An Investigation of the Impact of Operating Room Occupational Hazards on Intraoperative Nurses

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Title

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Abstract

The aim of this bachelor thesis was to investigate the impact of occupational hazards of operating room working environment on intraoperative nurses in Central Finland Central Hospital, Jyväskylä, Finland. The purpose of this study was to raise intraoperative nurses' awareness of occupational hazards and sense of self-protection in surgical working environment and to make nurse administrators to realize how to minimize the risk factors and provide an optimal working environment for intraoperative nurses.

The study was conducted by a standardized scales questionnaire. It was distributed by the author to the participants in paper copies in May 2011. The questionnaires were sent to 69 scrubbing and circulating nurses and 62 anesthesia nurses who are first-line workers in the surgery unit of central Finland central hospital. The valid response rate was 45.8% (n=60). And the data was analyzed during summer 2011.

The results of the study showed that, the subject group was significantly affected by various occupational hazards of operating room, especially from perspectives of ergonomic factors and chemical factors; Meanwhile, the prevalence of different work-related illness among the group was also high, and the most popular ones were concerning muscular-skeletal disorders and dermatological problems, yet the psychological health of this group was fairly positive. Furthermore, relevant protective measures should be taken by the hospital to ensure an optimal working environment for OR nurses are able to work under least occupational hazards and work-related illnesses.

The results of this study may not be generalized as a model for all the OR settings since the quantity of participants were still limited to reach the universality. Yet, the study had meaningful value for the subject organization and future researchers.

Keywords

Operating room, nurse, working environment, occupational hazards, occupational diseases

Miscellaneous

Agreement on research cooperation, Application for Research Permission, Questionnaire form

CONTENTS

1 INTRODUCTION

Operating room (OR), functioning as a site of performing surgical treatment to patients, is of great importance in the hospital among other health care settings. The nature of surgeries makes characters of nursing work in the OR to be fast-paced, high-loaded, and changeful. With the rapid development of medical science, technology and model, OR nurse, namely intraoperative nurse's job content becomes highly extensive today. Their responsibilities involve not only basic medical caring, scrubbing and circulating, and anesthetic skills, as well as engineering and technical skills (Huang 2010).

Additionally, the complexity of surgical working environment is also determined by various occupational hazards and risks, from accidental, physical, chemical, biological, ergonomic, psychosocial and organizational perspectives, and all of them could potentially affect and threaten intraoperative nurse's physical and psychological health and well-being in varying degrees (Wu 2010). In recent years, OR occupational hazards and nurse's occupational safety have became very popular issues of worldwide concern.

The author of this Bachelor's Thesis, a nursing degree graduate who specialized in intraoperative nursing, was also interested in this area and decided to carry out a relevant research study. And the purpose of this study was to investigate the impact of OR occupational hazards on intraoperative nurses. During a 2-month period nursing practical training experience and observation in the OR, the author realized that, inherent occupational hazard factors can possibly be harmful to each intraoperative nurse including the author herself, but the extents of effect which those factors produced depend on individual worker and a series of limiting factors. Later on, after extensive literature search and review, the author also found out that, majority of previous studies were focusing on discovering OR occupational hazard factors themselves, or only studying hazard factors from one single perspective, and there was a lack of research which regarding all nurses working in surgical units of a hospital as a whole target group

and conducting a comprehensive assessment and analysis about the degree of influences of occupational hazards on such group. Based on the reasons above, the topic of this Bachelor's Thesis became apparent and finally been established.

The main theoretical model had been used in this study was "International Hazard Datasheets on Occupations", which was a publication of International Labor Organization (ILO), listing multipurpose information resource containing information on the hazards, risks and notions of prevention related to a specific occupation (Hazard Datasheets on Occupations 2011), including the operating room nurse profession. A quantitative survey was designed accordingly as means of data collection based on the datasheets and was sent to the target group – all anesthesia, scrubbing and circulating nurses working in surgical units of Central Finland Central Hospital (in Finnish: Keski-Suomen sairaanhoitopiiri, abbreviation: KSSHP), city of Jyväskylä, Finland, which was the hospital where the author had done her intraoperative nursing practical training as a nursing student.

Thanks to the global growing interest on the topic of OR occupational hazards and safety, intraoperative nurse's safety and health are doubtlessly vital issues which should not be ignored and require particular attention. Investigation and assessment of occupational hazards of surgical settings and their impacts are highly beneficial and contributing to prevent occupational diseases, to raise the senses of intraoperative nurse's self-protection and to promote their overall health and well-being (Wang et al. 2004). Additionally, it is also helpful for the nurse administrators and the organization to take appropriate measures to detect and reduce possible threats and optimize intraoperative nurses' working environment and team management, so that nurses' health and nursing quality can be ensured to the highest level. A positive working environment produces practical significance to nurses, patients, and the hospital. And the author hopes that, this research paper will have some referential value for nursing students, nurse colleagues, and future researchers.

2 CONCEPTS AND LITERATURE REVIEW

2.1 Surgery and the surgical team

From the past few decades till nowadays, surgical treatment has always been playing a critical role in modern clinical medicine. By adhering the ultimate objectives of prolonging human life and alleviating suffering, the definition and category of surgery have been formed as deep and broad from various aspects such as therapeutic surgery, diagnostic surgery, exploratory surgery, palliative surgery, reconstructive surgery, and, cosmetic surgery. Considering about the urgency, surgeries can be also classified as: emergency, urgent and elective surgery (Dušková 2009, 4-6). It is worth noting that, thanks to intensive breakthrough of surgical science, recent technologic advances have led to more complex procedures, more complicated microsurgical and laser technology, more sophisticated bypass equipment, increased use of laparoscopic surgery, and more sensitive monitoring devices. Surgery might now involve transplantation of multiple human organs, the implantation of mechanical devices, or the reattachment of body parts. (Smeltzer & Bare, 2000, 315)

However, no matter how basic or advanced, how simple or sophisticated, how minor or major a surgical procedure is, behind a successful and perfect performance of a surgery, there should always be an outstanding surgical team, to provide high-quality surgical service to the patient. The surgical team is a well-organized group with multi-disciplinary and multi-professional practitioners working in an operating room (OR). The surgical team consists of the surgeon(s) and his/her assistant(s), the anesthesiologist or the anesthesia nurse, the intraoperative nurses, and the surgical technicians. The surgeon(s) perform(s) the operation on the patient, while the assistant(s) provide(s) necessary help on the side of the surgeon(s). The anesthesiologist or the anesthesia nurse administers the anesthetic agent, places the patient in the proper position on the operating table,

and monitors and manages the patient's physical status throughout the surgery, and the intraoperative nurses and technicians manage the operating room. (Smeltzer & Bare, 2000, 330)

Since surgery is a complex process which needs to be performed in an isolated, restricted, yet flexible environment that requires coordinated, well-directed team effort (Lemaitrie & Finnegan, 1980), surgical workers are required to have specialized up-to-date knowledge, abundant clinical skills and competence, and to be rapidly responsive to their patients' needs (Woodhead & Wicker, 2005, 23). Each individual worker comes together as a team member, playing a vital role respectively, to create a very cohesive, effective and highly focused group to achieve the necessary tasks, namely safe timely surgical interventions for patients (Taylor & Campbell, 2000, 44-48; Woodhead & Wicker, 2005, 48). According to Reilly and Jones J. (1974, 227-237) defined the basic characters of a team:

> *"Having a shared goal or reason to work together; being interdependent, that is, they need each other's experience, ability and commitment in order to achieve mutual goals; being committed to working together; being accountable."*

From clinical perspectives, the surgical team has similar features comparing with the general definition of a team, which can be revealed from the common responsibilities and the objectives of a surgical team: the delivery of a physiologically and psychologically prepared patient for the planned surgical experience; the safe, efficient, and therapeutic alleviation of the patient's problem based on sound scientific knowledge and proficiency in technique; the careful guidance of the patient's immediate postoperative care in order to minimize the possibility of future problems or complications. (Fairchild, 1993, 16)

2.2 The intraoperative nurses

An intraoperative nurse or an operating room nurse is a professional registered nurse who assists the surgeon and the surgical team in the operation. He/she is knowledgeable about aseptic technique, who is responsible for scrubbing, circulating, or anesthesia nursing, for the supply of surgical needs and various items used during the operation. An intraoperative nurse is also in charge of the safety and well-being of the patient in the operating room. He/she maintains the standards of surgical care, monitors risk factors that can cause injury of patient, protects the patient's dignity and interests while he or she is anesthetized.

In addition, the intraoperative nurses oversee the work organization within the operating theatre, coordinate of the operating room personnel, and mediate between the various hospital departments, the surgeons, and other health care workers. Meanwhile, he/she supervises the legal aspects of nursing (ILO & CIS, 1999; Fairchild 1993, 7). Whether scrubbing, circulating, anesthesia activities, or supervising other team members, the intraoperative nurse is always aware of the total environment, as well as the patient's reaction to the environment and the care given during the surgical intervention, and the management of nursing activities associated with the specific surgical procedure being performed (Fairchild 1993, 7).

The circulating nurse

The circulating nurse is a registered nurse. He/she manages the operating room and protects the patient's safety and health needs by monitoring the activities of surgical team and checking the conditions in the operating room. The main responsibilities include verifying consent, coordinating the team, and ensuring cleanliness, proper room temperature, humidity, and lighting; the safe functioning of equipment; and the availability of supplies and materials. The circulating nurse also monitors aseptic practices to avoid fail maintenance of sterilized

field. He or she is also managing the flow of information to and from the surgical team members scrubbed at the field. The circulating nurse documents activities throughout the operative procedure to ensure the patient's safety, well-being and legal rights. (Fairchild 1993, 724; Smeltzer & Bare, 2000, 316)

The scrub nurse

The scrub nurse is also a registered nurse whose main activities include scrubbing for surgery, setting up the sterile tables, assisting the surgeon and the surgical assistants during the procedure by anticipating the required instruments and equipment. When the surgical incision is closed, the scrub nurse counts all needles, sponges, and instruments to be sure they are accounted for to ensure patient well-being. Implementation of this role is based on knowledge of anatomy, strict aseptic techniques and the sequence of the surgical procedure (Fairchild, 1993, 24; Smeltzer & Bare, 2000, 316).

