Journal of Surgery and Trauma 2014; 2(1): 17-20

www.jsurgery.bums.ac.ir

ORIGINAL ARTICLE

Surgical Team' Knowledge About electrocautery smoke complications in the Educational hospitals in Birjand, 2011

Hoda Khoshdel[1]✉, Ahmad Amouzeshi[2], Zahra Amouzeshi[3], Zahra Unesi[3]

[1] *MS operating room, Birjand University of Medical Sciences, Birjand, Iran;*

[2] *Assistant Professor, Faculty of Medicine, Birjand University of Medical Sciences, Birjand, Iran;*

[3] *Instructor, Faculty of Nursing and Midwifery, Birjand University of Medical Sciences, Birjand, Iran.*

Received: February 14, 2014 ***Revised: April 17, 2014*** ***Accepted: May 10, 2014***

Abstract

Introduction: Electrocautery device is one of the most widely used electronic devices in operating rooms; despite its advantages in operations, production risks such as the halo of smoke above the operating position. The smoke with hazardous substances,cause to transmitting HIV, HPV and hepatitis and complications such as respiratory distress, nausea and vomiting, eye irritation, headache, and so on; The purpose of the present study was to determine Surgical Team' Knowledge of electrocautery smoke complications in the Educational hospitals in Birjand, 2011.

Methods: In this descriptive and cross-sectional study Surgical Team in Birjand Educational hospitals who were available were selected. After ensuring that they were content with and cooperate in the study, a researcher designed questionnaire was filled. The questionnaire included demographic questions (4 items) and knowledge questions (21 items) of electrocautery smoke complications. The obtained data was analyzed by SPSS software (V: 16), using Kruskal-Wallis and Mann-Whitney at the significant level $P<0.05$.

Results: Mean score Surgical Team ' knowledge of electrocautery smoke complications were 9.0±4.88 (of the total 21 points); that is, 57% of them had low knowledge of electrocautery smoke complications.

Conclusions: Given the low level of knowledge about electrocautery smoke complications in Surgical Team, planning to enhance their knowledge through workshops and continuing education programs and training is essential.

Key Words: Electrocautery smoke; Complications; Knowledge; Surgical Team

Introduction

Today with the increasing advances in medical techniques, equipment and construction of modern tools, results to better and easier therapeutical methods (especially surgery). Unfortunately applying some of these tools is problematic. One of these instruments is electrocautery device which will be used in the operating room.

Electrocautery device is a tool that creates electrical current by high-frequency to flow in the direction of the pen, heat is generated. And that is used in orthopedic surgery, neurosurgery, general and vascular homeostasis, cutting and drying tissues, etc. By applying heat and burning tissues and vaporizing liquid, smoke zone is created within the context of the so-called "surgical smoke". Potential hazards of surgical smoke have become a source of concern in recent decades. A large number of studies have attempted to assess the

@2014 Journal of Surgery and Trauma

Tel: +985614443041 (5533)
Fax: +985614440488
Po Box 97175-379
Email: jsurgery@bums.ac.ir

✉**Correspondence to:**
Hoda Khoshdel, MS operating room, Birjand University of Medical Sciences, Birjand, Iran.;
Telephone Number: +985614440550
Email Address: Tanin.orn88@yahoo.com

[Downloaded from jsurgery.bums.ac.ir on 2026-11-17]

hazards of smoking surgery for surgeons and their patients [1-3].

According to the survey, this smoke contains 95% water and 5% toxic substances including chemical mutagen (acetaldehyde, hydrogen cyanide, formaldehyde, styrene, toluene, ethylene, ethane, methane, phenol, xylene, benzene, carbon monoxide, etc.), blood and tissue, the viruses and bacteria [1-4].

The risks of Surgical Smoke contains hepatitis, human immunodeficiency virus, human papilloma virus, and the incidence of acute and chronic inflammatory changes in the respiratory system (emphysema, asthma, chronic bronchitis), hypoxia, confusion, nausea, vomiting, headache, sneezing, weakness, Lightheadedness, carcinoma, dermatitis, Cardiovascular dysfunction, eye and throat irritation, Lacrimation, colic, anxiety, anemia, leukemia, Nasopharyngeal lesions, etc [5-9].

