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Occupational risks among healthcare professionals in the mobile emergency service: an integrative review

Riesgos ocupacionales de los profesionales de la salud en el servicio de emergencia móvil: una revisión integrativa

Riscos ocupacionais entre os profissionais de saúde do serviço de atendimento movél de urgência: uma revisão integrativa

ABSTRACT
Objective: to analyze what has been published in the national literature on occupational risks that SAMU professionals are exposed to. Method: This is an integrative review, whose search took place in the Virtual Health Library and Google Scholar, with 11 articles published between 2011 and 2020 being selected. Results: Physical risks such as siren noise and high temperature were identified; chemicals, dust and gases; biological, contact with blood, secretions and vomiting; ergonomic, weight lifting and inadequate posture; psychosocial, stress and mental fatigue. Some factors contribute to these problems, such as the insufficient number of workers, work overload, stressful hours, physical and emotional exhaustion and stress. Conclusion: The analyzed articles showed that health professionals who work at SAMU due to the nature of their work, are constantly exposed to occupational risks.
DESCRIPTORS: Occupational risks; Health Personnel; Emergency Medical Services.

RESUMEN
Objetivo: analizar lo publicado en la literatura nacional sobre los riesgos laborales a los que están expuestos los profesionales del SAMU. Método: Se trata de una revisión integradora, cuya búsqueda se realizó en la Biblioteca Virtual en Salud y Google Scholar, seleccionándose 11 artículos publicados entre 2011 y 2020. Resultados: Se identificaron riesgos físicos como ruido de sirena y alta temperatura; productos químicos, polvo y gases; biológico, contacto con sangre, secreciones y vómitos; ergonomía, levantamiento de pesas y postura inadecuada; psicosocial, estrés y fatiga mental. Algunos factores contribuyen a estos problemas, como el número insuficiente de trabajadores, la sobrecarga de trabajo, las horas estresantes, el agotamiento físico y emocional y el estrés. Conclusión: Los artículos analizados mostraron que los profesionales de la salud que laboran en SAMU por la naturaleza de su trabajo, están constantemente expuestos a riesgos laborales.
DESCRIPTORES: Riesgos laborales; Personal de salud; Servicios médicos de emergência.

RESUMO
Objetivo: analisar o que tem sido publicado na literatura nacional sobre os riscos ocupacionais que os profissionais do SAMU estão expostos. Método: Trata-se de uma revisão integrativa, cuja busca ocorreu na Biblioteca Virtual em Saúde e no Google Acadêmico, sendo selecionados 11 artigos publicados entre 2011 a 2020. Resultados: Identificou-se os riscos físicos como o barulho da sirene e alta temperatura; químicos, poeira e gases; biológicos, contato com sangue, secreções e vômitos; ergonômicos, levantamento de peso e postura inadequada; psicossocial, estresse e fadiga mental. Alguns fatores contribuem para estes agravos, como o número insuficiente de trabalhadores, sobrecarga de trabalho, jornadas fatigantes, desgaste físico, emocional e estresse. Conclusão: Os artigos analisados evidenciaram que os profissionais de saúde que atuam no SAMU devido à natureza do seu trabalho, estão constantemente expostos a riscos ocupacionais.
DESCRITORES: Riscos ocupacionais; Pessoal de Saúde; Serviços Médicos de Emergência.

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INTRODUCTION

The Mobile Emergency Care Service (SAMU - Serviço de Atendimento Móvel de Urgência) is a Brazilian pre-hospital emergency care service whose purpose is to provide assistance to people in urgent and emergency situations of a clinical, surgical, traumatic, obstetric, pediatric, psychiatric nature, among others, which can lead to suffering, complications or even death, connecting victims to the resources they need as soon as possible. [1]

This SAMU service is performed by Basic Life Support (SBV) and Advanced Life Support (SAV) teams. BLS teams are composed of drivers and nursing technicians, who perform non-invasive activities, such as: the initial approach of the victim, basic care for ventilation and circulation, immobilization and transport to emergency services. [2] The VAS teams, on the other hand, are composed of drivers, nurses and doctors, who perform invasive procedures for ventilatory and circulatory support, as well as transport patients between hospitals, called medicalized transport. [2]