The anesthesia nurse

An anesthesia nurse is also a registered nurse with anesthesia nursing education. Before the surgical procedure, the anesthesia nurse visits the patient to provide information and answer questions. When the patient arrives in the operating room, the anesthesia assists the anesthesiologist to assess the patient's physical condition, to administer anesthesia agent, to intubate the patient and place on a ventilator, if indicated. During surgery, the anesthesia nurse help the anesthesiologist to monitors and documents the patient's vital signs such as: blood pressure, pulse, and respirations as well as the electrocardiogram (ECG), oxygen saturation, tidal volume, blood gas levels, blood pH, alveolar gas concentrations, and body temperature. Anesthetic levels in the body can also be determined. Throughout the surgical procedure, the anesthesiologist or the anesthesia nurse manages any technical problems relating to the administration of the

anesthetic agent, and to supervise the patient's general condition (Smeltzer & Bare, 2000, 331). When the surgery ended, the anesthesiologist or the anesthesia nurse keeps monitoring to ensure the patient's condition is stable and eventually brings the patient and the documents to the post anesthesia care unit (PACU) and tells about patient basic information, the process of the surgery and anesthesia, and turns over the duty to the local health care practitioners (Taylor & Campbell, 2000, 104).

2.3 Occupational hazards and occupational disease

The term 'occupational hazard' is defined in Webster's New World Law Dictionary as: "A risk peculiar to the specific occupation or place of employment and that arises in normal work at such a job or work place. Occupational hazards include the likelihood of accidental injuries and diseases" (Ellis, 2006, 752). Every day at the workplace, workers confront with health and safety hazards such as accidents, dust, chemicals, noise, violence or stress (Occupational Hazards, 2011). In most of occupations, occupational hazards, or also called work-related risk factors are often inherent and workers' or employees' physical and psychological health are easily threatened. It is also a known fact that, certain sectors and occupations are riskier than others, in what the working condition is often known as the "3D" -- dirty, difficult and dangerous. For example, people who work in agriculture, construction, mining, or ship-breaking industries, are highly possible to expose to hazardous agents, such as chemical substances or radiation. (Hazardous Work, 2011)

The effects of a hazardous working condition can range from injuries and occupational diseases such as skeletal-muscular disorders and respiratory diseases, or cancer, to even premature death. The ILO statistics revealed that, every day, 6,300 people die as a result of occupational accidents or work-related diseases, which are more than 2.3 million deaths per year. Over 337 million accidents occur at work

annually; many of these resulting in extended absences from work. The human cost of this daily adversity is huge and the economic burden of poor occupational safety and health practices is estimated at 4 per cent of global Gross Domestic Product each year. (Safety and Health at Work, 2011) Occupational hazards and diseases are affecting not only the worker's health and welfare, but also the family, community, his or her working organization, even the whole society. Thus, to create worldwide awareness of the dimensions and consequences of work-related accidents, injuries and diseases, to place the health and safety of all workers on the agenda and to raise special importance on developing and applying a preventive safety and health culture in workplaces should be the most pressing demand of the time. (Op.cit.)

2.4 Occupational safety and health

Since 1950, the joint committee of International Labor Organization (ILO) and the World Health Organization (WHO) have adopted a definition of occupational health: "... the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention among workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job" (Regional Strategy on Occupational Health and Safety in SEAR Countries, 2005, 3).

It is obvious to see that, the goal of all occupational health and safety programs is to foster a safe work environment. As a secondary effect, a high level of occupational safety and health may also protect co-workers, family members, employers, customers, suppliers, nearby communities, and other members of the public who are impacted by

the workplace environment (Cantwell, Downer & Billingsley, 2005, 7). Occupational health and safety is a cross-disciplinary area concerning many subject areas, including occupational medicine, public health, safety engineering, biology, chemistry, and physics.

It is one of the fundamental rights that each worker is deserved to the highest attainable standard of health. To achieve this objective, access to occupational health services should be ensured for all workers of the world regardless of age, sex, nationality, occupation, type of employment, or size or location of the workplace. Occupational health services aim to provide essentially preventive functions and responsible for advising the employer, the workers and their representatives in the undertaking, on the requirements for establishing and maintaining a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work; also, they help the workers on the adaptation of work to the capabilities of workers in the light of their state of physical and mental health (Rantanen J. 1995). Health and safety at work are so important matters that relate to the general health and well-being of working people and that should be given consideration in policies at all levels (i.e. company, national and international). Health and safety problems at work are, in principle, preventable and should be prevented by using all available tools-legislative, technical, research, training and education, information, and economic instruments (Rantanen, He, Lemen & Izmerov, 1994).

On the side of employer organizations, occupational health and safety officers should be responsible to promote health and safety procedures within the organization. They recognize hazards and measure health and safety risks, set suitable safety controls in place, and give recommendations on avoiding accidents to management and employees in an organization. Furthermore, an effective training session for employees can be organized which may reduce the number of injuries and deaths, property damage, legal liability, illnesses, workers' compensation claims, and missed time from work

(Occupational Disease Control Act of the People's Republic of China, 2002).

2.5 International Hazard Datasheets on Occupation

As a large and famous non-governmental organization with worldwide influence, International Labor Organization (ILO) has always been paying great attention to employers' occupational safety and health. It developed a series of Hazard Datasheets on Occupations (HDO), in collaboration with the Israel Institute for Occupational Safety and Hygiene (IIOSH), and European Union (EU). An International Hazard Datasheet on Occupations is a multipurpose information resource containing information on the hazards, risks and notions of prevention related to a specific occupation. The datasheets list in a standard format different hazards to which a worker, in the normal course of normal work, may be exposed. They provide several measures for the prevention of occupational accidents and diseases. These datasheets are intended for those professionally concerned with health and safety at work: occupational physicians and nurses, safety engineers, hygienists, education and Information specialists, inspectors, employers ' representatives, workers' representatives, safety officers and other competent persons (Hazard Datasheets on Occupations, 2011).

The Datasheet of each occupation includes information on the most relevant hazards related to the occupation, a more detailed presentation on the different hazards related to the job, suggestions for preventive measures, and specialized information relevant primarily to occupational safety and health professionals and including information such as a brief job description, a list of tasks, notes and references.

International Hazards Datasheet on Operating room nurse

The occupation of operating room nurse is also included in HDO of ILO (see Appendix 1), which lists different hazards to which nurse of surgical settings may be exposed in their normal work. The occupational hazards of operating room can be various and the main hazards in the work are due to nurses' direct involvement in the surgical operation. OR nurses may suffer from cuts, stabs, scratches, and stings stemming from the use of syringes and scalpels. They may be exposed to anesthetic gases, drugs, and radiation. Operating room nurses use cleaning, disinfecting, and sterilizing agents that may damage the skin, mucous membranes, and respiratory system. Contact with hot surfaces, faulty electrical equipment, etc. may cause skin burns. They may suffer from musculoskeletal problems and back pains resulting from the handling of heavy patients. Continuous work while standing or walking causes fatigue and leg problems. Operating room nurses may suffer from stress and burnout caused by shift work, night work, and other psychological and organizational factors. (International Hazard Datasheets on Occupation, Nurse, Operating Room, 1999) Based on the aspects mentioned above, the datasheet classified occupational hazards of operating room nurse into 6 categories: accident hazards, physical hazards, chemical hazards, biological hazards, and , ergonomic, psychosocial and organizational factors.

3 OBJECTIVES OF THE STUDY

The aim of this bachelor thesis was to investigate the impact of occupational hazards of operating room working environment on intraoperative nurses in Central Finland Central Hospital, Jyvaskyla, Finland. The purpose of this study was to raise intraoperative nurses' awareness of occupational hazards and sense of self-protection in surgical working environment and to make nurse administrators to realize how to minimize the risk factors and provide an optimal working environment for OR nurses.

Research question

What is the extent of adverse effect caused by different occupational hazards of surgical setting on intraoperative nurses in Central Finland Central Hospital from both physical and psychological perspectives?

4 IMPLEMENTATION OF THE STUDY

4.1 Research cooperation

The research cooperation institution in this study was Central Finland Central Hospital, which is comprised by Central Finland Health Care District (in Finnish: Keski-Suomen Sairaanhoitopiiri, abbreviated as KSSHP). The federation of municipalities of the KSSHP is owned by 23 municipalities located in the Central Finland region with a total population of 271.747 (31.12.2008). The health care district employs 2.763 persons (offices), of whom 290 are physicians, 1.584 nursing staff and 889 other staff. The KSSHP is the largest non-university health care district in Finland with almost all specialist fields represented including surgical treatment and care (Health through Knowledge, Expertise and Co-operation, 2009).

The subjects of the study were first-line nurses from the surgery units of central Finland central hospital. The surgery units have a total number of 131 clinical nursing staff, of which 69 scrubbing and circulating nurses, and 62 anesthesia nurses. The surgical units are divided into 3 separate sections:

Surgery unit 1

It operates five days a week in one shift, from 7 to 15 o'clock, with a total of eight operating rooms, performing procedures specialized in: gynecological surgery; ear, nose and throat (ENT) surgery; pediatric surgery; plastic surgery; eye surgery; mouth, teeth and jaw surgery; and, urological surgery. (Anestesia ja leikkaustoiminta, 2010)

Surgery unit 2

It works every day around the clock in three shifts, with a total of 8 operating rooms. Operational areas are: gastroenterological surgery; vascular surgery; pediatric orthopedic surgery; orthopedic surgery; traumatology surgery; and emergency surgery. (Anestesia ja leikkaustoiminta, 2010)

Surgery unit 3

It is also called day surgery department. Day surgery is elective, or pre-planned surgical operation, in which the patient enters and leaves the hospital for surgery during the day. Outpatient surgical operation is popularized since that it does not require overnight sustainable post-hospital follow-up. Day surgery procedure is suitable for patients who do not have other serious general diseases and complications.

