

Non-clinical topics

Medwave 2015 Aug;15(7):e6239 doi: 10.5867/medwave.2015.07.6239

Occupational hazards and diseases among workers in the emergency services: narrative review of international literature and an approach to Chile

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Citation: Jiménez Paneque R, Pavés Carvajal JR. Occupational hazards and diseases among workers in emergency services: a literature review with special emphasis on Chile. *Medwave* 2015 Aug;15(7):e6239 doi: 10.5867/medwave.2015.07.6239

Submission date: 5/8/2015

Acceptance date: 24/8/2015

Publication date: 8/9/2015

Origin: not requested

Type of review: reviewed by three external peer reviewers, double-blind

Abstract

BACKGROUND

Healthcare workers face the risk of accidents and illnesses related to their occupation. Psychological stress, exposure to communicable diseases and violence are perhaps the most significant ones. Workers in emergency services are more likely to be subjected to these risks than healthcare workers in other areas. This review aims to assess current international literature regarding this situation and more specifically the treatment that this issue has had in Chile.

METHODS

We based the review mainly on PubMed/MEDLINE. The general search strategy included the following keywords: health personnel, emergency medical services and occupational diseases combined with other specific words. We also reviewed the state of prevention for occupational hazards in the emergency services.

RESULTS

More than 70 studies addressing the issue of one or another occupational hazard in emergency services were detected. In Chile 12 studies refer to the issue of occupational risks in healthcare workers and at least two of them focus on emergency services.

CONCLUSIONS

The review evaluates the overall picture of the risks and illnesses of emergency services health workers but does not analyze each of the risks in depth. We recommend delving deeper into the issue of occupational hazards of emergency service healthcare workers in order to help improve and evaluate preventative measures.

Introduction

It is known that an employee of any profession or occupation may be subjected to the risk of disease or suffering a trauma related to his or her work. The branch of Medicine named Occupational Medicine or Occupational Health deals with these health problems. Occupational health includes the study of diseases related to occupations, the job and the workplace, accidents that

may occur during working hours or during transfer from or to the workplace or between tasks, and the risks of illness or injury present in the work environment.

The WHO on its [website](#) states that occupational health encompasses all aspects of health and safety in the workplace and focuses especially towards primary

prevention of risks. Furthermore, the World Health Organization promotes the development of this area stating "... occupational health and welfare of the people who work are prerequisites for productivity and are important for socio-economic and sustainable development in general." [1]

The risks at work are diverse and spread across a wide range of levels of impact and likelihood of occurrence ranging from a low chance of getting a relatively minor ailment, to the highest risk of dying from an accident or illness related to the occupation.

Obvious and known are the risks of construction workers, members of crews of ships and aircraft, drivers of any kind of automotive transport, firefighters, police officers, workers in cement factories, people working exposed to the sun and other occupations that involve great risks of serious trauma or diseases directly related to their work conditions.

Health workers also face risks of accidents or diseases because of their occupation. In this area, some common and important risks are labeled. The psychological stress generated by dealing with sick people who expect the care they receive will improve their health; contagion due to handling infected people with communicable diseases; radiation exposure by the use of equipment and devices that emit X-rays; and contact with chemical or biological substances that may derive from sick patients. WHO mentions seven types of risks to which health workers are exposed: biological (such as hepatitis, tuberculosis and acquired immunodeficiency syndrome); chemicals (such as contact with glutaraldehyde and ethylene oxide); physical (like noise and radiation); ergonomic (e.g. heavy lifting); psychosocial (such as stress and violence), and related to fire, explosion and contact with electricity [2].

Workers in the emergency services are subject to almost all the risks of illness mentioned above probably more likely than workers in other areas of health care are. Stress, harmful biological substances and violence are perhaps the risks to which most often emergency department workers are exposed.

This review aims to assess concisely the magnitude of the problem from the international literature published without delving into the intricacies of its causes and consequences. For our location in Santiago, Chile, we will make a particular foray into this country.

