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Enhancing Healthcare Worker Well-Being and Patient Safety in the Pediatric Emergency Department: A Comprehensive Hazard and Risk Analysis

Çocuk Acil Serviste Sağlık Çalışanlarının Refahının ve Hasta Güvenliğinin Artırılması: Kapsamlı Bir Tehlike ve Risk Analizi

Abstract

Providing a healthy and safe hospital environment improves employee health and prevents occupational diseases and accidents. This increases staff motivation and productivity and helps to improve the quality of hospital services. Healthcare workers must work meticulously to provide accurate diagnosis, treatment and care services while competing against time. Working under pressure can cause healthcare workers to become fatigued, stressed and burnt out. This can have an impact on their ability to make decisions and lead to malpractice. Errors can cause occupational accidents or occupational diseases, while misunderstanding or misapplication can cause serious damage to the patient's health. This study identified hazards and risks to ensure that staff working in the hospital's pediatric emergency department work in a healthier and safer environment. Fine Kinney method was used as a risk analysis method in the study. It was observed that the high rate (86.7%) of employees' inability to participate in social and cultural activities (86.7%) due to occupational fatigue caused a decrease in the desire to work (70%), as well as the intense feelings of burnout and frustration (70%) caused by stress caused by the profession. As a result of the challenging conditions experienced, it was noted that the desire not to see patients during the day (76.7%) and dissatisfaction (46.6%) increased. Healthcare workers must be vigilant and careful, and occupational health and safety initiatives should be carried out systematically, team-based, and education-focused.

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Özet

Sağlıklı ve güvenli hastane ortamı sağlandığında, çalışanların sağlık durumları iyileşir ve mesleki hastalıklar ve iş kazaları önlenir. Bu durum, çalışanların motivasyonunu ve verimliliğini artırarak, hastanelerde hizmet kalitesinin de yükselmesine katkı sağlar. Sağlık çalışanları bir yandan zamanla yarışırken diğer yandan doğru tanı, tedavi ve bakım hizmeti sunmak için titizlikle çalışmak zorundadırlar. Baskı altında çalışma durumu, sağlık çalışanlarında yorgunluğa, strese ve tükenmişliğe neden olabilir. Bu da karar alma yeteneklerini etkileyebilir ve hatalı uygulamalara neden olabilir. Hatalar iş kazasına veya meslek hastalıklarına sebep olurken, yanlış anlama veya bir yanlış uygulama sonucu, hastanın sağlığına ciddi zararlar verebilir. Bu çalışmada hastanenin çocuk acil servisinde çalışanların daha sağlıklı ve güvenli bir ortamda çalışmalarını sağlamak amacı ile tehlikeler ve riskler belirlenmiştir. Çalışmada risk analizi yöntemi olarak Fine Kinney metodu kullanılmıştır. Çalışanların meslek kaynaklı olarak stresin yol açtığı tükenmişlik, yılgınlık hislerinin yoğun olarak yaşanması (%70) yanında, mesleki yorgunluk nedeni ile çalışanların sosyal ve kültürel faaliyetlere katılamama oranın (%86,7) yüksek olması çalışma isteğindeki azalmaya (%70) neden olduğu gözlenmiştir. Yaşanan zorlu şartlarının sonucunda gün içerisinde hasta görmeme isteğinin (%76,7) ve tatminsizliğin artırdığı (%46,6) tespit edilmiştir. Sağlık çalışanlarının dikkatli ve özenli olmaları, iş sağlığı ve güvenliği çalışmalarının planlı, ekip tabanlı ve eğitim odaklı şekilde yürütülmesi gereklidir.

Introduction

Meeting society's most basic needs, the health sector is vital to human health. Due to the occupational accidents and hazards to which hospital workers are exposed in the course of their work, they are an important part of the sector (Soares, et al., 2019).

Occupational risks in hospitals include various factors such as transmission of infections, injuries, chemical exposure, work stress, fatigue and psychological stress. In particular, during the pandemic period, the risks for health care workers have become even more acute (Çevirme & Kurt, 2020).

Injuries to staff, damage to hospital equipment and even harm to patients can result from workplace accidents in hospitals. It is therefore vital that everyone working in hospitals is aware of occupational health and safety (OHS) and takes the necessary precautions to reduce risks (DiBenedetto,1995). In recent times, the exposure of health care workers to violence in the workplace has become a serious problem (Esen & Aykal, 2020). Nurses are one of the health care professionals who are most affected by this situation. (Uğurlu et, al., 2010). Nurses can be physically and emotionally injured by the stress, anxiety, anger or violent behavior of patients and their families. The causes of violence in hospitals include factors such as long waiting times, communication problems, patient or family dissatisfaction, stress and fatigue. Basically, violence is a way for a lost soul to cry out and express itself. Violence is a behavior chosen as a means of self-expression. It is a method used by those who have no other way of expressing themselves (Adler, 2011).

In 2022, two personnel lost their lives: 149 doctors, 76 nurses, 76 security guards, 58 emergency medical technicians, 3 pharmacy workers and 60 other healthcare personnel; a total of 422 healthcare workers were subjected to violence (Uzuntarla, 2022).