Day Surgery department has six operating rooms, 18-bed recovery rooms, and 6-bed children's recovery rooms. Surgical specialization are: orthopedics; gastroenterology; proctology; general surgery; vascular surgery; plastic surgery; hand surgery; urology surgery; and, pediatric surgery. (Päiväkirurgia, 2011)

4.2 Research methodology

Quantitative research method was used to find out the extent of adverse effect caused by different occupational hazards of surgical setting on intraoperative nurses. Quantitative research refers to the systematic empirical investigation of social phenomena via statistical, mathematical or computational techniques (Hunter & Leahey, 2008). Quantitative research uses a systematic process of gathering and using numerical data to obtain information (Cormack, 2002, 165-169). It is used to measure how many people feel, think or act in a particular way. The surveys tend to include large samples, and structured

questionnaires are usually used incorporating mainly closed questions - questions with set responses (Yang, 1999, 275).

The main purpose of the questionnaire is to collect specific information that will provide answers to the research questions. Questionnaires provide privacy thus increases the chances of participants to give more honest answers. This makes it easier to categorize and analyze the data (Cormack, 2002, 301-304). A questionnaire was appropriate method for this particular research as it is cost effective and easy to organize even if time frames are restricted (Bell 1993, 76).

Planning a questionnaire is a lengthy process as it takes a lot of careful research and thought process. The research question and then the factors possibly affecting the answers of the respondents need to be determined first (Heikkilä 2001, 47). This is important for cross-sectional study and for determining whether the repliers were biased in their answers. When planning a questionnaire, the outlook of the questionnaire should be planned carefully. A good questionnaire is logically constructed, and seems simple and appealing for the respondents. It is also good to have the easiest questions in the beginning in order to catch the possible repliers' interest. The questionnaire needs to also include some control questions to ensure the reliability of the replies (Heikkilä 2001, 48-49).

4.3 Sampling

The study was based on purposive non-random sampling which means that data was collected from readily available subjects who met the study criteria and were available to the researcher (Fain 1999, 103-115).

The research group in this study was first-line clinical scrubbing and circulating nurses and anesthesia nurses who are working in the surgery units of Central Finland Central Hospital, Jyväskylä, Finland, which is the only medical institution with surgical treatment service in Central Finland health care district. The total number of clinical nurses

is 131, of which 69 are scrubbing and circulating nurses and 62 are anesthesia nurses. The size of the research group was relatively large, which enable the survey has enough responses. Since the purpose of the research was to investigate the impact of occupational hazards of surgical setting on intraoperative nurses, other practitioners who work in the surgery units for example nurse managers, surgeons, anesthesiologists, cleaners and technicians, are excluded.

4.4 Data collection

Data collection methods depend on the aims, design and resources of the research project. Questionnaires are common with survey designs keeping in mind that there are different types of questionnaires ranging from highly structured, standardized scales and unstructured open-ended formats (Polgar & Thomas 2008, 97).

In this study, data were collected through standardized scales questionnaires that were distributed by the author to the participants in paper copies on a morning meeting of intraoperative nurses in May, 2011 (see appendix 2). Participants completed the questionnaires on the meeting and returned them into a box, which was advantageous for the author to obtain maximum responses and quick feedback.

The questionnaire included 27 questions and was divided into three sections. In the first section "basic information", participants' gender, age, educational background, working years, job type and working unit were required. In the second section "operating room occupational hazard", the frequency was asked to fill from 1 to 5 about 21 different occupational hazard factors using the WHO datasheets. And the third section "your occupational health", 16 multiple-choice questions were listed about the possible work-related physical and psychological illnesses. All the questions were all concerning the main research question.

4.5 Data analysis

In the survey a quantitative method was used to analyze the questionnaires and SPSS statistics programme version 16.0 was implemented in order to gather, categorize and process the data from the questionnaires. SPSS programme was chosen because the relatively large group of samples and questions made the amount of data information quite big and complicated, which was not appropriate for artificial analysis. Additionally, SPSS is a scientific statistic software with comprehensive functions and easy access, and it has been widely used in research of e.g. natural science, technological science and sociological science.

At first, the questionnaires were browsed through in order to eliminate papers that were not completed properly (Heikkilä, 2001, 43). The questionnaires, in which three or more questions were not answered or answered properly were picked out and not used in the research. Then the valid questionnaires were numbered and all the options of multiple-choice questions were converted into different codes in order to facilitate the SPSS analysis. Data was typed into SPSS programme and changed into statistical information and diagrams, allowing it to be compared and analyzed more conveniently.

In this study, the most frequently used functions of SPSS programme were summaries, frequencies and crosstab statistic calculation, in order to acquire all the significant results of sums, frequencies in percentage, and cross-sectional comparison, that would be highly useful and descriptive for the research.

4.6 Ethical considerations

Ethical considerations include protecting confidentiality and anonymity of the informants on publication and in the use of the findings. It also includes the responsibility of offering informants a chance to hear about the findings of the study (De Raeve, 1996, 53). In this study,

participants' anonymity and confidentiality were strictly protected and no names were required in the questionnaires, thus the participants cannot be identified from the study although the gender, age and job type were included. A cover letter attached to the questionnaire also informed the participants the purpose of this study, and their privacy would be highly ensured and the participation was voluntary. And it was observed that the participants completed the paper independently and retuned into a box respectively. During the whole process of the research, only the author had read the filled questionnaires.

Prior to the conduction of questionnaire distribution, a cooperation agreement (see appendix 3) and a research permit (see appendix 4) were both signed by the nurse director of surgery units, the author, and the author's education institution. Additionally, the research plan and rough draft of the questionnaire had been also reviewed by the nurse director. And the reserved distribution time was consented by the head nurse of surgery units.

5 RESULTS

5.1. Basic analysis

The questionnaires were sent to 69 scrubbing and circulating nurses and 62 anesthesia nurses who are first-line workers in the surgery unit of central Finland central hospital, Jyväskylä, of whom 67 responded, in which 7 samples were picked out due to three or more improper answers. The valid response rate was 45.8% (n=60).

Background information

Among all the participants, the vast majority of them were female nurses (93.3%), and male nurses only accounted for 6.7%. Nurses' average age was 41.4ys, ranging from the youngest of age 23 to the oldest 60 years old, and the largest two age groups were 40-49ys and 50-60ys (I = 31.7%, II = 26.7%). The participants' educational backgrounds were distributed in 3 categories: college level (23.3%), bachelor degree level (40.0%), and specialist level (36.7%). Their work experience in intraoperative nursing ranged from 1y to 35ys, with the average of 14.28ys. The participants were either scrubbing and circulating nurses (63.3%) or anesthesia nurses (36.7%), and among the three surgery units, the percentage of nurses who work in one unit permanently were 11.7% in unit 1, 18.3% in unit 2, and 18.3% in unit 3 (day surgery sector), and the total percentage was 48.3%. Respectively, the other half (51.7%) of the nurses' workplace was flexible depending on the shift arrangement (see Table 1).

Background Variables	***n***	***%***
Gender		
Female	*56*	*93.3*
Male	*4*	*6.7*
Age *Mean = 41.4ys*		
20-29ys	*12*	*20*
30-39ys	*12*	*20*
40-49ys	*19*	*31.7*
50-60ys	*17*	*28.3*
Education		
College level	*14*	*23.3*
Bachelor degree level	*24*	*40*
Specialist level	*22*	*36.7*
Work experience *Mean = 14.2ys*		
1-5ys	*17*	*28.3*
6-10ys	*8*	*13.3*
11-20ys	*19*	*31.7*
21-30ys	*11*	*18.3*
31-35ys	*5*	*8.3*
Work type		
Scrubbing & circulating nurse	*38*	*63.3*
Anesthesia nurse	*22*	*36.7*
Work sector		
OR 1	*7*	*11.7*
OR 2	*11*	*18.3*
OR 3	*11*	*18.3*
Flexible	*31*	*51.7*

Table 1. Descriptive statistics for the background variables

Operating room occupational hazards

All the participants were acquainted with the concept "operating room occupational hazards". And most of the nurses (93.3%) agreed that operating room is a working environment with multiple hazard factors for intraoperative nurses. Comparing with nurses who working at any other departments in the hospital, 70% of the participants thought that they were more vulnerable to the OR working environment. Concerning the degree of the adverse influence of operating room occupational hazards, all the nurses considered that they were affected in some level: 20% occasionally, 45% sometimes, 25% often, and 10% very often.

In the section of investigating the impact on 21 different operating room occupational hazard factors, which were categorized by five major hazard groups, the most threatening hazards were "acute muscle pain resulting from awkward body position or overexertion when handling and transferring patients" (accident hazards group), "fatigue and chronic muscular-skeletal pain due to the handling of heavy patients and to longed periods of work in a standing posture" (ergonomic, psychosocial and organizational factors group), "exposure to various anesthetic drugs and gases" (chemical hazards group), and, "skin problems because of frequent use of soaps, detergents, disinfectants" (chemical hazards group), which over half of the nurses felt that they confronted with those hazards "very often". In the rest two hazard groups, the most harmful factors were "exposure to radiation from x-ray and radioisotope sources" and "exposure to blood, body fluids or tissue specimens possibly leading to blood-borne diseases such as HIV, Hepatitis B and Hepatitis C", belonging to physical hazards group and biological hazards group respectively, although the percentage of nurses choosing "very often" were 18.3% and 31.7%, less than those of the previous four factors.

On the contrary, the factors with minimal impact on the nurses were "burns and scalds from hot sterilizing equipment" and "electrical shock

from faulty or improperly grounded equipment, or equipment with faulty insulation" (accident hazards group), and also "increased hazard of spontaneous miscarriages" (biological hazards group). Similarly, there were also half of the participants regarding that they "never" encountered them. In the rest of the groups, factors such as "latex allergy caused by exposure to natural latex gloves and other latex-containing medical devices" and "exposure to severely traumatized patients, multiple victims of a disaster or catastrophic event or severely violent patients may lead to post-traumatic stress syndrome" were also the least harmful, whilst 31.7% and 21.7% of the nurses chose "never" Encountered.

Additionally, "harms caused by falling objects, e.g., medical instruments" and "slips, trips, and falls on wet floors, especially during emergency situations" (accident hazard group), and "problems of interpersonal relations with surgeons and other members of the operating team" (ergonomic, psychosocial & organizational factors group) had a relatively mild effect on the participants, with the rate of choosing "sometimes" more than 50% (see Table 2).

