

EXPLORING THE FREQUENCY OF SHARPS INJURIES AND AFFECTING FACTORS AMONG HEALTH CARE WORKERS IN A UNIVERSITY HOSPITAL

BİR ÜNİVERSİTE HASTANESİ SAĞLIK ÇALIŞANLARINDA KESİCİ DELİCİ ALETLERLE YARALANMA SIKLIĞI VE ETKİLEYEN FAKTÖRLERİN İNCELENMESİ

Tülay ORTABAĞ¹, Aslı GÜLEŞEN¹, Ayla YAVA¹, Bilal BAKIR¹

¹ Gülhane Askeri Tıp Akademisi, Halk Sağlığı Hemşireliği BD. Ankara.

Abstract

The aim of the study was to investigate the frequency of and factors determining sharps injuries among health-care workers in a university hospital. We conducted a prospective and descriptive research from January to May 2005 at the clinics of the Department of Surgical Clinical Sciences of 1200-bed hospital of Gülhane Military Medical Academy (GMMA). There are 273 doctors, 315 nurses and 92 technicians serving at the Department of Surgical Clinical Sciences. All doctors and nurses serving at the surgical clinics, without exception, are included in the research. The sample of the research includes 341 employees of 128 doctors, 159 nurses and 54 technicians who accepted to answer the survey. In statistical analysis, numbers, frequencies, percentages, and mean \pm standard deviation ($x \pm SD$) depictions were utilized. We applied chi-square test for the group comparisons. According to the evaluation of the data from the research; 305 healthcare workers (n=341) claimed that they were injured with sharps at least once during their occupational experience. It was found that while physicians and technicians were most injured in operating rooms, nurses were most injured in intensive care units. While physicians were injured most with suture needle while suturing, nurses and technicians were most injured with the syringe needle. Considering the survey findings, we suggest that, units must be established in hospitals to guide health care workers against sharps injuries, protect them from pathogens caused by blood and make record of incidents. (Anatol J Clin Investig 2009;3(4);208-212).

Özet

Bu çalışmanın amacı, bir üniversite hastanesinde görev yapan sağlık çalışanlarında kesici/delici aletlerle yaralanma sıklığını belirlemek, yaralanmalara neden olan faktörleri tanımlamaktır. Araştırma, Ocak-Mayıs 2005 tarihleri arasında Gülhane Askeri Tıp Akademisi (GATA) 1000+200 Yataklı Eğitim Hastanesinde Cerrahi Tıp Bilimleri Bölüm Başkanlığına bağlı kliniklerde uygulanmış, prospektif ve tanımlayıcı bir çalışmadır. Cerrahi Tıp Bilimleri Bölüm Başkanlığına bağlı kliniklerde 273 hekim, 315 hemşire ve 92 teknisyen görev yapmaktadır. Cerrahi kliniklerde çalışan doktor ve hemşireler ayırım gözetmeksizin araştırma kapsamına alınmıştır. Araştırmanın örneğini, çalışmaya katılmayı kabul eden 128 hekim, 159 hemşire, 54 teknisyen olmak üzere 341 sağlık çalışanı oluşturmuştur. Elde edilen verilerin analizinde aritmetik ortalama ve frekans analizi, grupların karşılaştırılmasında Ki-Kare testi kullanılmıştır. Çalışma sonucunda; sağlık çalışanlarının 305' i çalışma yaşamında en az bir kez kesici alet yaralanması yaşadıklarını ifade etmişlerdir (n=341). Doktor ve teknisyenlerin yaralanmaya en çok ameliyathanede maruz kalmalarına karşın hemşirelerin ise yoğun bakım ünitelerinde maruz kaldıkları saptanmıştır. Doktorların yaralanmalarına neden olan kesici-delici alet sutur iğnesi iken, hemşire ve teknisyenlerde ise enjektör iğnesi olarak bulunmuştur. Araştırma sonucunda elde edilen veriler ışığında, hastanelerde sağlık çalışanlarının kesici/delici alet yaralanmaları ve kan kaynaklı patojenlerden korunmasına yönelik sağlık çalışanlarına yol gösterecek ve gerekli kayıtları tutacak birimlerin kurulması önerilmiştir.(Anatol J Clin Investig 2009;3(4);208-212).

Introduction

Although there is little information on the real magnitude of the job-safety and health risks of health-care workers, it is thought that sharps injuries cause approximately one-thirds of all work-related injuries in hospitals [1]. In most cases, these injuries are preventable with some precautions such as closing the needle caps or discarding used needles. Sharps injuries affect the health-care personnel physically and emotionally in a negative way. On the other hand, the transmission of infections causes working-time loss, hence, a reduction in the quality of patient care. Therefore, it is important for the

personnel to know the importance and the outcomes of the accidents and apply working safety precautions to prevent them [2-4]. This study investigates the frequency and factors determining sharps injuries among health-care workers in a university hospital.