In addition, it is worth saying that pre-hospital care takes place in homes, workplaces or on public roads, in order to stabilize the patient's clinical condition, until he arrives at the hospital, contributing significantly to the reduction in the number of deaths, or avoiding an aggravation of victims affected by any complication. [3]

In this context, due to the characteristics of the assistance, these professionals are constantly exposed to different occupational risks, which are understood as one or more conditions of the work process with the necessary potential to cause damage, disrupting the physical, mental and social balance of workers. [4] Among these risks are the physical risk, when the professional is exposed to explosive agents, radiation, extreme temperatures, noise and vibrations; chemical risk, when it comes in contact with gases or vapors, fumes, mists, toxic products; accident risk, refers to situations such as limited space and physical accommodation of the ambulance, inadequate lighting, lack of protection, fire or explosion, unsuitable or defective tools, machines or equipment; biological risk, when in contact with excreta, saliva, vomit, blood, secretion and pleural or amniotic fluid; psychosocial risk, relates to stress, fatigue, fast pace, alternate shift work, prolonged working hours, impairment in interrelationship with boss and/or co-workers, among others, and ergonomic risk, which is characterized by sudden and repetitive movements, such as excessive weight, uncomfortable and prolonged positions, etc. [5]

In view of these risks, health professionals who work in pre-hospital care face the complexity and invisibility of the care provided to the user, deal with situations of difficult access to the victims, lack of security at the accident scene, reduced space to perform procedures and maneuvers, both with the vehicle stopped and moving, poor hygiene, presence of animals, aggressive people, social unrest and lack of exclusive protocols for infection prevention and control.[6] These situations experienced by health professionals, can make them sick and/or work accidents. An accident at work is considered when there is a collision between a person and an offending object causing bodily harm resulting in occupational diseases in the long term. [7] These accidents are a constant concern for workers, especially those who work directly with biological and chemical risks, as this exposure is linked to infection by a pathogenic agent, and is accompanied by psychological and physical trauma, which can cause disability or death. [7]

Considering these issues, this study is justified by the need to deepen the knowledge about occupational risks to which health professionals working at SAMU are exposed, for dealing with situations that expose them to different types of risks in their work processes. Thus, this study aims to: analyze in the national literature what has been published about the occupational risks that SAMU health professionals are exposed to.

METHOD

It is an integrative review, this type of study is what among the subtypes of the literature review, observes the studies developed by different methodologies in a defined period, generating the opportunity for researchers to know the production related to a specific theme and analyze it from different perspectives in an expanded perception of knowledge. [8]

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In the first stage, the guiding question was listed: what has been published about the occupational risks to which SAMU health professionals are exposed? In the second stage, the inclusion criteria were defined: articles in English, Portuguese or Spanish and that addressed the proposed theme. It is important to point out that a time frame was not established, as the low scientific production on the subject was evidenced. Thus, duplicate articles, course completion work (monograph, dissertation and thesis), citations, reviews, not found and

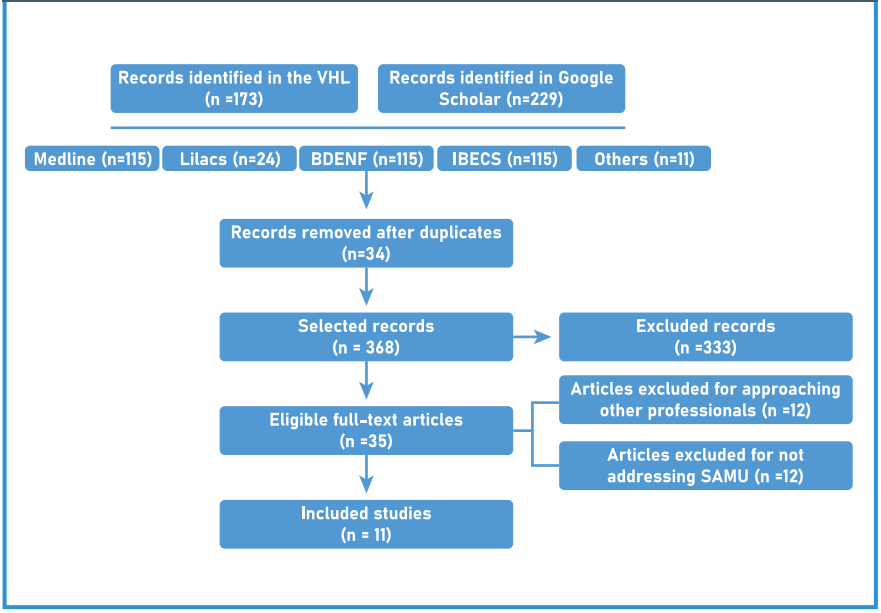
others (abstracts from annals, notices, editorial, manual, letter to the editor) were also not found, as well as studies with other professionals and services.