Operating Room Hazard Factors	***Frequency % ****				
	1	***2***	***3***	***4***	***5***
Accident hazards					
·Harms caused by falling objects, e.g., medical instruments.	*6.7*	*35*	*40*	*16.7*	*1.7*
·Slips, trips, and falls on wet floors, especially during emergency situations.	*6.7*	*31.7*	*46.7*	*15*	*/*
·Harms caused by sharp objects, especially needle-pricks and cuts by blades.	*1.7*	*20*	*31.7*	*25*	*21.7*
·Burns and scalds from hot sterilizing equipment.	*56.7*	*41.7*	*1.7*	*/*	*/*
·Electrical shock from faulty or improperly grounded equipment, or equipment with faulty insulation.	*43.4*	*31.7*	*11.7*	*11.7*	*1.7*
·Acute muscle pain resulting from awkward body position or overexertion when handling and transferring patients.	*/*	*/*	*23.3*	*28.3*	*48.3*
	(continued)				

Table 2. Frequency of affecting by series of occupational hazards (* 1 = never, 2 = occasionally, 3 = sometimes, 4 = often, 5 = very often)

Operating Room Hazard Factors	***Frequency % ****				
	1	***2***	***3***	***4***	***5***
Physical hazards					
·Exposure to radiation from x-ray and radioisotope sources.	*5*	*10*	*23*	*43.3*	*18.3*
Chemical hazards					
·Exposure to various anesthetic drugs and gases.	*5*	*5*	*10*	*30*	*50*
·Skin problems because of frequent use of soaps, detergents, disinfectants, etc.	*10*	*20*	*18.3*	*16.7*	*35*
·Irritation of the eyes, nose, and throat because of exposure to airborne aerosols or contact with droplets of washing and cleaning liquids.	*15*	*35*	*25*	*13.3*	*11.7*
·Chronic poisoning because of long-term exposure to medications, sterilizing fluids (e.g., glutaraldehyde), anesthetic gases, etc.	*10*	*18.3*	*23.3*	*18.3*	*30*
·Latex allergy caused by exposure to natural latex gloves and other latex-containing medical devices.	*31.7*	*16.7*	*11.7*	*20*	*20*
Biological hazards					
·Exposure to blood, body fluids or tissue specimens possibly leading to blood-borne diseases such as HIV, Hepatitis B and Hepatitis C.	*3.3*	*18.3*	*26.7*	*20*	*31.7*
·Risk of contracting a nosocomial disease as a result of a prick from a syringe needle.	*1.7*	*16.7*	*35*	*18.3*	*28.3*
·Possibility of contracting palm and finger herpes.	*25*	*35*	*25*	*6.7*	*8.3*
·Increased hazard of spontaneous miscarriages.	*56.7*	*16.7*	*16.7*	*6.7*	*3.3*
Ergonomic, psychosocial & organizational factors					
·Fatigue and chronic muscular-skeletal pain due to the handling of heavy patients and to longed periods of work in a standing posture.	*/*	*10*	*25*	*31.7*	*33.3*
·Psychological stress caused by a feeling of heavy responsibility towards patients.	*/*	*10*	*25*	*31.7*	*33.3*
·Stress, strained family relations, and burnout due to shift and night work, overtime work, and contact with sick patients, especially when patients don't recover from the operation.	*3.3*	*20*	*16.7*	*35*	*25*
·Problems of interpersonal relations with surgeons and other members of the operating team.	*5*	*30*	*40*	*20*	*5*
·Exposure to severely traumatized patients, multiple victims of a disaster or catastrophic event or severely violent patients may lead to post-traumatic stress syndrome.	*21.7*	*43.3*	*21.7*	*8.3*	*5*

Table 2. Frequency of affecting by series of occupational hazards

Occupational health

Comparing with that after working as an operating room nurse, 53.3% of the participants felt that their health situation was worse than before; 33.3%of them thought they were healthier, and 8.3% of them felt their health status kept same. Up to 93.3% of the participants thought that they had health problem(s) which might be connected to the occupation, and they affected their work efficiency in varying degrees: occasionally 28.3%, sometimes 28.3%, often 20.0%, and very often 16.7%.

Work-related accidental sharp injuries happened to most of the nurses (81.7%), however, nearly half of them (42.9%) never reported the injuries. Among those who had done the injury reports (57.1%), 42.8% of them reported once, 46.4% of them reported 2-5 times, and 10.6% reported more than 5 times.

Health problems which arose during routine work were also investigated. The most common symptoms represented as shoulder pain, lower-back pain, skin dryness, dizziness, headache, sleepiness, insomnia, somnolence, fatigue, and irritation of optic mucosa, in which over half of the participants suffered or had suffered from at least one of the symptoms. The percentage of those who experienced general muscle pain, shoulder pain, AND lower-back pain was 15%; 10% of the nurses suffered from all of the symptoms of dizziness, headache, nausea and sleepiness while working; and skin rash, dryness, and irritation all appeared in 5% of the participants. Health problems such as varicose vein of lower limbs, gastric illnesses, endocrine disturbance, and difficulty of breathing were also mentioned by some of the participants. Additionally, a few participants complemented blood pressure problems, arthritis and arrhythmia which were not mentioned on the potions of questionnaire (see Figure 1).

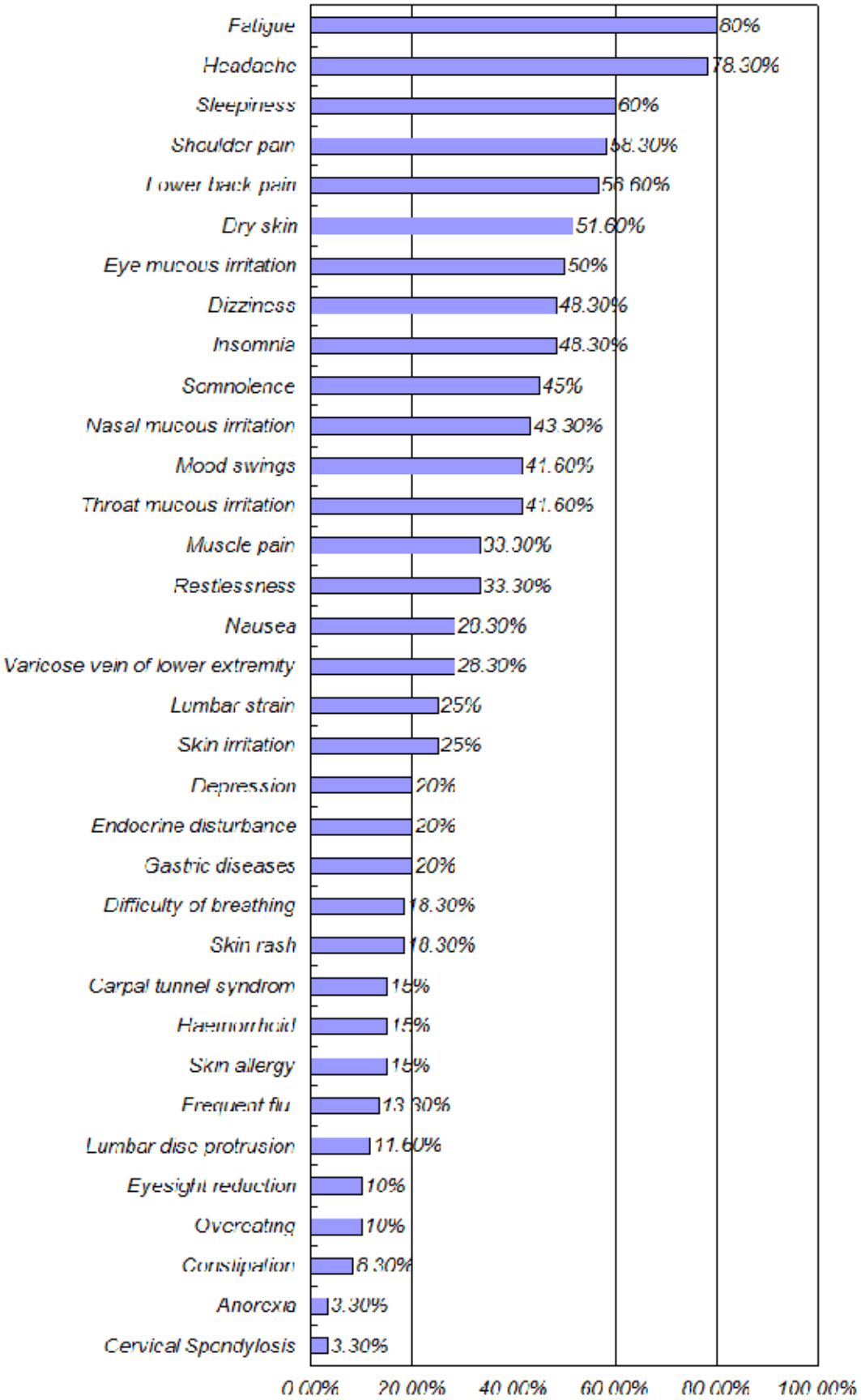

Figure 1. The prevalence of work-related illnesses among the participants.

66.7% of the participants have had exposure to various contagions at work. The exposure rates from high to low were: MRSA 66.6%; hepatitis C 58.3%; ISBL 56.6%; hepatitis B 46.6%; HIV 43.3%; mycobacterium tuberculosis 40%; herpes virus 35%. And 26.6% of the participants have had contact with all the contagious pathogens above. Plus, measles virus, clostridium difficile and erysipelas had been reported as often-encountered pathogens additionally (see Figure 2).

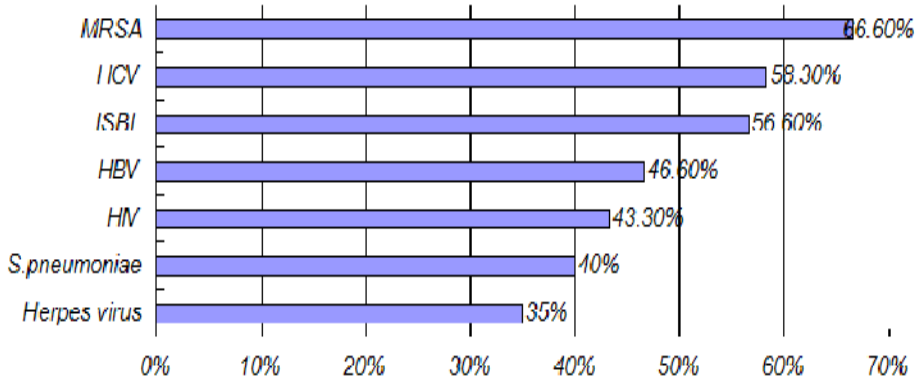

Figure 2. Rates of occupational contacts with varies of pathogens among the participants.