Material and Methods

The research was conducted from January to May 2005 at the clinics of the Department of Surgical Clinical Sciences of 1200-bed hospital of GMMA. There are 273 doctors, 315 nurses and 92 technicians serving at the Department of

Surgical Clinical Sciences. All doctors and nurses serving at the surgical clinics, without exception, are included in the sample of the research. Among the assisting health-care staff, only anesthesia technicians, surgical technicians, laboratory technicians and autopsy technicians, who are using sharps and exposed to blood or any other body fluids are included.

With Ethics Committee approval and informed consent, 341 employees of 128 doctors, 159 nurses and 54 technicians; excluding the personnel who were on leave, sick leave and night shift were asked to participate in the study.

In statistical analysis, numbers, frequencies, percentages, and mean \pm standard deviation ($\bar{x} \pm SD$) depictions were utilized. We applied chi-square tests for the group comparisons. A value of $p \leq 0.05$ was considered statistically significant.

Results

The sample of the research includes 128 doctors, 159 nurses and 54 technicians working at the Department of Surgical Clinical Sciences of GMMA. Table 1 indicates the demographic characteristics of health care workers. Most of the nurses (61%) are bachelor's degree and 31% of them are serving as clinical nurses. More than one third of the technicians (37%) are serving as anesthesia technicians.

Average ages of the doctors, nurses and technicians are 35.4 ± 7.2 , 28.7 ± 5.1 and 31.8 ± 5.2 , respectively. Forty nine doctors (38.3%) and 46.3% of the technicians have been serving for more than 10 years while 40.3% of the nurses have been serving for 6 to 10 years.

Cumulative distribution of injuries can be seen in Table 2. Survey results show that 89.4% of the health care workers were subject to sharps injuries at least once in their professional careers. The doctors and technicians who answered our survey indicated that most of the sharps injuries occurred in the operating theatre while nurses noted that the injuries mostly happened in the intensive care unit. The amount of inoculum in case of an injury is an important factor for infections. The type, shape and the characteristics of the sharps also affect this. The amount of inoculum is less in bistouries and suture needle injuries.

Table 3 shows that 26.7% of the doctors, 34.7% of the nurses and 32.1% of the technicians were injured by syringe needles. Fifteen doctors, 3 nurses and 2 technicians were injured by some sharp tools which are more peculiar to the clinics

such as surgical scissors, Kirschner wires, osteotomes, bone fractures, lamella and drills.

Table 4 shows that 16.9% of doctors' injuries are caused by self-harming during stitching, 33.2% of nurses' and 30% of technicians' injuries are occurred during either breaking ampoules or removing serum covers. Survey subjects report that injuries also occur during debridementing, tissue cutting, tissue sampling, IV line-related causes, cleanup, removing the stitches.

Discussion

In this section, the results in according to sharps injuries for 128 doctors, 159 nurses and 54 technicians were discussed.

Survey results show that every nine of the ten health care workers were subject to sharps injuries at least once in their professional careers. However, some of them cannot tell the exact number of injuries, while some of them answered the question "many times". Their inability to tell the exact number shows that sharps injuries occur frequently and they are not taken seriously. There are different types of studies in the literature on this subject. In his study on 87 subjects Gücük shows that 46% of the health care workers were injured by sharps in one week [5]. İnanç et al. found an injury ratio of 25.8% among nurses working in GMMA hospital [6]. In their study on operating theatre nurses Köşgeroğlu et al. found an incidence ratio of 57.2% [7]. The results in Shiao et al. indicate a ratio of 61.5% [8], while Bennett and Mansell note that 21% of the community health nurses were injured [9].

Cutter and Jordan found that 74% of the surgeons, nurses and midwives working in operation theatres and delivery rooms were injured [10]. Shiao's dissertation also shows that 93.1% of nurses, 86.6% of doctors and 78.3% of technicians were injured at least once [11]. The above mentioned results are in parallel with our findings.

In our study, while there is a statistically significant difference among different types of professions regarding injury occurrence of at least once ($p < 0.05$), there is not a difference concerning number of injuries. Results indicate a higher incidence of injuries among doctors than other workers. Cutter and Jordan also report that surgeons get injured more frequently than nurses and midwives; a result which is parallel with our findings [10].