Methods

We reviewed PubMed database that contains over 24 million citations of biomedical literature obtained from MEDLINE (database of the National Library of Medicine of the United States), magazines of life sciences and online books.

The general search strategy included the following descriptors obtained from Medical Subject Headings

(MeSH) PubMed: health personnel, emergency medical services and occupational diseases.

So we generated a basic search strategy: ("Health Personnel"[Mesh]) AND "Emergency Medical Services"[Mesh]) AND "Occupational Diseases"[Mesh]) and further combined it with other keywords separately: stress, psychological; HIV; tuberculosis; workplace violence; human engineering and sleep disorders, circadian rhythm.

For the search of the published literature in Chile, we also explored the databases Scielo, LILACS and the general Google search data. We also looked for documents published by international organizations such as WHO and the International Labor Organization (ILO) on their websites; and for Chile, we looked for publications of the Ministry of Health as well.

We did not set a time limit to the search terms but emphasized that published in the last ten years.

For an easier reading of the review, the results are set out by risk explored.

Results

Stress (psychosocial risk)

The likelihood of stress is usually high in situations where patients' lives are at risk and the health care provider must operate with agility and skill. It is recognized that a worker with stress is "less likely to be healthy, is poorly motivated, less productive and less safe at work," a situation that also affects the success of the organization [3]. Stress is inherent to psychosocial factors that influence the work, an issue widely discussed at the ninth session of the joint committee ILO / WHO meeting in 1984 [4]. The literature reviewed, displays the issue of stress experienced by emergency service workers addressed by different authors and from different angles [5],[6],[7],[8],[9],[10],[11],[12],[13],[14],[15],[16]. It is very likely that stress be the number one occupational hazard for workers (doctors, other professionals, technicians and administrative employees) of the emergency services and its consequences are quite varied. Flowerdew et al[9] identify factors causing stress in a survey conducted in an emergency department of a London hospital and focused on staff behavior. They identified as most important excess workload (due to shortage of staff in that service) and deficiencies in teamwork. Healy and Tyrrell [10] conducted a study on attitudes of doctors and nurses who were emergency department workers. These authors remark that witnessing aggression or violence and participating in the resuscitation of people, may trigger important emotional demands and, despite the frequency with which emergency service workers face them, they do not become immune to stress. In a study conducted with emergency physicians in Germany, Pajonk et al, point out the importance of personality type in the consequences of stress as the so-called "post-traumatic stress disorder" [8]. In a study conducted in France [5] stress was associated with age younger than 30 years and low social support from

supervisors. In addition, non-medical personnel had more stress-related problems than physicians.

Stress often also generates the syndrome called "burnout" which has also been and is being studied in professionals working in emergency departments [11],[14],[17],[18],[19],[20]. In a recent analysis carried out in the UK, stress is considered a sign and symptom of what they call "the emergency medicine workforce crisis" [21].

Bernaldo de Quiros-Aragon and Labrador-Encinas [6] found a moderate average level of stress and burnout in workers from emergency services in Madrid. Another study in Spain [7] states overwork and lack of emotional support are major predictors of burnout or any of its components. A study in nurses working in emergency services (hospital and pre-hospital) in Italy [18], finds that at least two thirds of nurses suffering from burnout classified as serious. The emergency service workers, showed a burnout level higher than that found in workers from intensive care units and palliative care in a study at a large hospital in Madrid [20].

Direct contact with blood or other biological fluids

Infection through contact with contaminated blood or body fluids is a problem in the emergency services, addressed by various studies reported in the literature [22],[23],[24],[25],[26],[27],[28]. These services often present situations where the necessary speed in caring for the sick, hampers taking precautions designed to prevent direct contact with blood or other biological fluids. We highlight needlestick or other injuries caused by sharp instruments when there is a risk of contamination from blood of patients with human immunodeficiency virus (HIV), hepatitis C or B or other disease.