From another point of view, violence can be a form of mourning as well as a form of self-expression. A soul that has lost itself can resort to violence because of its sense of loss. Similarly, violence can also be used as a form of revenge. An individual may resort to violence because they want what they cannot have from those who have (Kara & Şakar, 2022). However, violence is the power of the powerless, and its consequences can cause both self and other people to be hurt (Akdur, 1997). According to the previous reports, healthcare workers are more affected by work-related injuries and illnesses than workers in other sectors (Uçak, 2009). In the US, in particular, hospitals rank second among all service sectors in terms of minor injuries, and nurses are the main sufferers of work-related injuries and illnesses (Yeşildal, 2005).

The American Nurses Association reports that between 2001 and 2011, rates of staff health problems increased, including violence (25%-34%), exposure to hazardous drugs (5%-10%) (Roberts & Grubb, 2014), acute and chronic effects of anxiety and overwork (70%-74%), and musculoskeletal injuries (59%-62%) (Venditteli et, al., 2016). This situation indicates that the conditions of the working environment of the nurses are gradually getting worse. There is a significant correlation between the number of days of disability and illness in the work environment and job stress, thoughts of leaving the job and professional satisfaction (Mc Caughey et al., 2013).

These data are an indication of the extent of the hazards to which health care workers are exposed in their work environment. Work-related accidents and injuries are also influenced by factors such as job stress, job dissatisfaction and thoughts of leaving the job. Measures such as ensuring a healthy working environment for healthcare workers, taking occupational safety measures and regulating workloads should be taken. In addition, measures should be in place for the punishment of patients who are violent towards health care workers and for the prevention of this type of behavior (İnci & Bourse, 2014).

Healthcare workers may face various risks in terms of OHS while practicing their profession. These risks include biological hazards, especially diseases transmitted by blood and body fluids, respiratory infections, droplet-borne diseases and contact infections (Akça & Aydın, 2016). There are also physical, chemical, biological, and ergonomic risks. Musculoskeletal disorders, back pain, falls, burns, latex allergy, and radiation exposure are other risks that health workers may face. For example, many healthcare workers working in hospitals face the risk of contracting blood-borne diseases such as Hepatitis B, Hepatitis C and Crimean-Congo Hemorrhagic Fever (Korkmaz et al.,

2013). This shows that health workers are in contact with different types of risks and their effects at various levels (Bulut et al., 2020).

In short, an unintentional event that causes injury, death or damage is defined as an occupational accident. Workers in the health care sector are very likely to be exposed to occupational accidents due to occupational hazards.

The present study was addressed to answer the following questions:

1. Are the health and safety measures in place in the emergency services selected for the study really designed to protect workers to the extent required by law?
2. How do the employees perceive the performance of the measures that have been taken?
3. Are there any hazards associated with the tools, machinery or equipment being used?
4. Do workers have exposure to excessive heat or cold?
5. Do excessive noises or vibrations occur?
6. Is there a possibility of harmful radiation, infection, damage from chemicals and transmission by inhalation?
7. Is it possible to come into contact with hot, toxic or corrosive products?
8. Are workers exposed to dust, smoke, mist or vapor in the air?

The aim is to measure employees' awareness of accidents at work and occupational diseases caused by the working environment, and to use the data obtained to assess the risks and identify the issues to be addressed in terms of precautions.

1. Material and Methods

1.1. Participants

The present study was carried out at the Pediatric Emergency Department of Iğdır State Hospital (Iğdır, Türkiye) between 2020 and 2021. In the relevant department, there were 30 personnel working in the Pediatric Emergency Department, mostly nurses, doctors, cleaning staff, secretaries, security guards, technicians, and information technicians. The 24-hour service was very busy, and a shift system was applied, according to the interview. Along with the present study, we focused on identifying the occupational risks faced by those who work in the department considered for analysis. The working conditions were assessed from an occupational health and safety perspective through physical, chemical, biological, ergonomic and psychosocial risks. The likelihood, frequency and severity values were determined based on data from the employee survey and expert opinion.

1.2. Data collection

Risk analysis begins with identification of risks associated with job performance or material characteristics. In this context, the risks arising from the hazards are identified. Each risk is assessed separately. The combined effects of these risks and how they relate to other works are considered. For this purpose, technical and scientific teamwork is required for this type of work. To determine the level of risks identified or the severity of hazards, analytical methods are used. The risk assessment is composed of a cycle including the processes (Figure 1.). Corresponding to the risk-assessments, taking into account the prevention of risks or the occurrence of new risks, the appropriate measures are taken to eliminate the risks.