There are also many studies showing that sharps injuries are most prevalent among nurses. The Exposure Prevention Information Network

(EPINet™) was developed to provide standardized methods for recording and tracking percutaneous injuries and blood and body fluid contacts. According to the second EPINet™ statistics, in the January-December 2002 period nurses were subject to 41.2% of all sharps injuries, which is the highest ratio [4]. The National Surveillance System for Health Care Workers (NaSH) statistics for the 1995-2001 period show that the occupational group which is most frequently subject to percutaneous injuries is nurses [12]. The study of Khuri-Bulos *et al.* also shows that nurses are subject to 43.2% of all injuries [13].

Ng *et al.*, on the other hand, found that most of the sharps injuries befell to the doctors [14]. We think that different results reached in the above mentioned studies are due to different sharps tools used in various health systems, registration systems, clinical and professional practices of health care workers, or demographic characteristics such as age or duration of service.

The doctors and technicians who answered our survey indicated that most of the sharps injuries occurred in the operating theatre while nurses noted that the injuries mostly happened in the intensive care unit. NaSH statistics also show that injuries occur in operating theatres and intensive care units with 25 and 13 percent ratios, respectively [12]. Guo *et al.* report that injuries most frequently occur in patient's rooms, secondly in operating theatres and thirdly in intensive care units [15]. Khuri-Bulos *et al.* also show that most (34%) of the injuries happen in patient's rooms [13].

Due to the selection of subjects from surgical clinics in the survey, the fact that doctors and technicians work in the operating theatre and nurses in the intensive care units, where invasive operations such as injecting or blood sampling are more common, affected the results reached in our survey.

The amount of inoculums in case of an injury is an important factor for infections. The type, shape and the characteristics of the sharps also affect this risk. The amount of inoculums is less in bistouries and suture needle injuries. In lumen needle and catheter injuries, however, the risk of contagion is high. Injuries because of bone fractures, which orthopedists are frequently subject to, are also highly risky [16]. Berguer and Heller report that 77% of operating theatre injuries were caused by suture needles [17]. Gücük also found that suture needles causes 77.1% of doctor's injuries [5]. Our results are in line with Berguer ve Gücük's findings. Shiao

found that doctors' injuries were caused by syringe and suture needles with 46.9 and 23.4 percentage ratios, respectively [11]. While the most important application that causes injuries for doctors' is caused by self-harming during stitching, one third of nurses' and technicians' injuries are occurred during either breaking ampoules or removing serum covers.

Our findings indicate that doctors most frequently get injured because of self-harming during stitching, and secondly by a second-party stitching.. This result is also in line with Gücük's study. Gücük also found that doctors most frequently get injured because of self-harming during stitching [5]. The fourth important reason for the injuries of doctors happened during taking sharps such as knife or cautery from another party. It is remarkable that almost in one third of all doctors' injuries there is a second party involved. This is because, for protection, the change in behavior of the real users of the sharps is as much important as the workers who are under risk.

Surgical techniques are also important in these outcomes. It is suggested that surgeons should never hold the tissue during stitching and not more than one surgeon stitch the same tissue. There must be a good coordination in the surgical team. Tools should not be passed through hand to hand and a "secure zone" should be set for passing the tools [12, 18].

The application which causes most of the injuries to nurses and technicians is ampoule-breaking or serum cover removing. Gücük also found that nurses most frequently get injured during ampoule-breaking [5]. While ampoule-breaking does not cause any infections by itself, the broken tissues caused by this increases the risk of being subject to body fluids and getting infected. This risk can be prevented if the producers make the ampoules self-breakable. Today, many ampoules are produced as self-breakable; but defective products are encountered occasionally. Using a piece of cotton is advised to prevent this kind of injuries. Syringing is one of the most frequent medical applications. World Health Organization (WHO) estimates that syringing is applied 12 billion times in a year all around the world, of which 95% is for curing [19].

The nurses and technicians who answered our survey were mostly injured by syringe needles. Needles were also found as the most frequent reason of injuries with a 64% ratio in the study of İnanç *et al.* [6] Shiao also found that most of the nurses (56.4%) and technicians (43.7%) were

injured by syringe needles [11]. Our findings are in line with those studies. Nurses and technicians, in the second place, get injured during replacing the needle cap. Guo et al. reported that 24% of all injuries occurred during needle cap replacing, while this ratio is 6% according to NaSH statistics [12, 15]. Jagger (1980) found that one out of every three injuries happened while closing the needle caps [20]. In 1983, Centers for Disease Control (CDC) pointed out that to prevent needle injuries; needle caps should not be closed after use, needles should not be

broken or bent, all sharps should be kept in safe boxes and these boxes should be kept only in areas where medical operations are concentrated. In 1987, CDC declared universal precautions against sharps injuries [12, 21].