Several studies in the 90s assess the risk of infection by human immunodeficiency virus in the emergency service workers [23],[24],[26]. One of these studies [23] situates the annual risk of infection by human immunodeficiency virus in doctors or nurses in emergency departments between 0.0005% and 0.026%, a low level of occurrence, but with high impact if one considers the consequences of an infection such as the human immunodeficiency virus.

The emergency department of a hospital in Rhode Island, United States, received 1436 visits classified as exposures to blood or other fluids [22] between 1995 and 2001. Twenty two percent of these visits were from health workers and 73% of the latter were needle sticks or sharps injuries. The needle puncture was the most frequent type of occupational exposure in hospital workers in a recent study in Tanzania as well [25].

In a study conducted in 2012 in Tehran, with 200 workers in the emergency services of three hospitals, it was reported that 115 (57.5%) had at least one episode of exposure to blood or accident with needle or other sharp instrument during their work in the emergency department [29]. An editorial of the Venezuelan journal *Salud de los Trabajadores* notes that about two

million needlestick accidents are reported each year worldwide and it is presumed that, as many remain unreported [30].

Infection with diseases such as tuberculosis are also considered more likely in emergency departments' workers. In 1994, the results of a survey conducted in the emergency department at Harbor-UCLA Medical Center (University of California, Los Angeles, United States) reveal that 25 of the 81 (31%) workers who responded to the survey and who had not received the BCG vaccine became positive to tuberculin test (Mantoux) during the time they worked in this department [31].

In 2011, a study conducted between 2007 and 2009 in urban emergency services from Boston (Massachusetts, USA), positioned tuberculosis exposure in second place, after meningitis, with 17.2% of all reports. This study also mentions exposure to other infectious diseases such as influenza [32].

Violence

Another health risk that is high in emergency service workers is violence. Very often situations occur where the relatives of patients in critical condition, or the patients themselves in stress situations, physically assault health providers or provoke episodes of violence that somehow involve health workers. A recent review of the literature highlights the problem of violence in emergency departments and its consequences for the health of their workers. The authors conclude that the problem is similar in many regions of the world and universal measures should be taken to prevent it [33]. In 1998, a survey in Canada reported that over 90% of workers had experienced verbal or physical violence during their working time in the emergency department. In the same survey, 68% referred they perceived an increase in the frequency of violence in the time and 27% had to take leave from work due to an episode of violence [34].

An editorial in the journal *International Orthopaedics* published in 2013, discusses with emphasis the current problem of violence against health workers. It criticizes the problem of violence against health workers in places where armed conflicts take place but it also states that violence "due to drug use, ignorance, intolerance and disrespect has become a daily occurrence." The editorial notes that there is no country free from this type of violence and pinpoints workers from the emergency departments at the forefront of danger regarding this scourge [35].

Other studies have examined violence in the emergency services and their impact on the people who work in them [36],[37]. A study conducted in an Italian hospital that included repeated surveys: 2005, 2007 and 2009, reports emergency departments as the most affected by violence that particularly involves doctors and nurses [38]. Miret and Martínez-Larrea point out thirteen factors that may contribute to the development of violence in emergency services; ten possible effects of violence on workers in these services; and eight effects of this problem on the services themselves [14].

Other risks

The literature mentions and discusses other occupational hazards for workers in the emergency services. Disorders involving the musculoskeletal system are frequent in health workers in general, particularly in nurses. Carrying stretchers with patients has been studied as a factor that produces high levels of fatigue in ambulance workers [39],[40]. A Finnish study published in 2008, found that handling heavy loads, maintaining unhealthy habits, and sleep disorders were factors associated with the occurrence of low back pain; three circumstances commonly seen in emergency services workers [41]. Furthermore, musculoskeletal disorders, burnout and job demands were interrelated factors in a study with nurses from the emergency services [42].

Exposure to toxic chemicals is one of the seven issues WHO points as risks for health workers [2]. An eloquent example of this risk is the case of a patient (published in 2004) who ingested arsenic and how several doctors who treated him in the emergency department, developed laryngitis and disorders such as corneal erosions due to the exposure to toxic gases derived from arsenic [43].

