcare priorities and by international organizations that fund health care initiatives. However, these countries should not delay the implementation of effective preventive strategies while waiting for more data. The expenditures should not be viewed as an increased cost of health care, but as insurance to protect each nation's investment in its healthcare work force. Given the significance of the present study, an educational and problem solving work group on nursing practices to prevent needlestick and sharp injury was effective and should be considered as an intervention to reduce needlestick and sharp injury in developing countries. Additional studies with an adequate sample size to examine its long-term effect are needed.

Conclusion

The intervention by education and problem solving work group improved the safety of nursing practices on the prevention of needlestick and sharp injury among nurses in emergency and labor rooms in Sermngarm Hospital.

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ประสิทธิผลของการให้การศึกษาและการแก้ปัญหาแบบมีส่วนร่วมต่อการป้องกันอุบัติเหตุเข็มตำและของมีคมบาด

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วัตถุประสงค์ : *เพื่อประเมินผลการศึกษา และการแก้ปัญหาแบบมีส่วนร่วมต่อการปฏิบัติตัวเพื่อป้องกันการถูกเข็มตำหรือของมีคมบาดในบุคลากรพยาบาลในโรงพยาบาลเสริมงาม*

วัสดุและวิธีการ : *ศึกษาในพยาบาลห้องฉุกเฉินและห้องคลอดโรงพยาบาลเสริมงามจังหวัดลำปาง โดยการสุ่มให้อยู่ในกลุ่มทดลองและกลุ่มเปรียบเทียบเท่า ๆ กัน ระหว่าง 1 เมษายน พ.ศ. 2545 ถึง 30 กันยายน พ.ศ. 2545 เก็บข้อมูลเกี่ยวกับผู้เข้าร่วมวิจัยในการแก้ปัญหาแบบการมีส่วนร่วมในการแก้ปัญหาเพื่อช่วยเพิ่มความปลอดภัยในกลุ่มพยาบาลและทำการติดตามผล โดยแบ่งเป็นช่วงสังเกตการ 2 เดือน ช่วงดำเนินมาตรการ 1 เดือน และช่วงติดตามผล 2 เดือน มาตราการคือ การให้การศึกษา การติดโปสเตอร์เพื่อรณรงค์ การแก้ปัญหาแบบมีส่วนร่วมและการสร้างอุปกรณ์ใส่ของมีคมที่ไม่ต้องจับปลายเข็ม นอกจากนั้นยังได้มีการติดตามผลหลังการทดลองในกลุ่มผู้เข้าร่วมวิจัย*

ผลการศึกษา : *พยาบาล 12 คนถูกเลือกอยู่ในกลุ่มผู้ถูกทดลอง และ 12 คนอยู่ในกลุ่มควบคุม โดยทั้ง 2 กลุ่มไม่มีความแตกต่างกันในข้อมูลส่วนตัว และวิธีการปฏิบัติตัวเพื่อป้องกันการเกิดอุบัติเหตุจากของมีคม หลังจากดำเนินมาตรการแล้วพบว่า การปฏิบัติตัวเพื่อป้องกันการถูกเข็มตำจากของมีคม มีความถูกต้องมากขึ้นในกลุ่มทดลอง (p=0.001) และการปฏิบัติป้องกันการถูกเข็มตำและของมีคมบาด ในกลุ่มทดลองมากขึ้นหลังการดำเนินมาตรการ (p=0.001)*

สรุป : *การให้การศึกษาและการแก้ปัญหาแบบมีส่วนร่วมเพื่อการปรับเปลี่ยนพฤติกรรมเพื่อช่วยลดปัญหาการถูกเข็มตำหรืออุบัติเหตุจากของมีคมบาดได้ผลดี*