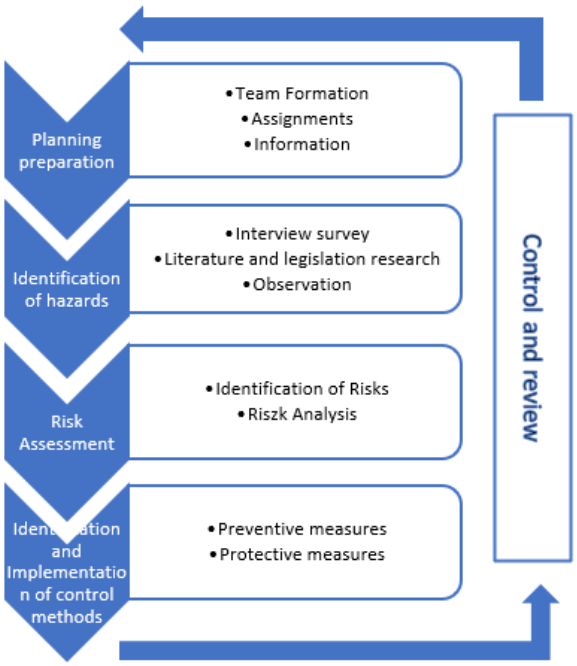

Figure 1. Risk Assessment Procedure in The Emergency Department

For data collection tools, methods such as observations and interviews were used. Among the methods, the observations were based on the careful monitoring of the actions that take place in the working conditions, contributing to increase the awareness of the possible risk categories to which employees are exposed (Taşdemir & Gür, 2021). In addition to the observations, interviews including questionnaires with employees provided information about the dimensions and types of physical, chemical, biological, ergonomic, and psychosocial risks experienced in the emergency department. Corresponding to the data obtained from the interviews, we used Fine Kinney method to rate and analyzed the risks. Fine Kinney method is a quantitative risk assessment method of MIL-STD-882 standard developed by Kinney and Wiruth in 1976. In this method, three parameters (probability, exposure factor and possible outcome) are considered for each hazard identified. For comparison and rating purposes, these parameters are multiplied to give a "risk score". (RP=L*F*S) (Kuleshov et, al., 2021). Briefly, "*likelihood* (L)" is the probability of damage occurring over time; "*frequency* (F)" is the frequency of exposure to the hazard. The "*severity* (S)" of a hazard is the amount of harm or damage to people, to the workplace and to the environment if the hazard occurs. The risk assessment method usually calculates the risk value by considering the potential outcome of the accident, the frequency and probability of the hazard event. This method is used to determine the risk level of a situation by assessing the possible consequences of a particular hazard or event, how often that hazard occurs and the probability of that event occurring, extending the understanding of the magnitude of a given risk and to take appropriate action.

This assessment is used as an important tool for risk management in different industries and workplaces. For instance, Doğan et al. (2022) used the Fine Kinney method to identify potential hazards and their risks for a medium-sized gas filling facility, which were scored by experts and classified by the Fine Kinney method. Pajic et al. (2023) adopted a similar methodology using the Fine Kinney method in warehouse and logistics applications. Bepary and Kabir (2022) used a multi-criteria and highly cognitive method called Fuzzy Analytic Hierarchy Process to determine the weights of risk parameters evaluated by Fine-Kinney method in the processes of transportation, construction, operation and maintenance of wind turbines. Netro et al. (2018) adopted the Fine Kinney method to identify and rate risks in the supply chain for a more competitive and safer workplace. Efe and Efe, (2023) developed an integrated method based on Fine Kinney and fuzzy logic to develop an OHS policy in a natural gas pipeline project.

The first step in the risk assessment process is to determine the potential outcome of the accident, the level of exposure and the probability of the event. In this step, the potential likelihood of the hazard or event is determined (Table 1). The exposure to the hazard is examined and the frequency of occurrence is assessed. The parameter "F" refers to the frequency of occurrence of the hazard event. The probability or frequency of the hazard event indicates how often this event occurs in a given time period (Table 2). The frequency of the hazard is an important factor in determining the magnitude of the risk and planning appropriate measures. In the next step, the identified potential consequences, ratings such as exposure level and probability of the event, include the consequences of potential accidents such as injury, property damage, etc., which are the most likely consequences of the hazard situation represented by the parameter "S" (Table 3). This assessment process is based on an examination of the conditions surrounding the hazard or incident and the experience of previous similar accidents. This analysis is done to understand the potential impacts and consequences of a particular hazard and plays an important role in determining the magnitude of the risk. This information plays a critical role in determining risk management strategies and measures.

Table 1. Table for Assigning Probability Values

Likelihood (L)	Category
0.2	Practically impossible
0.5	Weak probability
1	Very Low Probability
3	Rare but possible
6	Most likely
10	Very strong possibility

Table 2. Table for Assigning Frequency Values

Frequency (F)	Descriptions	Category
0.5	Very Rare	Once a year or less
1	Extremely rare	Once or several times a year
2	Rare	Once a month or a few
3	Occasionally	Once a week or a few
6	Frequently	Once or several times a day
10	Permanent	Continuous or more than once per hour

Table 3. Table for Assigning Severity Values

Severity (S)	Descriptions	Category
1	Must be taken into consideration	Slightly harmless or insignificant
3	Significant	Minor-Low work loss, minor damage, first aid
7	Serious	Major-Significant Damage, External Treatment, loss of working days
15	Very serious	Disability, limb loss, environmental impact
40	Very bad	Death, Total disability, Severe environmental impact
100	Catastrophe	Multiple deaths, major environmental disaster

In summary, after conducting hazard and risk analysis through interviews, surveys, expert opinions and literature studies, the findings were listed. After the identification process, the analysis of accidents, incidents, and accidents in the organization was carried out. According to the data obtained, a value was assigned to each criterion, and a general risk calculation was made. After the risk scores were calculated, the corresponding action was applied in the decision table given in Table 4. If the risk value is greater than 400, it requires urgent measures; if it is between 400 and 200, it requires short-term improvement; if it is between 200 and 70, it requires long-term improvement; if it is between 70 and 20, it should be kept under surveillance, and if it is less than 20, it does not require a priority measure (Karahan & Aydoğmuş, 2023).