Another aspect that affects workers in the emergency services is the change in shift work and night work. Many workers in the emergency services are often required to work on different schedules. A very recent study explains why the disruption of the biological clock actually may have a negative impact on health and thus endorses clinical studies that have linked this problem to the risk of some diseases (metabolic, neurological disorders and cancer) [44]. The increased risk of cancer, particularly breast cancer, due to working night shifts is still under study [45],[46],[47],[48],[49],[50]. Four recent meta-analysis found a weak but consistent association between night work and breast cancer risk [46],[47],[49],[50]. While more studies are needed, the results so far point to a relative risk (relative to those who do not work night shifts) relatively low but above one. The meta-analysis by Jia et al gives overall confidence interval for the relative risk of breast cancer (risk for persons performing night shifts / risk for people who do not do night shifts) of 1.08 to 1.33 [50].

Night work has also been associated with other disorders. A recent systematic review definitively links it to the risk of metabolic syndrome when it finds a 95% confidence interval for the relative risk for those who had a longer exposure to work at nighttime with regard to night work not performed between 1.39 and 1.49[51].

Prevention

Recognition of the risks experienced by workers in the emergency services has also contributed to the development of prevention measures and programs. In 2002 the ILO conjointly with WHO published the "Framework guidelines for addressing workplace violence in the health sector" [52]. In 2007, another joint work of both organizations resulted in a document that regulates the

post-exposure prophylaxis to human immunodeficiency virus, HIV [53].

WHO has also developed the *guiding principles to ensure injection device security* [54]. An article recently published, addresses and analyzes the prevention of burnout stress syndrome in emergency service workers in [55]. The author notes that the emergency services often work beyond their capabilities and have fewer resources than necessary; this fact is reflected in the mental health of their workers and leads to low survival in their jobs. He further notes the importance of designing prevention strategies that address a wide range of aspects leading to maintain wellness in the workplace. The College of Emergency Medicine published on its website in October 2013 the results of a survey in which they evaluate the sustainability of emergency services in the UK. The results led to the publication of three key recommendations for a prevention strategy [56].

The global plan of action developed by WHO includes the need for hepatitis B vaccination of health workers[57]. The Institute of Public Health, Ministry of Health, Government of Chile, on its website on biological agents, publishes preventive guidelines for handling potentially toxic or harmful biological substances [58]. Furthermore, the Ministry of Health, Government of Chile, published in 2012 a document entitled "Protocols for monitoring workers exposed to risk factors of skeletal muscle of upper limb disorders related to work" "*Protocolos de vigilancia para trabajadores expuestos a factores de riesgo de trastornos muscular esqueléticos de extremidades superiores relacionados con el trabajo*" [59].

However, some studies point out poor adherence to safety measures at work observed in the emergency services workers. A recent review of the literature recognizes poor adherence to the practices for infection control as well [60]. Another study, in the Netherlands, also reported problems in adherence to post-exposure tetanus prophylaxis [61]. A survey of workers from an emergency hospital in Nigeria recently evaluated the attitude toward hepatitis B vaccine in emergency services [62]. Contradictorily, even though more than 80% of respondents knew about hepatitis B vaccine and the disease, only 25% were vaccinated.

Chile

The literature on health and occupational risk in workers of the emergency services is not very abundant in Chile; nevertheless, we must highlight some studies and published papers. In 1999, Alvarado et al [63] conducted a comprehensive analysis of the situation of occupational health in Chile at that time, including weaknesses, strengths and projections. In 2008, Melita et al studied the presence of job stress (burnout) and its probable relationship to social and employment factors, in nurses who worked in emergency units and emergency healthcare services in the Eighth Region [64]. They surveyed 88 nurses and found a moderate average degree of burnout according to the best-known instrument to measure this disorder. A thesis presented for the degree of Bachelor of Midwifery addresses job stress in the staff of emergency

obstetric and gynecological unit of the Regional Clinical Hospital of Valdivia [65].