Conclusion

Considering the survey findings, we suggest that, units must be established in hospitals to guide health care workers against sharps injuries, protect them from pathogens caused by blood and make record of incidents.

Table 1. Demographic Characteristics of Health Care Workers (n=341)

Demographic Characteristics	Doctors (n=128)		Nurses (n=159)		Technicians (n=54)		Total		
	Frequency	%*	Frequency	%	Frequency	%	Frequency	%	
Age	22–29	27	21.1	104	65.4	20	37.0	151	44.3
	30–39	63	49.2	47	29.6	28	51.9	138	40.5
	40–64	38	29.7	8	5.0	6	11.1	52	15.2
Duration of service at the department	≤ 5	93	72.7	107	67.3	31	57.4	231	67.7
	6–10	15	11.7	33	20.8	13	24.1	61	17.9
	>10	20	15.6	19	11.9	10	18.5	49	14.4
Total duration of service	≤ 5	35	27.3	62	39.0	11	20.4	108	31.6
	6–10	44	34.4	64	40.3	18	33.3	126	37.0
	>10	49	38.3	33	20.7	25	46.3	107	31.4

*Column percentages

Table 2. Cumulative Distribution of Injuries (n=305*)

Units	Doctors (n=121)		Nurses (n=139)		Technicians (n=45)		Total	
	Frequency	%**	Frequency	%	Frequency	%	Frequency	%
Operating theatre	96	65.8	31	16.7	40	80.0	167	43.6
Emergency room	15	10.3	10	5.4	2	4.0	27	7.1
Intensive care	11	7.5	56	30.1	2	4.0	69	18.1
Laboratory	8	5.5	3	1.6	5	10.0	16	4.2
Patient's room	5	3.4	38	20.4	-	-	43	11.3
Medicine preparation unit	4	2.7	46	24.7	-	-	50	13.1
Other	7	4.8	2	1.1	1	2.0	10	2.6
Total	146	100.0	186	100.0	50	100.0	382	100.0

*n was increased because of multiple answers. **Column percentages

Table 3. Distribution of Sharp Tools According to Professional Groups (n=305*)

Sharps	Doctors (n=121)		Nurses (n=139)		Technicians (n=45)		Total	
	Frequency	%**	Frequency	%	Frequency	%	Frequency	%
Suture needle	90	26.7	30	8.6	15	13.4	135	16.9
Syringe needle	76	22.5	121	34.7	36	32.1	233	29.2
Bistoury	45	13.4	56	16.0	19	17.0	120	15.0
Medication ampoule/vial	41	12.2	85	24.4	22	19.6	148	18.6
Surgical knives	27	8.0	9	2.6	3	2.7	39	4.9
Cautery	26	7.7	4	1.1	3	2.7	33	4.1
IV Catheter Stylet	12	3.6	28	8.0	11	9.8	51	6.4
Lancet	5	1.5	13	3.7	1	0.9	19	2.4
Other sharps	15	4.4	3	0.9	2	1.8	20	2.5
Total	337	100.0	349	100.0	112	100.0	798	100.0

* n was increased because of multiple answers **Column percentages.

Table 4. Distribution of Applications Causing Injuries According to Profession (n=305*)

Applications	Doctors (n=121)		Nurses (n=139)		Technicians (n=45)		Total	
	Frequency	%**	Frequency	%	Frequency	%	Frequency	%
Suturing	47	16.9	8	2.0	5	4.6	60	7.7
Second-party suturing	44	15.8	11	2.8	5	4.6	60	7.7
Breaking an ampoule/removing a serum cover.	38	13.7	130	33.2	33	30.0	201	25.8
Passing a knife/cautery to another party.	36	12.9	9	2.3	3	2.7	48	6.1
Recapping	27	9.7	68	17.3	15	13.6	110	14.1
Bending a needle	15	5.4	18	4.6	2	1.8	35	4.5
Locating the needle holder	13	4.7	11	2.8	-	-	24	3.1
Using pre-used and not properly discarded sharps.	10	3.6	17	4.3	12	10.9	39	5.0
Filling up a syringe	8	2.9	25	6.4	10	9.1	43	5.5
Separating the needle and the syringe after use	7	2.5	22	5.6	5	4.6	34	4.3
Discarding the needle	6	2.2	14	3.6	2	1.8	22	2.8
Blood sampling	5	1.8	18	4.6	2	1.8	25	3.2
Removing the needle cap	3	1.1	16	4.1	4	3.6	23	3.0
Other applications	19	6.8	25	6.4	12	10.9	56	7.2
Total	278	100.0	392	100.0	110	100.0	780	100.0

* n was increased because of multiple answers **Column percentages.