Table 4. Risk Value and Decision Table

No	Risk Value (RP)	Decision	Action
1	RP<20	Acceptable Risk	Urgent action may not be necessary
2	20<RP< 70	Certain Risk	Should be included in the action plan
3	70 <RP<200	Significant Risk	Carefully monitored and addressed in the annual action plan
4	200 <RP< 400	High Risk	Short-term action plan should be put in place to address the problem
5	RP>400	Very High Risk	Immediate action should be taken by suspending work

These ratings are the basis for the risk analysis and then the determination of the risk score or risk level. This information is an important part of the determination of appropriate risk management strategies and the planning of response actions.

2. Results and Discussion

The present section was composed of two major parts. The first one was related to the findings we have obtained from questionnaire survey. In the subsequent part, the findings were analyzed using Fine- Kinney method for risk analysis. According to the questionnaire survey, concerning the physical risks; 83.3% (n=25) of the participants stated that there was no disturbing level of noise in the environment. However, 16.17% of the participants reported noise as a physical risk, stating to be badly affected. Regarding ventilation status of the conditions, 50% (n=15) of the workers reported that ventilation was adequate. All of them also reported that they were not exposed to excessive heat but 13.3% (n=4) of the participants stated that they were exposed to excessive cold. According to the findings linked to the other critical physical conditions, lighting was not a problem (76.6% n=23), there was no radiation exposure (76.6% n=23), and 30% of the workers (n=9) reported that the ambient air was humid and uncomfortable at times. Additionally, it was reported that the storage (86.7% n=26) and preparation (86.7% n=26) of chemicals used in the emergency department were carried out under appropriate conditions and that information labels were available on them (90%; n=27).

Regarding biological risks, it was stated that the ward had been exposed to a harmful agent related to blood-body fluids in the last year (16.7%; n=5) and that there was a high risk of exposure to viruses, fungi or bacteria (20%; n=6). While there was a risk of injury with sharp or piercing instruments in the ward (20%; n=6), inadequate isolation of infected patients (53% n=16), lack of necessary hygiene conditions (23.3% n=7) and deficiencies in the use of PPE (40% n=12) came to the fore.

Concerning assessment of psychosocial risks, it was stated that ward staff were exposed to verbal violence (73.4% n=22) or physical violence (36.6% n=11) by patients or their relatives. In this regard, it is also stated that there is a code white application for violence and that measures are taken and used by the employees in case of exposure. It was furthermore stated that the mental fatigue of the profession was high (93.4% n=28) and that the rate of experiencing irritability, anger and agitation due to the profession is high (73.4% n=22), as well as burnout and frustration (70% n=21). Subsequently, such a high percentage of mental fatigue might be manifested as low-level social and cultural activities (86.7%; n=26) and low-desire to work (70%; n=21), as evidenced from our current findings. As expected, challenging conditions of the profession caused stress among the employees (96.7% n=29) and increased the desire not to see patients during the day (76.7% n=23) and increased dissatisfaction (46.6% n=14). Those findings might be manifested as a decreased employees' sense of empathy with patients (36.6% n=11), according to our analysis. Regarding the determination of ergonomic risks, it was found that employees experienced occupation-related foot pain (76.6% n=23), low back pain (86.7% n=26), back pain (90% n=27), neck pain (80% n=24) and headache (93.4% n=28). 63.3% of the employees stated that they did not have the opportunity to sit during work, and 36.7% stated that there was no suitable furniture for sitting. It was reported that 36.7% of the employees carried heavy loads.

In addition to the findings given above, we further assessed/tabulated the results for each risk group. To minimize the risk of infection to patients and the safety of emergency services personnel, a range of personal protective equipment (PPE) is used. This equipment includes items such as masks, protective goggles and protective gloves (Northington et al., 2007). Infection control nurses provide trainings on infection and hygiene to employees. The participation in these training courses is provided by the health care institutions. The risk score was 270 (L:6, F:3, S:15) due to the intensive use of sharp and piercing instruments and the high risk of infection following an accident. In the case of exposure to blood and body fluids, the occupational health physician conducts examinations and follow-ups for employees at risk of injury from sharp and piercing instruments (Burkeen, 1973). However, preventive measures, such as implementing isolation procedures for infectious patients within the hospital to prevent the spread of infectious diseases (Önder et, al., 2011), as proven in our study. The risk score is reduced to 15 (L:1, F:1, P:15). The new risk status is at an acceptable risk level. RP: 180 (L: 6, F: 2, S: 15) is the risk of infection that may result from medical waste. Waste management should be carried out in accordance with the hospital's waste management plan, and waste should be carefully controlled, collected and sorted. In the final case, the risk score is 30 (L: 1, F: 2, S: 15), which reduces the probability but does not completely eliminate the event (Table 5). The risk of transmission of blood and body fluids by skin contact RP: 135 (L:3, F:3, S:15) is one of the key risks to be assessed in the annual action plan.

Appropriate PPE use should be encouraged and risk reduced through training RP: 21 (L: 3, F: 1, S:7). The risk of respiratory diseases transmitted by inhalation from patients RP: 75 (L: 3, F: 2, S: 15) is not included in the high-risk group due to the measures taken and the high sensitivity of the personnel, but requires attention and constant warnings about taking the necessary measures. Risk of transmission by contact of blood and body fluids to the eyes RP: 42 (L: 3, F: 2, S: 7) is one of the important events that can be detected under current conditions.