Pregnancy situation was studied among female nurses. Up to 12.5% of them reported occurrence of spontaneous miscarriage after they working as an operating room nurse. 50% of them had normal pregnancy (pregnancies) and healthy child(ren). The percentage of choosing the option "congenital abnormalities on children" was 0%. Yet it is noteworthy that, a 35% of missing response rate was found in this question.

When asking about the attitude that if health is affected by any occupational hazard factor, 71.6% of the participants thought that "I will find the way of self-protection"; 18.3% of the participants thought that "maybe I will think about another job"; 15% of them considered that "I don't think it is a big deal and I feel like I'm still healthy"; 10% of them "will complain to my colleagues and the manager, and ask for their advice"; 8.3% of them were "worried about that and I don' t know

what to do"; and only 3.3% of them thought "it is quite natural that health problems is a part of the job".

The participants also had different opinions on the impression of being an operating room nurse: 68.3% of them believed that "I love my job and I will keep working on it"; 60% of them thought it was "meaningful and exciting"; 58.3% of them thought it was "challenging and difficult"; 38.3% of them thought it was "stressful and exhausting"; 16.6% of them did not have special feelings but just doing it for a living; 8.3% of them felt that the work of operating room was "flexible and cheerful"; only 1.6% of them thought it was "simple and comfortable"; and no one chose the option "boring and disappointing".

5.2 Cross-sectional analysis

Since the basic horizontal analysis could not interpret the data comprehensively, several variables in the questionnaire were cross-sectional analyzed for more in-depth study and obtainment of more valuable and concrete information. Significant statistical difference in impact of occupational hazards in operating room on intraoperative nurses were found in relation to age, educational background, working year, professional type and working sector (significant difference, $p<0.05$) (see Table 3).

Background variables *Response rates (%)*	*Operating room is a hazardous working environment*	*OR nurses are more vulnerable than other nurses*	*Often or very often affected by occupational hazards*
Age			
20-29ys	*91.7*	*66.7*	*8.3*
30-39ys	*91.7*	*50.0*	*41.7*
40-49ys	*89.5*	*73.7*	*42.2*
50-60ys	*100.0*	*82.4*	*41.2*
Education			
College level	*85.7*	*71.4*	*35.7*
Bachelor level	*91.7*	*54.2*	*25.0*
Specialist level	*100.0*	*86.4*	*45.5*
Work experience			
1-5ys	*88.9*	*50.0*	*16.7*
6-10ys	*85.7*	*42.9*	*28.6*
11-20ys	*100.0*	*89.5*	*52.7*
21-30ys	*90.9*	*72.7*	*36.4*
31-35ys	*100.0*	*100*	*40.0*
Work type			
Scrubbing & circulating	*92.1*	*76.3*	*36.9*
Anesthesia	*95.5*	*59.1*	*31.8*
Work sector			
OR 1	*100.0*	*85.7*	*42.9*
OR 2	*100.0*	*81.8*	*45.5*
OR 3	*72.7*	*72.7*	*18.2*
Flexible	*96.8*	*61.3*	*35.5*
		Note: $p < 0.05$	*(continued)*

Table 3. Cross-sectional statistics between background variables and response rates of certain questions from the questionnaire

Background variables *Response rates (%)*	*Health worsened after working as an OR nurse*	*Work efficiency often or very often affected by health problems*	*Experience of work-related accidental injuries*
Age			
20-29ys	*58.3*	*16.6*	*66.7*
30-39ys	*16.7*	*16.6*	*75.0*
40-49ys	*57.9*	*52.7*	*94.7*
50-60ys	*70.6*	*47.0*	*82.4*
Education			
College level	*42.9*	*42.8*	*92.9*
Bachelor level	*37.5*	*16.6*	*66.7*
Specialist level	*77.3*	*54.5*	*90.9*
Work experience			
1-5ys	*44.4*	*16.7*	*55.6*
6-10ys	*28.6*	*42.9*	*85.7*
11-20ys	*47.4*	*42.1*	*100.0*
21-30ys	*81.8*	*63.7*	*100.0*
31-35ys	*80.0*	*20.0*	*60.0*
Work type			
Scrubbing & circulating	*52.6*	*34.2*	*78.9*
Anesthesia	*54.5*	*40.9*	*86.4*
Work sector			
OR 1	*42.9*	*28.6*	*100.0*
OR 2	*54.5*	*36.4*	*81.8*
OR 3	*36.4*	*27.3*	*54.5*
Flexible	*61.3*	*41.9*	*87.1*
		Note: $p < 0.05$	

Table 3. Cross-sectional statistics between background variables and response rates of certain questions from the questionnaire

Regarding to the participants' age, the most remarkable difference was found in middle-aged groups. All the nurses from 50-60ys group agreed that operating room is a working environment with multiple hazard factors, while the proportion of other groups were slightly lower, and majority of them thought that operating room nurses are more vulnerable comparing with those who working at other departments in the hospital. In the investigation of the impact on 21 different operating room occupational hazard factors, the participants who mostly preferred to choose "often" or "very often" were from 40-49ys and 50-60ys groups. A quarter of nurses at 50's felt that their work efficiencies were "frequently" affected by health problems, whilst the percentages of other age groups were all less than 15%. Vast majority of the 40's and 50's experienced work-related accidental sharp injuries, and followed by also a relatively high injury report rate consistently.

The prevalence of work-related illnesses and rate of pathogen contact were also high among these two groups. However, gratifyingly, there was also a large portion of the 40's and 50's stated that they will find the way of self-protection towards the impaired health affected by the occupation. Furthermore, most of them felt confident about their job. In other age groups, 75% of the nurses at 30's thought their health situation was worse after working at operating room. And participants who thought working in operating room is "challenging and difficult" and "meaningful and exciting" distributed evenly in each age group with high percentage.

When examining the different educational backgrounds, specialized nurses were found more vulnerable towards occupational hazards and work-related diseases especially in muscle-skeletal and skin illnesses, holding less positive attitudes on operating room jobs but possessing stronger awareness of working environment hazard factors and better sense of self-protection among those who had other qualifications. Oppositely, nurses with bachelor degree seemed to be the healthiest group, with the minimal impact of occupational hazards, lowest prevalence of work-related illness and pathogen contact rate, and most positive impressions on operating room jobs. Ones with college

education stood in the middle from almost all the aspects except for that they had a lowest accidental injury report rate and a strongest willingness of changing to another career.

According to the working years, the group with middle-length operating room working experience (11-20ys) was needed to pay more attention to. The nurses with 11-20ys and 31-35ys (the longest working years) believed the most that their working environment is harmful and OR nurses are more vulnerable comparing to other types of nurses generally, and the former group occupied a significant highest prevalence of all types of work-related illnesses and predominantly complained that they were affected "very often" by occupational hazards. On the other hand, they showed as well a highest consciousness of self-protection. Concerning the impression of the job, the 11-20ys group revealed a contradictory attitude: "I love my job and I will keep working on it", but "I don't have special feelings but just doing it for a living" and "maybe I will think about another job". Nurses with the minimal 1-5 working years were regarded as the most optimistic, which reported a least impact on occupational hazards, a least suffering from illnesses and a positive job attitude. However, they shared the highest rate of career changing willingness with the group of 11-20 working years, surprisingly.

Large differences could be also seen among professional types. More scrubbing and circulating nurses than anesthesia nurses felt that the working environment is hazardous and intraoperative nurses are more vulnerable. Within the hazard factors mentioned in the questionnaire, scrubbing and circulating nurses are more frequently affected by sharp injuries, radiation exposures, skin problems due to frequent use of soaps and disinfectants, and chronic muscular-skeletal pain because of prolonged standing working posture; for anesthesia nurses, they more often confronted with anesthetic drugs and gases exposure, burnout and problematic interpersonal relationship at work. In terms of work-related illnesses, shoulder pain, lower back pain, carpel tunnel syndrome, lower extremity varicose veins and skin dryness were more found among scrubbing and circulating nurses; anesthesia nurses

more easily tended to have dizziness, headache, sleepiness, mucous membrane irritation and mood swings. Sharp injury report rate, sense of self-protection and tendency of career changing were relatively high in scrubbing and circulating nurse group. But from the two groups, there were both 50% of proportion which thought the health situation was worse after working as an OR nurse. Furthermore, equally high proportions of the two groups revealed a positive attitude towards their job.

Different working units also showed obvious divisions of responses. Vast majority of the nurses from unit 1, 2 and ones with flexible working units agreed that the working environment is hazardous and OR nurses are more easily to be harmed while the same views were only held by relatively small amount of nurses of unit 3. Unit 2 nurses thought they were affected by occupational hazards "very often", which can be seen specifically from risks of acute muscle pain due to overexertion when handling and transferring patients, radiation exposure and psychological stress caused by a feeling of heavy responsibility towards patients. For nurses working flexibly in different sectors, burnout, shift and night and overtime work, and problems of interpersonal relations with colleagues were more threatening factors, meanwhile, the highest percentage were also found from them in terms of worsen health situation after working as intraoperative nurses and frequently-affected work efficiency. Unit 1 and unit 2 nurses were both found with relatively high prevalence of work-related illnesses especially in muscular-skeletal symptoms, while they had also the highest knowledge level of self-protection. The most positive group were unit 3 nurses which had the least impact on occupational hazards, the minimal prevalence of illnesses and a lowest rate of accidental injuries and pathogen contact, but smaller percentage was seen in awareness of self-protection, yet an optimistic working attitude. Plus, nurses who work flexibly in all units revealed a higher frequency of encountering problems of interpersonal relations with surgeons and other members of the operating room.