More publications come from studies that address occupational hazards in health workers without special attention to emergency services. A study on job stress and health in persons who worked in primary care (professionals or not) in a commune located in the metropolitan region [66] was published in 2006. The prevalence of burnout in the *Clinica Alemana* of Puerto Varas was the subject of a study published in 2010 [67]. In 2006, another study on the prevalence of burnout is published, this time in an intensive care unit of Concepción [68]. In 2004, violence perceived by workers of a primary care clinic in Region VIII [69] is studied. Ceballos et al, recently conducted a review of psychosocial risks at work with particular attention to nurses [70]. Sanchez published in 2004 an article reviewing risk prevention in health personnel [71]. Rojas et al published in 2008 a study about accidents reported in workers at the Clinical Hospital of the University of Chile, the University Psychiatric Clinic, Quilín Clinic and Medical Centers Badajoz, El Salto, Macul and Vivaceta [72]. A thesis of the School of Kinesiology, University of Chile, studied ergonomic hazards in nursing assistants and auxiliary personnel from two units at the General Hospital of the University of Chile [73]. A thesis of the Austral University of Chile presents the psychosocial risk factors related to stress in nurses who work in critical services in Puerto Montt Hospital [74]. A study about occupational mental health of nurses in the public sector in the Metropolitan Region [75] was presented in 2007 at the "International Seminar on research, policies and practices associated with mental health and work in Chile: a gender perspective". Recently the Chilean Medical Journal (*Revista Médica de Chile*) published a study, carried out with workers of a highly complex pediatric hospital, where the authors describe the association between psychosocial risk factors in the workplace and various mental health indicators [76].

The [annex](#) provides a summary of relevant quantitative data that emerged from the literature review.

Final considerations

Services and emergency departments of hospitals, clinics and primary care, are essential in a health system. This is due to the frequency of accidents and the incidence of disease episodes that need immediate care in any population in the world. The results of the review suggest that, within the diverse group of people who work in and for health systems, those working at emergency services are the most exposed to occupational hazards such as major stress, communicable diseases and violence. This is an issue of concern for health systems worldwide, due to the importance of emergency services for the health of populations. Similarly, its relevance also derives from the negative impact that unawareness of this problem would have on the services themselves and their workers (doctors, nurses and other professionals, technicians or administrative personnel).

In Chile, one can also perceive evidence of the general problem, but still appears little explored. In its present condition, as a country that aspires to improve its health system in short time, a more substantial and thorough study of this problem is warranted.

Finally, although the topic is generously discussed in the literature, it still not seems to be a closed issue. For instance, risks related to night work and violence continue to be studied and evaluated. These aspects can vary between places and times. This means that, on the one hand, local studies are needed and secondly, only the repeatability of results at different latitudes will allow generalizations for a relevant completed knowledge. Moreover, it seems advisable in future studies to incorporate a gender perspective, given the high percentage of women who make up the health personnel at all levels.

Recommendations

This review can assess the overall picture of the risks and illnesses of the emergency services, but does not allow the depth deserved by every one of the risks mentioned here. One must continue conducting studies on this subject, seeking accurate and precise estimates of the incidence of accidents and violence and prevalence of occupational diseases in this sector. It is also in order to assess risk and protective factors with more conceptual and methodological rigor. This will help to enrich prevention measures, evaluate their compliance and the factors that can prevent it as well as the efficiency and effectiveness of general or specific measures that can be implemented.

Notes

Annex 1: [Quantitative summary of occupational hazards in emergency service workers obtained from the review.](#)

Conflicts of interests

The authors have completed the ICMJE Conflict of Interest form and have no relevant interests to declare. The forms may be requested from the author or the editors.

From the editor

This article was originally submitted in Spanish and was translated into English by the authors. The Journal has not copyedited this version.

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