As a preventive measure, a hospital training plan on infection control, employee safety and employee rights should be drawn up once a year and as required (subject specific). Ensuring employee participation in such training will reduce the risk of environmental infections RP:42 (L:3, F:2, S:7), while hygiene training will reduce the risk of diseases transmitted by waste RP:21 (L:3, F:1, S:7). This also reduces the risk of eye contact diseases RP: 14 (L: 1, F: 2, S: 7). The risk of becoming infected through the physical environment RP: 84 (L: 6, F: 2, S: 7) is significant (Table 5). This can be controlled through the use of appropriate ventilation and air conditioning systems RP:42 (L:3, F:2, S:7), while preventing infectious diseases through inhalation in the environment RP:30 (L:1, F:2, S:15). Depending on the risk of infection, departments should be cleaned and inspected regularly. Health screening programs can be implemented to monitor the health status of employees and health screening checks and immunization/vaccination follow-ups can be carried out by workplace physicians (Omaç et, al., 2010).

These measures form part of the comprehensive infection control measures that healthcare organizations implement to ensure the safety of their staff and patients. By minimizing the risk of infection, they represent important steps towards improving the quality of healthcare.

Clearly, the appropriate use of PPE and infection control within the healthcare setting requires a number of measures to be taken. To ensure the correct use of PPE by staff within the healthcare facility, training should be organized. Information on current infection control protocols and the use of PPE should be included in this training. Staff participation in this training should be the responsibility of the health care organization (Azap et, al., 2005).

Hand hygiene is an important measure in the prevention of the spread of infection. To monitor and improve staff hand hygiene practices, regular audits should be carried out. An important factor in controlling healthcare-associated infections is ensuring compliance with hand hygiene. It is important for staff to report incidents such as injuries caused by sharps or splashes of blood. Such incidents should be recorded and analyzed on a regular basis, and corrective action should be taken where required. This process enables our employees to work in a safer and more secure environment (Karakuş, 2011).

Table 5. Risks from Infection and Physical Environment

Decision	Identified Risks	Current Situation				After Preventive Measures			
		L	F	S	RP	L	F	S	RP
High Risk	Risk of sharps injury	6	3	15	270	1	1	15	15
Significant Risk	Risk of infection due to medical waste accidents	6	2	15	180	1	2	15	30
Significant Risk	Risk of transmission of blood and body fluids by skin contact	3	3	15	135	3	1	7	21
Significant Risk	Risk of infection due to chemical/medical waste accidents	6	3	7	126	3	2	7	42
Significant Risk	Risk of infection due to improper use of sharps waste bins/waste bags	6	2	7	84	3	1	7	21
Significant Risk	Risk of transmission through the physical environment	6	2	7	84	3	2	7	42
Significant Risk	Respiratory diseases transmitted by inhalation from patients	3	2	15	75	1	2	15	30
Certain Risk	Risk of transmission of blood and body fluids by eye contact	3	2	7	42	1	2	7	14

L= Likelihood; **F**: frequency; **S**: severity; **RP**: Risk value

Occupational medicine or similar departments should regularly check the health of employees following accidents. In order to protect the health of employees and to detect potential health problems at an early stage, these checks are essential. To evaluate the effectiveness of existing policies and practices, regular employee surveys should be conducted on OHS issues. As a result of these evaluations, improvements should be made where they are needed. These measures form part of an academic and professional approach that healthcare organizations implement to improve the safety of both their staff and patients and to ensure effective infection control.

It is critical to health and safety to quickly identify, address and resolve issues that arise in the work environment. To reduce the risk of noise-induced illness RP:84 (L:6, F:2, S:7), effective management of noise generating equipment failures will reduce the risk RP:21 (L:3, F:1, S:7) (Table 6).

Table 6. Physical Risks and Risks From Electrical and Chemical Substances

Decision	Identified Risks	Current Situation				After Preventive Measures			
		L	F	S	RP	L	F	S	RP
Significant Risk	Electric shock caused by electrical leakage in devices	6	2	15	180	3	1	15	45
Significant Risk	Employee injuries and burns due to errors in the use of pressurized oxygen cylinders	6	2	15	180	3	2	7	42
Significant Risk	Risk of exposure to radiation when intervening/assisting patients during X-rays	6	6	3	108	3	2	3	18
Significant Risk	Diseases caused by noise	6	2	7	84	3	1	7	21
Significant Risk	Electrical burns during defibrillator use	6	2	7	84	3	1	7	21
Acceptable Risk	Risk of disease due to thermal comfort conditions of the working environment	3	2	3	18	3	2	3	18
Acceptable Risk	Risk of worker injuries, burns and allergic reactions in accidents due to chemical spills and splashes	6	1	3	18	6	1	3	18

L= Likelihood; **F**: frequency; **S**: severity; **RP**: Risk value

Radiation is an important tool that is widely used in a number of applications in the healthcare sector, including for medical imaging and diagnostic purposes. There is a risk RP:108 (L:6, F:6, S:3) of exposure to radiation during procedures/assistance to patients during x-rays. When carrying out such work, the safety and health of those engaged in work that involves the risk of being exposed to

radiation should receive the highest priority. Furthermore, radiation safety training should be provided regularly. These trainings will help staff understand the correct use of radiation, the risks of exposure and safe working methods, which will reduce the risk value to RP: 18 (L:3, F:2, S:3).