It is noteworthy that, high degrees of consistency and correlation could be found in numerous variables. Participants who thought they were very often affected by risk of needle-pricks or blade-cuts mostly had experienced work-related sharp injuries, and even more than once; Nurses who very often encountered risks of acute or chronic muscle pain due to awkward body position, patient handling and prolonged standing were more likely to have muscular skeletal disorders; those who exposed frequently in anesthetic drugs and gases also complained more about dizziness, headache, fatigue, sleepiness and mucous membrane irritations; nurses who encountered hazards of frequent use of soaps, detergents and disinfectants very often had higher prevalence of skin problems; and who felt very often influenced by psychosocial and organizational factors more tended to be suffering from psychological health problems and negative working attitudes.

Additionally, it is necessary to indicate that, cross-sectional analysis regarding gender difference and pregnancy situation were not conducted due to the significant difference in quantities of two genders, too little number of male respondents, and a high rate of missing response in the question of pregnancy situation.

6 VALIDITY AND RELIABILITY

Before the conduction of the survey, the questionnaire was pre-tested for its adequacy and practicability, however, the validity was still possibly affected by many contributors. The total amount of respondents (n =60) and the response rate (45.8%) were relatively low which could threat the authenticity and catholicity of the results and mislead the interpretation regarding the results. The great disparity of the quantity of male and female respondents also led a part of cross-sectional analysis unsuccessful.

Another issue which might affect the reliability is the design of the questions. For instance, in this questionnaire, one question concerning nurses' pregnancy situation gained a high rate of missing response. There were many possible reasons of quitting the answer, the participants could feel being offended since the question could be too straight to invade their privacy, or many female participants had not experienced a pregnancy, or male respondents thought they should be excluded from the question.

The survey was only conducted in one hospital, the small range of investigation determined the results could not be generalized and applied in surgical settings of other health care institutions. Difference in results could be seen if the research is carried out in other medical institutions with same level of the subject hospital.

7 DISCUSSION

The subject group of this study was a female-dominated and middle-aged professional intraoperative nursing team with fairly high education level and long working experience. The nurses had a fairly high level of understanding and awareness of the hazardous nature of operating room working environment and the vulnerability towards such occupational hazards as OR nurses. Generally, they were significantly affected by various hazard factors, which the major ones were concerning ergonomic and chemical aspects. Over half of the nurses complained about an impaired health after working in this occupation which more or less influenced their work efficiency.

High prevalence among participants was also found in muscular-skeletal disorders, skin and mucous membrane problems, headache, dizziness, sleepiness, and fatigue. High degree of consistency and correlation were also discovered between such illnesses and specific occupational factors, and the findings correspond well to many related previous studies.

Ergonomic occupational factors were regarded connecting to several muscular-skeletal disorders. Work in health care units is associated with considerable physical stress and many complaints relating to the musculoskeletal system (Kant, deJong, vanRijssen-Moll & Borm, 1991). According to Kant, the nursing profession actually ranks second after industrial work as far as physical work load is concerned (op.cit). In routine work of operating room, for example, patient-handling tasks such as lifting, transferring and repositioning requiring forced, sudden or strained movements are the main causes of shoulder injuries and back pain (Matthews, 2006). Also, working in an awkward position, long-time standing, working over head or away from the body all could be risk factors, even the preparation for surgical procedures requires much physical strength since it generally involves assisting in patient repositioning, lifting and carrying surgical trays, pushing/pulling carts loaded with surgical trays, and standing long hours assisting OR staff, among other duties. And usually open surgical cases to be more physically demanding than minimally invasive procedures because more

trays of instruments are required and they take longer to prepare and complete (Sheikhzadeh, Gore, Zuckerman & Nordin, 2009). Continuous or repeated performance of these activities throughout one's working lifetime greatly increases the chances of developing muscular-skeletal disorders (Matthews, 2006).

Therefore, it is of great need to take effective measures to eliminate intraoperative nurses' physical stress and to create ergonomic environment in future OR settings. Simple engineering and administrative ergonomic interventions and recommendations can significantly improve nurses' efficiency and performance and minimizing the physical risks during their work day (Sauter, Boyle, Wallace, Andrews, Johnson, Bates, Edenfield, Carr, Campbell, Hamilton & Taunton, 1997), for example, guidelines regarding safe patient handling, adoption of well-designed instrument and devices, simple stretching exercises and updated sitting/standing policy without jeopardizing sterile policy and patient safety (Sheikhzadeh, Gore, Zuckerman & Nordin, 2009).

Exposure to various anesthetic drugs and gases might be responsible for headache, dizziness, fatigue and mucous membrane irritations. OR nurses usually expose in low concentration but long-lasting anesthetic medications. Prolonged contact with those drugs such as enflurane and isoflurane can cause fatigue, headaches and irritation of respiratory tract (Qiu & Yang, 2010). Even more serious disorders such as reduced fertility, problems during pregnancy and increased rate of spontaneous abortion are reported (Bilban, Jakopin & Ogrinc, 2005). Pregnancy situation was asked in the questionnaire, however, due to the high missing response rate of that question, the previous findings were not able to be generalized in this study. Additionally, the symptoms of fatigue and headache could be also explained by that as operating room is an enclosed working environment with limited air flow and many staffs are working together in such narrow space for long time, lack of oxygen can easily cause fatigue and sleepiness (Qiu & Yang, 2010).

Frequent use of soaps, detergents and disinfectants might result in rash and dryness of skin and mucous membrane symptoms. Strictly ensured sterilized surgical environment requires nurses washing and scrubbing hands and arms

frequently even several times a day. According to Li (2007), soaps and disinfectants remove the protective grease from skin thus causing dermatological dryness, peeling even cracking. Formaldehyde, glutaraldehyde, chlorine and other volatile disinfectants are harmful to skin, mucous membrane and nervous system. Long-term inhalation of air mixed with high concentrations of glutaraldehyde or direct contact with glutaraldehyde likely to cause dermatitis, allergy, conjunctivitis, headache, chest tightness and sore throat. And formaldehyde also can cause irritation of the respiratory mucosa even occupational asthma in high concentrations (Zhang & Jia, 2001). Additionally, volatile smell of burn ointment, intraoperative use of antineoplastic agents and various built-in filling materials, such as the use of orthopedic bone cement and adhesives, especially with acrylic ingredients, can cause skin irritation, peeling, allergic reactions or severe allergic asthma (Polovich & Eisenberg, 2009).

As anesthetic drugs and noxious chemicals exposure became the second largest threat towards the subject group, organizational support and nurses' self-protection are both important to minimize the risks. High quality hand cream or other skin care products for medical use need to be provided and popularized by nurses administrators; Ventilation in OR units should be ensured and the air quality should be checked periodically; Continued use of masks, goggles and protective gowns are encouraged; Inadequate clean-up, spills and overuse should be avoided.

The participants frequently exposed to blood, body fluids or tissue specimens might contain various pathogens including HIV, and accidental sharp injuries happened to almost everyone, but only half of them did injury reports. The extensive pathogen exposure and sharp injuries among operating room nurses were consistent with much previous research (Jagger, Berguer, Phillips, Parker & Gomaa, 2011; Foley, 2005; Foley, 2004). Similar results of low injury report rate could be also found from several earlier studies (Makary, Al-Attar, Holzmueller, et al., 2007; Lynch & White, 1993). The possible reasons of un-reported sharp injuries could be oblivion, deliberate concealment, fear of punishment, lack of time, avoiding extra paperwork, or being considered unnecessary.

However, most of them showed a confident attitude of self-protection towards occupational hazards. The participants mostly had passionate and optimistic feelings about their jobs, yet they at the same time assumed considerable challenges and stress at work and the willingness of changing a career was discovered in over a quarter of them. It reflected that, the group had a fairly active working atmosphere, strong adaptability and psychological toughness even towards multiple occupational hazards and illnesses, sick patients, fast paced work, and constantly-updated professional knowledge.

In this study, nurses in middle-age (40-59ys), with specialized qualifications, with 11-20ys working experiences, scrubbing and circulating nurses, and ones who worked in OR 1 and OR 2 were found more vulnerable than others, with more frequent influence by occupational hazards factors, higher prevalence in different illness and disorders, more exposures in various pathogens, fewer knowledge of self-protection and less positive attitudes towards their jobs.

As age increases, physical quality gradually falls into a downward trend while health situation and working ability are also impaired. The fact of aging can possibly be a trigger of high impact level of occupational hazards, high prevalence of related illnesses, less motivated work attitude; nurses with specialized intraoperative nursing education which is the highest educational level among that of OR nurses. Be specialized in operating room study area means more professional in intraoperative nursing and deeper understanding of the characteristics of surgical work, as well as its occupational hazards. So the specialized nurses could be more sensitive and serious about the hazards, illnesses which might also adversely affect their working attitudes; Nurses with 11-20ys working experience were more vulnerable because of their years of continues working in surgical settings, many chronic disorders or illnesses are hence developed, and it is easy to create a less positive working attitude due to physical and psychological stress; generally, scrubbing and circulating nurses are required more physical power than anesthesia nurses in terms of lifting and transferring of heavy materials and tools in surgery preparations, assisting surgeons during the surgery in a static for example standing posture or holding an instrument still for long hours, and scrubbing and circulating nurses are more close to blades and other invasive instruments, open wounds, blood, various body fluids and tissue specimens which raise the risk of

accidental sharp injuries. These reasons might explain the bigger possibility of work-related physical disorders among scrubbing and circulating nurses, and the higher risks of the work might cause the working attitude tend to be less active; As mentioned before, the three surgery sectors are responsible for different types of surgeries, which OR 1 and OR 2 usually perform gastroenterological, orthopedic and other major open surgeries and OR 2 also opens 24 hours for emergency procedures. While OR 3 mostly performs day surgeries and minor gynecological and otolaryngological procedures, which demands less patient transferring and instrument preparation, shorter operating time, and less stress.

In conclusion, the subject group in this study was significantly affected by various of occupational hazards of operating room, especially from perspectives of ergonomic factors and chemical factors; Meanwhile, the prevalence of different work-related illness among the group was also high, and the most popular ones were concerning muscular-skeletal disorders and dermatological problems, yet the psychological health of this group was fairly positive. Furthermore, relevant protective measures should be taken by the hospital to ensure an optimal working environment for OR nurses so that the employees are able to work under least occupational hazards and work-related illnesses.