Kaynaklar

- McCormick RD, Maki DG. Epidemiology of needle stick injuries in hospital personnel. *Amer J Med* 1981;70: 928-932..
- CDC, National Institute for Occupational Safety and Health. Preventing needlestick injuries in health care settings, DHHS (NIOSH) 1999; Publication No. 2000 108: 4-6.
- Durgut Ş. Sağlık kuruluşlarında iş güvenliği ve meslek hastalıkları ve İ.Ü. Cerrahpaşa Tıp Fakültesi ile S.S.K. İstanbul hastanelerinde iş güvenliği ve meslek hastalıklarına ilişkin bir araştırma. İstanbul Üniversitesi Sosyal Bilimler Enstitüsü İşletme Fakültesi Hastane ve Sağlık Kuruluşlarında Yönetim Bilim Dalı Yüksek Lisans Tezi. İstanbul; 1999.
- Watterson L. Monitoring sharps injuries: EPINetTM surveillance results. *Nursing Standard* 2004; (3); 19:33 38.
- Gücük M. Genel Cerrahi Kliniği çalışanlarında kesici delici alet yaralanmaları. İstanbul Üniversitesi İstanbul Tıp Fakültesi Halk Sağlığı Anabilim Dalı Uzmanlık Tezi. İstanbul; 1999.
- İnanç N, Özkan Ö. Hemşirelerin kesici delici batıcı cisim yaralanma sıklığı ve aldıkları önlemlerin incelenmesi, V. Ulusal Hemşirelik Kongresi; 1997. p. 222 236.
- Köşgeroğlu N, Ayrancı Ü, Bahar M. Ameliyathanede çalışan hemşirelerde kesici/delici aletle yaralanma ve tıbbi yardım alma durumları. *Hemşirelik Forumu Dergisi* 2003; (6); 6:32 37.
- Shiao J, Mclaws M, Huang K, Guo Y. Student nurses in Taiwan at high risk for needlestick injuries. *Ann Epidemiol.* 2002; (3); 12:197 201.
- Bennett G, Mansell I. Universal precautions: A survey of community nurses' experience and practice. *Journal of Clinical Nursing* 2004; 13: 413 421.
- Cutter J, Jordan S. Uptake of guidelines to avoid and report exposure to blood and body fluids. *Journal of Advanced Nursing* 2004; (4);46: 441 452.
- Shiao JSC. Needlestick injury in health care workers in Taiwan. University Of New South Wales, PhD Dissertation. 2000.
- CDC's Division of Healthcare Quality Promotion. Sharps injury prevention workbook 2004.
- Khuri-Bulos N, Toukan A, Mahafzah A et al. Epidemiology of needlestick and sharp injuries at a university hospital in a developing country: A 3 year prospective study at the Jordan University Hospital, 1993 through 1995. *AJIC* 1997; (4); 25:322 329.
- Ng LN, Lim HL, Chan YH, Bin BD. Analysis of sharps injury occurrences at a hospital in Singapore. *International Journal of Nursing Practice* 2002; 8: 274 281.
- Guo YL, Shiao J, Chuang YC, Huang KY. Needlestick and sharps injuries among health care workers in Taiwan. *Epidemiol Infect.* 1999; 122: 259 265.
- Dokuzoğuz B. Kontamine kesici ve delici tıbbi aletlerle bulaşan enfeksiyonlar ve önlemler. *Hastane Enfeksiyonları Dergisi* 1999; (4); 3:235 239.
- Berguer R, Heller PJ. Preventing sharps injuries in the operating room. *J. Am Coll Surg* 2004; (3); 199: 462 467.
- Haznedaroğlu T, Özgüven V, Ceylan S. Sağlık Kuruluşlarında Enfeksiyon Kontrolü Pratik Uygulamalı Eğitim Rehberi.. GATA Basımevi: Ankara; 2002.
- Kermode M. Unsafe injections in low income country health settings: need for injection safety promotion to prevent the spread of blood borne viruses. *Health Promotion International* 2004; (1): 1995 103.
- Jagger J, Hunt EH, Brand Elnaggar J, Pearson RD. Rates of needle stick injury caused by various devices in a university hospital. *The New England Journal of Medicine* 1988; (5); 319:284 288.
- Centers for Disease Control Recommendations for prevention of HIV transmission in health-care settings. *MMWR* 1987; 36 (SU02).