Electric shock, which can occur as a result of electrical leakage from equipment RP: 180 (L: 6, F: 2, S: 15), is a significant risk. The risk of electrical burns that may occur during the use of defibrillators RP:84 (L:6, F:2, S:7) should be included in action plans and the new situation will be RP:21 (L:3, F:1, S:7) when employees are supported with training programs (Table 6). The risk of illness due to the thermal comfort conditions of the working environment is expected to be RP:18 (L:3, F:2, S:3), while the risk of employee injuries, burns, and allergic reactions in accidents due to chemical spills and splashes was RP:18 (L:6, F:1, S:3) (Table 6.). The level of risk is reduced by regular training of personnel on electric shock and by raising awareness through appropriate warning signs RP:45 (L:3, F:1, S:15). The risks posed by adverse conditions arising from thermal comfort conditions and injuries and allergic disorders caused by chemical splashes are considered to be at acceptable levels and therefore do not require urgent action.

The identified risk of workers being injured and burned by incorrect use of pressurized oxygen cylinders RP:180 (L:6, F:2, S:15) is very high. Oxygen cylinders are important medical devices that are widely used in the healthcare sector. However, knowing how to handle and store them is essential to ensure the safety of both workers and patients. Oxygen cylinders should not be touched without the use of gloves. By preventing oil or dirt from getting onto the cylinders, gloves increase cylinder safety (Karagölge & Gür, 2016). Contact with the cylinder should be avoided by wearing oily gloves or by applying cream to the hands. Such substances may adhere to the surface of the cylinders and may increase the risk of a fire occurring. The valves of an oxygen cylinder should never be allowed to come into contact with flammable substances. This is important to minimize the risk of fire. Flammable materials must not be stored near cylinders. The outlet valves of the cylinders must be kept clean and free from contamination, in particular from oil and water. Dirty valves can prevent proper valve operation and cause problems controlling oxygen flow. Oxygen cylinders should be stored in specially designed carts. These carts ensure the safe transportation and storage of cylinders. In addition, there should be specially designated places where the cylinders are kept connected. With these improvements and training programs, both the probability and severity of the current situation will understandably change RP:42 (L:3, F:2, S:7).

Regarding the risk of exposure to allergic infections, the risk of developing allergies due to exposure to instrument disinfectants RP:126 (L:3, F:6, S:7), skin allergy due to the use of hand antiseptics RP:22.5 (L:0. 5, F:3, S:15), risk of drug reaction due to exposure to drug splashes RP:90 (L:1, F:6, S:15), allergic-skin diseases due to use of surface disinfectants RP:56 (L:3, F:3, S:7), risk of latex allergy due to use of gloves RP:45 (L:1, F:3, S:15) (Table 7). The severity and frequency of any allergic reaction varies depending on the properties of the causative agent and the individual's exposure. It is known from the literature that there is a wide variation in the severity of allergic reactions and that this variation is observed across individuals. Studies have shown that there are marked variations in the severity of allergic reactions between different individuals exposed to the same allergen (Sicherer & Sampson, 2018, Wood et al., 2014, Nwaru et al., 2014, Basketter et al., 1999, Api, et al., 2008). People at risk of allergic reactions should be provided with alternative gloves and encouraged to use them when necessary and in sufficient quantities. In addition, hand hygiene training should include a detailed explanation of the need to use hand protection cream. Equipment disinfection should be carried out by suitably trained personnel using PPE. Procedures for instrument disinfection should be established. These procedures should be used when necessary and in appropriate quantities.

In addition, an effective ventilation system should be used, and the use of PPE during the use of tools will significantly reduce the risk. Providing PPE, and using it correctly increases the safety of workers. Therefore, employees should be actively involved in training, and the correct use of PPE should be encouraged. As a result of these improvements, there will be a significant reduction in the severity of the condition, and there will also be a reduction in the frequency of the condition (Table 7).

Table 7. Allergy Risk due to The Materials Used

Decision	Identified Risks	Current Situation				After Preventive Measures			
		L	F	S	RP	L	F	S	RP
Significant Risk	Risk of developing allergies from exposure to instrument disinfectants	3	6	7	126	1	3	3	9
Certain Risk	Skin allergy due to the use of hand antiseptics	0.5	3	15	22.5	0.5	2	7	7
Certain Risk	Risk of drug reaction from exposure to drug splashes	1	6	15	90	1	2	7	14
Certain Risk	Allergic-skin diseases caused by the use of surface disinfectants	3	3	7	56	1	2	3	6
Certain Risk	Risk of developing latex allergy due to glove use	1	3	15	45	1	2	7	14

L: Likelihood; **F**: frequency; **S**: severity; **RP**: Risk value

OHS is of great importance in healthcare organizations, especially with regard to ergonomic hazards and risks. In this context, employees should be trained in the identification and prevention of ergonomic hazards and risks, and in the use of appropriate work practices. When the current situation is examined, vascular diseases due to prolonged standing RP:126 (L:1, F:2, S:15), risk of body injuries during patient handling and turning RP:42 (L:1, F:6, S: 7), risk of worker injuries due to falling or tipping of items not secured to the wall, floor and falling or rolling of items/materials that cannot be secured RP:30 (L:1, F:2, S:15), risk of bumps, sprains, and injuries due to bumps, slips, trips, falls and pinching due to wet/slippery floors RP: 30 (L:1, F:2, S:15), risk of wrist disorders due to prolonged computer use RP:21 (L:0.5, F:6, S:7), risk of musculoskeletal disorders due to prolonged standing RP:21 (L:0.5, F:6, S:7), risk of bodily injuries during pulling and carrying materials within the unit RP:10.5 (L:0.5, F:3, S:7), risk of bumps, jams, falls and injuries due to irregular placement of objects in the working environment RP:4.2 (L:0.2, F:3, S:7) (Table 8.).