8 FUTURE SUGGESTIONS

A wide range of operating room occupational hazards had been examined and meaningful results had obtained in the study, yet many issues and problems also arose. Not all the occupational hazards were studied with the WHO datasheets, such as workplace violence, and noise factors, were not involved, which might lead to the incomprehensiveness of this study. The design of the question concerning nurses' pregnancy situation in the questionnaire could be regarded as a failure due to a high rate of missing response. The possible reasons of quitting an answer might be that, the participants felt being offended since the question could be too straight to invade their privacy. The issue was neglected by the author and causes the failure of investigation of the correlation between fertility and anesthetic drug exposure. A better-designed question form is needed for the relevant studies.

More attention should be paid by nurse administrator and colleagues, and continued evaluation should be done by future researchers on the specific highlighted groups mentioned before, due to their more visible vulnerability and sensibility towards occupational hazards and illnesses.

Furthermore, the results of this study may not be generalized as a model for all the OR settings since the quantity of participants were still limited to reach the universality. Therefore, it is suggested that, the subject organization should create unique protocols and guidelines for their employees for prevention and coping strategies towards occupational hazards and illnesses, for example, against ergonomic and chemical stress, and all these actions should be with a good understanding of the roles and responsibilities of intraoperative nurses.

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10 APPENDICES

10.1 Appendix 1. International Hazard Datasheets on Occupation, nurse, operating room

International Hazard Datasheets on Occupation

Nurse, operating room

What is a Hazard Datasheet on Occupation?

This datasheet is one of the International Datasheets on Occupations. It is intended for those professionally concerned with health and safety at work: occupational physicians and nurses, safety engineers, hygienists, education and Information specialists, inspectors, employers ' representatives, workers' representatives, safety officers and other competent persons.

This datasheet lists, in a standard format, different hazards to which nurse, operating rooms may be exposed in the course of their normal work. This datasheet is a source of information rather than advice. With the knowledge of what causes injuries and diseases, is easier to design and implement suitable measures towards prevention.

This datasheet consists of four pages:

Page 1: Information on the most relevant hazards related to the occupation.

Page 2: A more detailed and systematized presentation on the **different hazards** related to the job with indicators for preventive measures (marked as ▼ and explained on the third page).

Page 3: Suggestions for **preventive measures** for selected hazards.

Page 4: **Specialized information**, relevant primarily to occupational safety and health professionals and including information such as a brief job description, a list of tasks, notes and references.

Who is an operating room nurse?

An operating room nurse is a healthcare worker who is a professional registered nurse and assists the surgeon and the surgical team in their tasks. Operating room nurses are responsible for the supply of all of the surgical needs and for keeping of inventory of all of the various items that were used during the operation. They also tend to the health and care of the patient in the operating room, oversee the work organization within the operating theatre, and mediate between the various hospital departments, the surgeons, and the management.

What is dangerous about this job?

The main hazards in the work of operating room nurses are due to their direct involvement in the surgical operation.

Operating room nurses may suffer from cuts, stabs, scratches, and stings stemming from the use of syringes and scalpels.

Operating room nurses may be exposed to anesthetic gases, drugs, and radiation.

Operating room nurses use cleaning, disinfecting, and sterilizing agents that may damage the skin, mucous membranes, and respiratory system.

Contact with hot surfaces, faulty electrical equipment, etc. may cause skin burns.

They may suffer from musculoskeletal problems and back pains resulting from the handling of heavy patients. Continuous work while standing or walking causes fatigue and leg problems.

Operating room nurses may suffer from stress and burnout caused by shift work, night work, and other psychological and organizational factors.

Hazards related to this job

Specific preventive measures can be seen by clicking on the respective in the third column of the table.

Accident hazards 	Injuries to legs and toes caused by falling objects, e.g., medical instruments.	1
	Slips, trips, and falls on wet floors, especially during emergency situations.	1
	Stabs and cuts from sharp objects, especially needle-pricks and cuts by blades.	2
	Burns and scalds from hot sterilizing equipment.	
	Electrical shock from faulty or improperly grounded equipment, or equipment with faulty insulation.	3 4
	Acute back pain resulting from awkward body position or overexertion when handling heavy patients.	
Physical hazards 	Exposure to radiation from x-ray and radioisotope sources.	5
Chemical hazards 	Exposure to various anesthetic drugs (e.g. N2O, halothane, ethyl bromide, ethyl chloride, ether, methoxyfluorane, etc.).	6
	Skin defatting, irritation, and dermatoses because of frequent use of soaps, detergents, disinfectants, etc.	
	Irritation of the eyes, nose, and throat because of exposure to airborne aerosols or contact with droplets of washing and cleaning liquids.	6 7
	Chronic poisoning because of long-term exposure to medications, sterilizing fluids (e.g., glutaraldehyde), anesthetic gases, etc.	
	Latex allergy caused by exposure to natural latex gloves and other latex-containing medical devices.	8
	Infections due to the exposure to blood, body fluids or tissue specimens possibly leading to blood-borne diseases such as HIV, Hepatitis B and Hepatitis C.	9 10

Biological hazards 		11 12
	Risk of contracting a nosocomial disease as a result of a prick from a syringe needle (e.g. infectious hepatitis, syphilis, malaria, tuberculosis).	
	Possibility of contracting palm and finger herpes (Herpes Whitlow).	
	Increased hazard of spontaneous miscarriages.	
Ergonomic, psychosocial and organizational factors 	Fatigue and lower back pain due to the handling of heavy patients and to longed periods of work in a standing posture.	13
	Psychological stress caused by a feeling of heavy responsibility towards patients.	
	Stress, strained family relations, and burnout due to shift and night work, overtime work, and contact with sick patients, especially when patients don't recover from the operation.	
	Problems of interpersonal relations with surgeons and other members of the operating team.	
	Exposure to severely traumatized patients, multiple victims of a disaster or catastrophic event or severely violent patients may lead to post-traumatic stress syndrome.	14

Preventive measures

1 Wear shoes designed for nurses, with non-slip soles.

2 Handle sharp objects with extreme care; use special safety receptacles to store used hypodermic needles until disposal. Use safety needles, if available.

3 Install ground fault circuit interrupters; call a qualified electrician to test and repair faulty or suspect equipment.

4. Comply with all safety instructions regarding the installation and periodic inspection of electrical medical equipment.

5. Wear a radiation dosimeter (badge or other) when exposed to radiation; comply with all safety instructions to reduce exposure to a minimum.

6. Install air conditioning with effective general ventilation in the operating room to reduce heat stress and remove odors, gases, and vapors.

7. Provide eye wash bottles or fountains.

8. Nurses sensitive to natural rubber latex must use non-latex or powder-free latex gloves and avoid contact with other latex products.

9. Follow established appropriate infection control precautions assuming blood, body fluids and tissue are infectious

10. Routinely use barriers (such as gloves, eye protection (goggles or face shields) and gowns)

11. Wash hands and other exposed skin surfaces after coming into contact with blood or body fluids

12. Follow appropriate procedures in handling and disposing of sharp instruments or needles

13. Provide lifting aids for the lifting and transport of heavy patients; consult an occupational safety specialist on the safe handling of heavy patients.

14. Procedures and counselling services should be available to workers exposed to post-traumatic stress syndrome

Specialized information

Synonyms

Operating-room technician (medical ser.); surgical technician

Definitions and/or description

Performs any combination of following tasks before, during, and after surgery to assist surgical team: places equipment and supplies in operating room and arranges instruments, according to instructions; assists team members to place and position patient on table; scrubs arms and hands and dons gown

and gloves; aids team to don gowns and gloves; maintains supply of fluids, such as plasma, saline, blood, and glucose for use during operation; hands instrument and supplies to surgeon; holds retractors, cuts, sutures, and performs other tasks as directed by surgeon during operation; puts dressings on patient following surgery. Counts sponges, needles, and instruments before and after operation; washes and sterilizes equipment, using germicides and sterilizers; cleans operating room.

Related and specific occupations

Anesthesiologist; nurse, anesthetist (medical ser.); surgeon; surgeon assistant (medical ser.)

Primary equipment used

Catheters; masks; medical supplies (scalpels, syringes, needles, bandages, gauze, sterile pads, plaster dressings, etc.); monitoring equipment; sterilization equipment; stethoscope; sphygmomanometer; thermometers; watch

Workplaces where the occupation is common

Operating rooms of hospitals and other health care institutions; small operating rooms in clinics

10.2 Appendix 2. Questionnaire in English with Cover Letter

A Questionnaire for Perioperative Nurses:

Investigation of the Impact of Operating Room Occupational Hazards on Scrubbing and Circulating and Anesthesia Nurses

Author: Jingke Gao

Dear respondent:

I am Jingke Gao, Nursing Degree Program student from School of Social and Health Care Studies, JAMK. In order to find out the **Impact of Operating Room Occupational Hazards on Scrubbing and Circulating and Anesthesia Nurses**, which is also the topic of my bachelor thesis, I designed this questionnaire and kindly ask you to spend a few minutes to answer the following questions as completely as possible.

Results of the survey will be very helpful to get information about OR nurses' current working situation, important work-related risk factors and most common occupational diseases of OR nurses in KSSHP, which will be greatly valuable feedback for promoting OR nurses' working environment and prevention of occupational diseases. A copy of the results will be sent to the hospital, for your convenience and interest of reading and referring.

The questionnaire was designed based on '*International Hazard Datasheets on Occupation, Nurse, Operating Room*' published by International Labor Organization (ILO), which is a specialized agency of the United Nations.

All answers are confidential and you will not be able to be identified from the information you provide. Thank you very much for your help and cooperation!

Best Regards,

Jingke Gao

I. Your basic information

1. You are: ____ male ____ female 2. Your age is: ____
3. Your educational background is: ____ College level ____ AMK graduate

   ____ Specialized nurse other _____
4. You have worked as an operating room nurse for _____ years.
5. You are: ____ Scrubbing and circulating nurse ____ anesthesia nurse
6. You are currently working at: ____ OR 1 ____ OR 2 ____ OR 3

   ____ My workplace is flexible depending on the shift arrangement.

II. Operating room occupational hazards

1. Are you acquainted with the concept of operating room occupational hazards?

   ____ yes ____no
2. Do you think operating room is a working environment with multiple hazard factors for you as an OR nurse?