It is estimated that the toxicity of surgical smoke is like cigarette smoke. Nevertheless, non-protected exposure to surgical smoke is still common in the surgical environment [3] and results of studies indicating the low Knowledge of the clinical staff about surgical smoke [10, 11].

Health and safety organization in America has estimated that every year about 500 thousand people, including surgeons, nurses, anesthesiologists and operating room technicians are exposed to the smoke [7, 12].

However, the use of surgical masks for reduction of surgical smoke are good but many studies have been reported their insufficient protection [7].

According to in Iranian hospitals is used electrocautery device frequently and contact with smoke may well threaten patients and operating room personnel, Also, due to the lack of research in this field (Evaluation of Surgical Team ' Knowledge About electrocautery smoke complications) in Iran, this study was done to determine Surgical Team ' Knowledge About electrocautery smoke complications in the Educational hospitals in Birjand, 2011.

Methods

This cross - sectional study on 100 Surgical Team, including peoples who are dealing directly with the smoke from electrocautery in the Educational hospitals in Birjand and their willingness to participate in the study, was done by available method. The sample size was calculated using the following formula; a pilot study was conducted on 34 persons.

$z^2 = 1.962$ $s^2 = 5.652$ $d^2 = 1.132$ $N = \frac{z^2 s^2}{d^2}$

The sample size was calculated by the formula 96. Therefore, 100 peoples were enrolled.

The data collection tool was a questionnaire which were determined its validity by content validity method and its reliability using the Cronbach's alpha with α=0.8.

The questionnaire consisted of two parts. The first part of demographic characteristics and the second part contains 21 questions Knowledge of the Electrocautery complications.

Three-choice questions (true, false, I do not know) were designed; the score for a correct answer was one, score for a wrong answer and I do not know, it was considered a zero score. The subjects' score was obtained by the sum total score questionnaire; Thus, the maximum knowledge score of 21 was calculated. Scores obtained were classified in poor (less than 50% of total score), moderate (51 to 75% of total score) and good (more than 75% of total score). Researcher completed questionnaires at the operating room after explaining the objectives of the study. Data were analyzed using SPSS (version 16) and Kruskal-Wallis and Mann-Whitney at the significance level $P<0.05$.

Results

In this study, 100 participants were studied. Their mean score of Knowledge was 9.0±4.88, and of these 100 participants, 57% had poor knowledge, 36% moderate knowledge level; Kruskal-Wallis results showed a statistically significant relationship between knowledge and level of education (p=0.012). However, Mann-Whitney test showed no significant difference between the knowledge and gender (p=0.459). Knowledge about respiratory, skin, nervous system, gastrointestinal, hematological, cardiovascular, vision complications was respectively 30%, 16%, 20%, 16%, 12%, 21%, 16%.

Discussion

The results of this study showed the knowledge of Surgical Team about complications of electrocautery smoke were poor. in the literature review were not found a similar study about determination the level of knowledge of Surgical Team about complications of electrocautery

[Downloaded from jsurgery.bums.ac.ir on 2026-11-17]

smoke; So studies were discussed closely associated with study.

Ortolano in his study states that operating room personnel chronically exposed to surgical smoke, this fact is a cause of concern and despite lowering interventions are available but are not widely used [13].

Surgeons and operating room personnel must be aware of the potential hazards of surgical smoke.While some immediate adverse effects, such as odor and irritation of mucous membranes may seem minor, but long-term health risks should not be ignored [14].

Massarweh explains that although the use of conventional electrosurgical instruments associated with the risk, Nevertheless surgeons and residents do not receive formal training in the proper use of them [10]. The Association of Perioperative Registered Nurses (AORN) believes that exposure to surgical smoke and alive aerosols are controllable. Health care personnel are responsible for the learning of surgical smoke and alive aerosols and must be to reduce the risks associated with these materials [13].

Nevertheless results of studies indicating the low knowledge of the clinical staff about surgical smoke. Such as the Spearman study results showed that the knowledge of general surgery consultants and surgical nurses about surgical smoke was low [11]. The Clark study results had indicated a low level of knowledge about the dangers of surgical diathermy [15]. Also in study of Lehman the knowledge about energy-based surgical devices was low [16]. The present study, knowledge of surgical team about the complications of smoke from electrocautery, was poor. Also, the results showed that the highest knowledge is related to respiratory complications. However, knowledge about skin, neurological, gastrointestinal, hematological, cardiovascular, vision complications were low.