Table 8. Ergonomic and Physical Environment Risks

Decision	Identified Risks	Current Situation				After Preventive Measures			
		L	F	S	RP	L	F	S	RP
Significant Risk	Vascular diseases caused by prolonged standing	3	6	7	126	2	3	7	42
Certain Risk	Body injuries during patient handling and turning	1	6	7	42	0.5	6	7	21
Certain Risk	Worker injuries due to falling or tipping of items that are not secured to the wall or floor and falling or rolling of items/materials that cannot be secured	1	2	15	30	1	2	7	14
Certain Risk	Risk of bumps, sprains and injuries due to bumps, slips, trips, stumbles, falls and entrapment due to wet/slippery ground	1	2	15	30	0.5	2	15	15
Certain Risk	Wrist disorders due to prolonged computer use	0.5	6	7	21	0.5	3	7	11.5
Certain Risk	Musculoskeletal diseases caused by prolonged standing	0.5	6	7	21	0.5	6	7	21
Acceptable Risk	Body injuries occurring during the pulling and transportation of materials within the unit	0.5	3	7	10.5	0.5	3	7	10.5
Acceptable Risk	Risk of bumps, jams, falls and injuries due to irregular placement of objects in the working environment	0.2	3	7	4.2	0.2	3	7	4.2

L:Likelihood; **F**: frequency; **S**: severity; **RP**: Risk value

When not in use, patient transport vehicles, stretchers and similar equipment should be parked in designated areas with the brakes locked. This is a safety measure for the prevention of uncontrolled vehicle movement and possible accidents. Materials that are heavy or hazardous to health should also be stored on lower shelves when stacking materials. Wet and slippery floors

should be marked with appropriate warning signs. It should be emphasized that care should be taken in these areas. Depending on the general condition of the patient, patient handling and turning should involve more than one member of staff. This aims to protect both the safety of the patient and the health of the employees. These methods ensure the effective implementation of OHS standards and ergonomic principles.

If the work environment involves fixed objects, such as cabinets, that could injure workers if they tip or fall, it is important to secure these. Ensuring worker safety and minimizing potential risks is a crucial step. Chairs, stools, and similar equipment used by employees should be removed from service immediately if faulty and returned to the appropriate department for maintenance or repair. Warning signs such as "Caution, do not use if broken" should be placed on these tools if they cannot be shipped immediately.

If these actions are trained and improved, the risk of vascular disease related to standing will be reduced to RP:42 (L:2, F:3, S:7), there will be fewer physical injuries due to moving and turning patients RP:21 (L:0.5, F:6, S:7), the risk of falling unsecured objects will be eliminated as a result of control and supervision RP:14 (L:1, F:2, S:7). As a result of marking or measures related to wet floors or uneven floors, accidents in such places will also decrease RP:15 (L:0.5, F:2, S:15). Risks from computer use will be reduced as a result of training on the risks associated with screen-based work RP:10.5 (L:0.5, F:3, S:7,). Musculoskeletal disorders caused by prolonged standing work, pulling or pushing materials, which are among the acceptable risks, can be reduced by organizing trainings related to manual handling regulations.

Healthcare organizations have a number of measures in place to ensure the professional development, skills and safety of their staff. Healthcare workers may have to race against time because healthcare services by their very nature may require hasty decisions and may be subject to time limits. As a result, health care professionals must work meticulously to provide accurate diagnosis, treatment and care in a race against time. Fatigue, stress, and burnout can result from working under this pressure. This can have an impact on their ability to make decisions and lead to malpractice (Girgin et, al., 2023). A patient's health can be seriously affected by an error, misunderstanding or misuse. For this reason, health care professionals should always be very careful and attentive. Within this framework, employees are provided with trainings on communication skills, stress management and anger management.

Table 9. Psychosocial Risks

Decision	Identified Risks	Current Situation				After Preventive Measures			
		L	F	S	RP	L	F	S	RP
Very High Risk	Lack of anger and stress management skills of employees	6	6	15	540	3	2	15	90
High Risk	Risk of employees being subjected to verbal violence	6	3	15	270	3	2	15	90
High Risk	Risk of physical violence, assault and battery against employees	3	1	100	300	1	1	100	100
Certain Risk	Risk of sexual harassment of employees	0.5	0.5	100	25	0.2	0.5	100	10
Certain Risk	Risk of employees being sued	1	0,5	40	20	0.5	0.5	40	10

L: Likelihood; **F**: frequency; **S**: severity; **RP**: Risk value

Psychosocial risks are always present and have a negative impact on health workers. Health workers are under pressure due to the nature of their work. In this regard, the risk of employees' lack of anger and stress management RP:540 (L:6, F:6, S:15) is quite high, and measures should be taken through continuous trainings and counseling RP:90 (L:3, F:2, S:15) (Table 9). The risk of employees being exposed to verbal violence RP:270 (L:6, F:3, S:15), and the risk of physical violence, assault and battery against employees RP:300 (L:3, F:1, S:100) constitute a situation that needs to be resolved in the short term. In order to prevent violence, information on legal regulations should be intensified, and security measures should be increased. In addition, the risk of sexual harassment

RP:25 (L:0.5, F:0.5, S:100) and the risk of being sued RP:20 (L:1, F:0.5, S:40) are recognized risks for hospital employees (Table 9).