Data were collected between March and May 2020. The search for the studies was carried out through online research in the databases: Virtual Health Library (VHL) and Google Scholar. These bases were listed due to the fact that SAMU is a service with specific characteristics of Brazil, as soon as the search was performed on Pubmed and ScienceDirect it was noticed that the articles did not match the object of study. To proceed with the search, the descriptor "Risco ocupacional" was used, which is indexed in the Health Sciences Descriptors (DeCS) and the keyword "SAMU". The search strategy consisted of the following intersection: "Risco ocupacional" AND "SAMU".

The search was validated by two researchers who independently analyzed the 402 studies found, after the evaluation a conference of inclusion and exclusion decisions was made, the cases of divergence were discussed and defined by the researchers. Thus, 34 were excluded because they were duplicated, 333 after reading the title and abstract for not meeting the inclusion criteria, 35 studies were selected for analysis, resulting in the inclusion of 11 articles as shown in figure 1.

In the third stage, a spreadsheet was prepared with the information to be extracted: database, author, title, magazine, year of publication, country, language, objective, design, instruments, population, results (types of occupational risks and use / availability of personal protective equipment (PPE) and completion. The fourth step consisted of filling out the worksheet and evaluating the studies, for data analysis, the results were separated by type of risk, use and availability of PPE, the fifth step was based on the interpretation of the results, based on the literature and, finally, the sixth stage turned to the presentation of this review.

Figure 1 - Flowchart of the identification and selection process of the selected studies to compose the integrative literature review. Bahia, BA, Brazil, 2020.



Source: Research data (2020).

RESULTS

Of the 11 selected studies, it was observed that all have the country of publication Brazil, with predominance of the Portuguese language, that the research subjects were doctors, nurses and nursing technicians, and that the age of the participants was 20 to 50 years old, with length of service at SAMU ranging from 1 to 15 years. The studies that made up the sample were designed with eight descriptive, six quantitative, five qualitative, three cross-sectional, four exploratory and one analytical studies. The instruments used for data collection were a structured questionnaire and semi-structured script (CHART 1).

After a thorough reading of the 11 articles found, it was possible to group them by content similarity constituting two categories of analysis: types of occupational risks and use and availability of PPE. Regarding the first category

Chart 1 - Characterization of the studies included in the integrative review. (n=11).

AUTHOR AND YEAR	LANGUAGE	POPULAÇÃO					DELINEAMENTO	INSTRUMENTO UTILIZADO
		N	AVERAGE AGE	SEX	PROFESSION	LENGTH OF SERVICE (YEARS)		
Leite et al., 2016[10]	Portuguese	69	40 to 49	M-36 F-33	Doc.-20 Nur.-16 Tec.-33	Most 10 to 14	Cross-sectional, descriptive, quantitative	Structured questionnaire

Nascimento; Araújo, 2017[11]	Portuguese	14	30 to 45	M-6 F-8	Nur.- 4 Tec.- 10	4 to 13	Descriptive, qualitative	Semi-structured script
Meireles et al., 2018[3]	Portuguese	22	Average 36	M-9 F-13	Nur.-7 Tec.-15	Average 6	Cross-sectional, analytical, quantitative	Sociodemographic and professional questionnaire; Work Stress Scale
Santos Júnior; Silveira; Araújo, 2010[12]	Portuguese	100	Most 36 to 45	M-24 F-76	Nur.-25 Tec.-57 Aux.-18	Most 5	Cross-sectional, exploratory, descriptive, quantitative	Structured questionnaire
Castro; Almeida, Mussi, 2018[13]	Portuguese	4	Average 32	M-2 F-2	Nur.-2 Tec.-2	3 a 6	Exploratory, qualitative	Semi-structured script
Silva et al., 2019[14]	Portuguese	18	Most 20 to 29	M-11 F-7	Nur.-7 Tec.-11	Most 10 to 11	Exploratory, descriptive, qualitative	Structured questionnaire; Questionnaire for preliminary identification of Burnout; Maslach Burnout Inventary
Mafra et al., 2008[15]	Portuguese	12	Most 41 to 50	M-4 F-8	Nur.-12	Most 3 to 4	Exploratory, descriptive, qualitative	Semi-structured questionnaire
Melo et al., 2016[16]	Portuguese	60	-	M-25 F-35	Doc-20 Nur.-20 Tec.-20	-	Descriptive, exploratory, quantitative	Structured questionnaire
Alves et al., 2013[17]	English	12	Most 21 to 30	Most female	Nur.-12	Most 10	Descriptive, qualitative	Semi-structured script
Carvalho et al., 2020[18]	English	203	Most 40 to 44	M-47 F-156	Nur.-56 Tec.-139 Aux.-8	Most 1 to 5	Descriptive, quantitative	Sociodemographic questionnaire and Lipp's Stress Symptoms Inventory
Guimarães et al[19]	Portuguese	5	-	-	Tec.-5	-	Qualitative	Semi-structured script