   ____ yes ____ no
3. Do you think operating room nurses are more vulnerable comparing with those who working at any other departments in the hospital?

   ____ yes _____ no ____ I don't know
4. How significantly do you feel that you are affected adversely by operating room occupational hazards?

   ____ not at all ____ occasionally ____ sometimes

   ____ often ____ very often

5. How frequently do you encounter the following occupational hazard factors during your daily work? Please write 1, 2, 3, 4, or 5 into the blank after each statement to indicate the frequency.

   (1 = never, 2 = occasionally, 3 = sometimes, 4 = often, 5 = very often)

Operating Room Hazard Factors		Frequency (1～5)
Accident hazards 	Harms caused by falling objects, e.g., medical instruments.	
	Slips, trips, and falls on wet floors, especially during emergency situations.	
	Harms caused by sharp objects, especially needle-pricks and cuts by blades.	
	Burns and scalds from hot sterilizing equipment.	
	Electrical shock from faulty or improperly grounded equipment, or equipment with faulty insulation.	
	Acute muscle pain resulting from awkward body position or overexertion when handling and transferring patients.	
Physical hazards 	Exposure to radiation from x-ray and radioisotope sources.	
Chemical hazard 	Exposure to various anesthetic drugs and gases.	
	Skin problems because of frequent use of soaps, detergents, disinfectants, etc.	
	Irritation of the eyes, nose, and throat because of exposure to airborne aerosols or contact with droplets of washing and cleaning liquids.	
	Chronic poisoning because of long-term exposure to medications, sterilizing fluids (e.g., glutaraldehyde), anesthetic gases, etc.	
	Latex allergy caused by exposure to natural latex gloves and other latex-containing medical devices.	
Biological hazards 	Exposure to blood, body fluids or tissue specimens possibly leading to blood-borne diseases such as HIV, Hepatitis B and Hepatitis C.	
	Risk of contracting a nosocomial disease as a result of a prick from a syringe needle.	
	Possibility of contracting palm and finger herpes.	
	Increased hazard of spontaneous miscarriages.	
Ergonomic, psychosocial & organizational factors 	Fatigue and chronic muscular-skeletal pain due to the handling of heavy patients and to longed periods of work in a standing posture.	
	Psychological stress caused by a feeling of heavy responsibility towards patients.	
	Stress, strained family relations, and burnout due to shift and night work, overtime work, and contact with sick patients, especially when patients don't recover from the operation.	
	Problems of interpersonal relations with surgeons and other members of the operating team.	
	Exposure to severely traumatized patients, multiple victims of a disaster or catastrophic event or severely violent patients may lead to post-traumatic stress syndrome.	

III. Your occupational health

1. Comparing with that before you've started working at operating room, your health situation now is:

   ____ better than before ____ quite same ____worse than before

   ____I don't know

2. Is there any work-related health problem which may affect your work efficiency?

   Yes, and, ____ occasionally ____sometimes

   ____often ____very frequently

   ____ No, I don't think I have any serious work-related health problem and I always work efficiently.

   ____ I don't know

3. Have you had any injuries due to accidents happen during the work? (Slips, trips, fallings, cuts, burns)

   ____ yes ____ no

4. If you have had accidental injuries, have you ever reported it?

   ____no ____ yes How many times? ____

   ____ I always report when I had an accidental injury.

5. When you working in the operating room, have you ever feel: (answers can be multiple)

   ____ dizzy ____headache ____nausea

   ____sleepy ____ difficulty of breathing

   ____ No, I feel quite ok.

6. Do you have any of the following nervous system disease? (Answers can be multiple)

   ____ muscle pain (any location) ____shoulder pain ____lower back pain

   ____ lumbar strain ____ lumbar disc protrusion

   ____ cervical spondylosis ____carpal tunnel syndrome

   ____ No, I don't have any of those nervous system disease.

7. Do you have any of following skin problem? (Answers can be multiple)

   ____ allergy ____ skin rash ____ dry skin ____ irritation

   ____ No, my skin is healthy.

8. Do you have any mucous membrane irritation or inflammation? (Answers can be multiple)

   ____ eyes mucous ____ nasal mucous ____ throat mucous

____ allergic asthma

____ No, I don't have any mucous membrane disease.

9. Have you had any of following problems? (Answers can be multiple)

____ varicose vein of lower extremity

____ eyesight reduction ____ haemorrhoid

____ No, I don't have any disease mentioned above.

10. Have you had any of the following problems? (Answers can be multiple)

____ gastric disease ____ fatigue ____ frequent flu

____ constipation ____ endocrine disturbance

____ No, I don't have any of those problems.

11. Have you had any accidental exposure to the following contagions? (Answers can be multiple)

____ hepatitis B ____ hepatitis C ____ tuberculosis

____ MRSA ____ISBL ____ herpes ____HIV

Other_____

____ No, I don't have any accidental exposure.

12. Have you had any of the following problems? (Answers can be multiple)

____ spontaneous miscarriage ____ congenital abnormalities on children

____ No, I have normal pregnancy and my child (ren) is (are) healthy.

13. Do you have any of the following problems because of stress and high workload of operating room? (Answers can be multiple)

____ insomnia ____ somnolence ____ mood swings

____ restlessness ____ depression

____ anorexia ____ overeating

____ No, I don't have any of those problems.

14. Do you have or have you ever had any other health problem(s) which is (are) not mentioned above?

____no ____ yes, and it is (they are) _____

15. If your health is affected by any occupational hazard factor, you will: (Answers can be multiple)

____ I think it is quite natural that health problems is a part of the job.

____ I am worried about that and I don't know what to do.

____ I will find the way of self-protection

____ I will complain to my colleagues and the manager, and ask for their advice.

____ I don't think it is a big deal and I feel like I'm still healthy

____ Maybe I will think about another job.

Other _____

16. Generally, you think working in operating room is: (Answers can be multiple)

____ challenging and difficult ____ simple and comfortable

____ stressful and exhausting ____ boring and disappointing

____meaningful and exciting ____ flexible and cheerful

____ I love my job and I will keep working on it.

____ I don't have special feelings but just doing it for a living.

Other _____

17. Would you like to add some comments?

_____
_____
_____
_____
_____

Thank you very much!!

10.3. Appendix 3. Agreement on Bachelor's Thesis Cooperation (in Finnish)

JYVÄSKYLÄN AMMATTIKORKEAKOULU
JAMK UNIVERSITY OF APPLIED SCIENCES

1(2)

SOPIMUS OPINNÄYTEYHTEISTYÖSTÄ

Sopijaosapuolet

Toimeksiantaja OHSINIKKA PIENIMEMI / KSSHP

Toimeksiantajan edustaja yh Tuula Kenta

Toimeksiantajan yhteystiedot (osoite, puhelin, sähköposti)
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Keskusallaalantie 19, 40620 Jyväskylä

Jyväskylän ammattikorkeakoulu

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Opinnäytetyön aihe

Opiskelija laatii opinnäytetyön aiheesta
An Investigation of the Impact of Occupational Hazards in Operating Room on OR Nurses

T&K Opinnäytetyö täyttää opetus- ja kulttuuriministeriön 1.2.2011 antaman ohjeen mukaisesti tutkimus- ja kehitystyön ominaisuudet

KYLLÄ ☒, opinnäytetyö on %:sti tutkimus-ja kehitystyötä.
EI TÄYTÄ ☐

Ohjaus Ammattikorkeakoulu vastaa opinnäytetyön ohjauksesta. Ammattikorkeakoulu ja opettaja eivät ole konsulttivastuussa työstä.

Dokumentointi Työstä laaditaan Jyväskylän ammattikorkeakoulun opinnäyteohjeen mukainen kirjallinen esitys joka luovutetaan toimeksiantajalle ja ammattikorkeakoulun kirjastoon julkaistavaksi.

Oikeudet Opinnäytetyön tekijänoikeudet kuuluvat Opiskelijalle. Toimeksiantaja saa rinnakkaisen käyttöoikeuden teokseen sen valmistuttua. Muut mahdolliset teollisoikeudet ja tekijänoikeudet ovat toimeksiantajan omaisuutta.

Keksinnöt Jos opinnäytetyön tekijä on osallisena keksintöön, joka patentoidaan, mainitaan hänet yhtenä keksijöistä. Mahdollisesta keksintökorvauksesta sovitaan erikseen noudattaen Jyväskylän ammattikorkeakoulun keksintöohjeen linjauksia.

Työsuhde Mahdollisesta työsuhteesta tai työstä maksettavasta palkkiosta toimeksiantaja ja opinnäytetyön tekijä sopivat erikseen. Opinnäytetyötä tekevät opiskelijat ovat Jyväskylän ammattikorkeakoulun tapaturmavakuutuksen piirissä, mikäli heillä ei ole työsuhdetta opinnäytetyön toimeksiantajaan.

10.4 Appendix 4. Application for Research Permission (in Finnish)

JYVÄSKYLÄN AMMATTIKORKEAKOULU
JAMK UNIVERSITY OF APPLIED SCIENCES
Hyvinvointiyksikkö

TUTKIMUSLUPAHAKEMUS 1 (2)

Opiskelija/ tutkimuksen tekijä	Nimi ja opiskelijanumero JINGKE GAO E1951	Ryhmätunnus SNP7S1	
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Muut tekijät	Nimi ja ryhmätunnus		
Tutkimuksen ohjaaja	Nimi Marjo Palovaara	Oppiarvo ja ammatti Lehtori	
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Tutkimuksen toimeksiantaja	Toimeksiantaja oh Sinikka Pieniniemi		
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Toimeksiantajan edustaja täyttää	Tutkimusluvan myöntäminen ☒ Tutkimuslupa myönnetään	☐ Tutkimuslupaa ei myönnetä	
	Myöntämisen ehdot ☒ Hakijan tulee toimittaa valmis raportti tutkimuksen valmistuttua ja esitellä tutkimuksen tulokset suullisesti, yhteyshenkilö oh Sinikka Pieniniemi tai oh Tytti Ewald ☐ Muut ehdot		
	Perustelut myöntämättä jättämiselle		
	Päättäjän nimi [signature]		
Päiväys ja allekirjoitus	Paikka ja päivämäärä JYVÄSKYLÄ 1/6/11	Allekirjoitus [signature]	