Employees should be provided with psychological support when necessary to help them cope with challenging situations and to meet their psychological needs (Baykan & Ünal, 2022). Physical security measures should be in place, such as 24-hour security guards in all areas of the facility, surveillance cameras monitoring the general areas of the hospital, and a rapid response to Code White calls. In addition, in order to increase the effectiveness of these measures, it is necessary to reinforce regular intervention practices following White Code notifications by conducting improvements and exercises where necessary.

The support and training that workers should receive to prevent psychosocial risks can reduce certain risks, but it may not be possible to eliminate them completely. Various measures must be taken to minimize the risks and prevent employees from being exposed to such negative experiences. This includes support such as training programs, awareness-raising seminars, guidance and advisory services. However, as there are different dynamics and variables in each work environment, these measures may not completely eliminate the risks. It is therefore necessary to make continuous efforts to mitigate the risks, which may not always result in the complete elimination of the risks. In this case, it should continuously review its policies and practices and develop new strategies to ensure the safety of employees. Taking precautions does not reduce the severity of the risk because the same outcome will occur, but it does reduce the probability and frequency of the event (Table 9).

Conclusion and Recommendations: The way forward

The health sector is one of the most important sectors that meets the most basic needs of society in our country and in the world. The health sector provides the medical services required for people to sustain a healthy/proper life. The medical services are orchestrated by a number of healthcare workers including nurses, doctors, cleaning staff, security, and information technology staff. As can be seen in every sector, a series of occupational risks might emerge in healthcare sectors, which subsequently causes threats for staff. However, the risks might be alleviated with trainings carried out by the relevant bodies. Along with the present study, we have assessed the risk factors at Pediatric Emergency Department (Igdır, Türkiye) using Fine Kinney Risk Method. To the best of our knowledge of the survey, the present study is one of the first reports to use the Fine Kinney Risk Method. According to the analysis considered, we have reported the high-risk scores for "anger and stress", "verbal harassment" and "physical violence", respectively RP:540, RP:320 and RP:300. Specially, verbal violence was experienced by 73.4% of the employees, but physical violence was experienced by 36.6% of the employees, according to the analysis.

However, there are also some limitations to the present study. Those are as follows; I) The Pediatric Emergency Department of Iğdır State Hospital was the only institution included in this study. The reported findings are the consequences of single hospital. For this reason, the number of participants and hospitals might be increase for comprehensive results. II) In addition, although the necessary approvals were obtained from health institutions and ethics committees at the beginning of the studies, given the sensitivity of the subject, people are reluctant to answer completely honestly when asked. This situation might arise from the fact that individuals are concerned about encountering possible problems in their work environment and can directly affect the success of the research.

High-risk workplaces such as hospitals should pay particular attention to OHS issues. First of all, the risks that may occur in the emergency department of hospitals should be identified, and how these risks can be prevented should be determined by making a risk assessment. Necessary warnings and emergency plans should be prepared within the scope of OHS studies to be carried out by a broadly participated team, including senior management and employees. OHS practices in hospitals should be periodically reviewed and updated when necessary. Thus, the health and safety of employees can always be protected at the highest level. To combat hospital violence, it is important for hospitals to increase security measures and train their staff on how to prevent and

manage violence. In addition, patients and their relatives should be aware of the need for respectful and understanding behavior in the hospital environment.

Aside from the patients and their relatives, personal protective equipment is very critical. In this context, the following recommendations, in accordance with the former reports and our findings, should be handled.

1. An effective method of preventing occupational accidents and occupational diseases is the effective use of personal protective equipment (PPE). PPE comes into play when technical systems, work organization and working methods are insufficient to reduce or prevent risks in the workplace. Healthcare workers have to use various personal protective equipment together or at the same time in different processes to protect themselves and the patients they care for. The most commonly used types of PPE among healthcare workers include gloves, gowns, masks/respirators, goggles and visors. This equipment plays an important role in helping health professionals to protect themselves and those around them from potential risks in the course of their work (Yüksel, 2021).

2. In order to reduce the risk of disease transmission during handling processes, a standardized procedure is required for all patients. In this process, hand hygiene, especially before and after contact, should be of utmost importance. When there is a risk of contact with blood, body fluids, injured skin or mucous membranes, it is important to use personal protective equipment such as gloves, gowns, masks and eye/ear protection. Hand hygiene should be observed before and after putting on and taking off gloves (Zenciroğlu, 2011). Needles should not be covered after use; the tip should not be bent and should be stored in puncture-proof boxes. Workers should cover all wounds and cracks in their hands with dressing materials. Contact isolation should be practiced in addition to standard procedures against diseases that can be transmitted by contact. When entering the patient room, hand hygiene must be observed and apron and gloves must be worn respectively. When leaving the room, gloves and apron should be removed and cleaning with alcohol-based antiseptics should be provided for hand hygiene (Pakdemirli, 2021).

3. These procedures are important to reduce the risk of disease transmission and improve the safety of healthcare workers and patients. An additional isolation procedure should be established against diseases that can be transmitted through coughing, sneezing and talking. Hand hygiene should be ensured before and after contact with the patient. During this process, care should be taken to use personal protective equipment such as medical masks, face shields and gowns. These additional procedures are necessary to reduce the risk of respiratory transmission and to ensure the protection of healthcare workers in contact with patients (Sarmasoğlu et, al., 2020).

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