AORN is believed that the chemical composition and biological surgical smoke is still not entirely clear, But the components are known to be potentially dangerous. Risks are divided into four categories: vision, smell, chemical mutagens and Infectious microorganisms. Therefore, health care professionals in order to minimize risks associated with surgical smoke are responsible for training and planning [13].The results of this study showed that there is a statistically significant relationship between knowledge and education. It seems that this is due to the higher degree of staff having completed more courses; therefore, their knowledge is higher. Therefore, the health authorities should pay more attention to the role of training, also in courses related to the field of the operating room, this will cost more. The study was not statistically significant relationship between gender and knowledge. Since this is a specialized topic; It seems that the underlying variable, does not affect the rate of knowledge. Therefore, short-term complications such as employee absenteeism, reduced productivity and long-term complications that can lead to disability and costs, protect the health of operating room staff should not be ignored.

Conclusions

Given the low level of knowledge about electrocautery smoke complications in surgical team, planning to enhance their knowledge through workshops and continuing education programs and training is essential.

Acknowledgements

We would like to thank Surgical Team in the Educational hospitals in Birjand for their contribution to this study.

References

1. Ulmer BC. The hazards of surgical smoke. AORN journal. 2008;87(4):721-38.
2. Weld K J, Dryer S, Ames C D, Cho K, Hogan C, Lee M, Landman J. Analysis of surgical smoke produced by various energy-based instruments and effect on laparoscopic visibility. Journal of endourology. 2007;21(3):347-51.
3. Al Sahaf OS, Vega-Carrascal I, Cunningham FO, McGrath JP, Bloomfield FJ. . Chemical composition of smoke produced by high-frequency electrosurgery. Irish journal of medical science. 2007;176(3):229-32.
4. Hensman C, Baty D, Willis R G, Cuschieri A. Chemical composition of smoke produced by high-frequency electrosurgery in a closed gaseous environment. Surgical endoscopy. 1998;12(8):1017-9.
5. Derkay CS, & Wiatrak B. Recurrent respiratory papillomatosis: a review. The Laryngoscope. 2008;118(7):1236-47.
6. Barrett WL, Garber SM. Surgical smoke: a review of the literature. Surgical endoscopy. 2003;17(6):979-87.
7. Alp E, Bijl D, Bleichrodt RP, Hansson B, Voss A. Surgical smoke and infection control. Journal of Hospital infection. 2006;62(1):1-5.
8. Nori S, Greene MA, Schrager HM, Falanga V. Infectious occupational exposures in dermatology–A review of risks and prevention measures: I. For

[Downloaded from jsurgery.bums.ac.ir on 2026-11-17]

all dermatologists. Journal of the American Academy of Dermatology. 2005;53(6):1010-9.

9. Bigony L. Risks associated with exposure to surgical smoke plume: a review of the literature. AORN journal. 2007;86(6):1013-24.

10. Massarweh NN, Cosgriff N, Slakey DP. Electrosurgery: history, principles, and current and futureUses. J Am Coll Surg. 2006;202(3):520-30.

11. Spearman J, Tsavellas G, Nichols P. Current attitudes and practices towards diathermy smoke. Annals of the Royal College of Surgeons of England. 2007;89(2):162.

12. King CA. Health Care Worker Safety in Surgery. AORN journal. 2011;94(5):457-68.

13. Ortolano GA, Cervia JS, & Canonica FP. Surgical smoke: A concern for infection control practitioners. Manag. Infect. Control. 2009;3:48-54.

14. Fan JKM, Chan FSY, and Chu KM. Surgical smoke. Asian Journal of Surgery .2009;32(4):253-7.

15. Clark SC. Are surgeons aware of the dangers of diathermy? Annals of the Royal College of Surgeons of England. 2002;84(5):369.

16. Lehman DS, Phillips CK, Hruby GW, Lambert S, Landman J. An assessment of urologists' training and knowledge of energy based surgical devices. BJU international. 2008;102(2):226-30.

[Downloaded from jsurgery.bums.ac.ir on 2026-11-17]