Source: Research data (2020).

called types of occupational risks, with 11 articles described in Charts 2 and 3, being that: three studies addressed physical risks; ergonomic risks addressed in three studies, biological risks also addressed in three studies; chemical risks in four; accidents in five studies and the psychosocial in 11.

In what corresponds to the second category entitled use and availability of PPE, 06 articles were compiled which addressed the theme, presented in Chart 4.

DISCUSSION

Types of occupational hazards

Physical risks were mentioned in only 3 articles [10,11,17], and in the study by Nascimento and Araújo [11] the type of exposure

Chart 2 - Summary of studies included in the review. (n=11).

AUTHOR	RISCOS			
	PHYSICAL	ERGONOMIC	PHYSICAL	CHEMICAL
Leite et al.[10]	87% siren noises 81,2% high temperature	79,7% weight lifting 73,9% inadequate posture 62,3% physical effort	89,9% blood 79,7% saliva 78,3% vomiting	63,8% dust 44,9% gases
Nascimento; Araújo[11]	42,8% report exposure	50% report exposure	71,4% report exposure	34,7% report exposure
Meireles et al.[3]	-	-	-	-
Santos Júnior; Silveira; Araújo[12]	-	65,1% muscle fatigue	-	-

Castro; Almeida; Mussi[13]	-	-	-	-
Silva et al.[14]	-	-	-	-
Mafra et al.[15]	-	-	25% contact with blood, with secretion and saliva	8,33% contaminated water
Melo et al.[16]	-	-	-	-
Alves et al.[17]	8,33% climate changes	-	-	-
Carvalho et al.[18]	-	-	-	-
Guimarães et al[19]	-	-	contact with blood, secretion and fluids corporais	chemical products

Source: Research data (2020).

Chart 3 - Summary of studies included in the review on accident and psychosocial risks. (n=11)

AUTHOR	RISKS	
	BY ACCIDENT	PSYCHOSOCIAL
Leite et al.[10]	79,7% car collision	82,6% stress 62,3% night work
Nascimento; Araújo[11]	35,7% report exposure	50% report exposure
Meireles et al.[3]	-	45,50% have high stress
Santos Júnior; Silveira; Araújo[12]	-	61,9% mental fatigue 67% extended working hours (> 60h weekly)
Castro; Almeida; Mussi[13]	-	Damage in the interrelationship with co-workers, municipal managers, patients and companions (humiliation, lack of respect and threat)
Silva et al.[14]	-	38,9% moderate level and 16,7% high level of emotional exhaustion 77,8% moderate level of depersonalization 100% high level of reduced professional achievement 78% extended working hours (> 60 hours) 22,2% chance of developing Burnout Syndrome
Mafra et al.[15]	16,66% report exposure (hardware accidents and inadequate lighting)	16,66% report exposure (stressful situations)
Melo et al.[16]	-	16,66%report workload > 60h.
Alves et al.[17]	16,66% report exposure (motor vehicle accidents on highways)	33,33 % report exposure (stressful situation, aggressive population, high environmental tension - shooting exchange, aggression, conflict in the SAMU x hospital Interprofessional relationship)
Carvalho et al.[18]	48,66% report exposure (inadequate physical installation) 77,83% report exposure (unhealthy work environment)	24.6% reported stress (19,7% resistance phase, 4,4% exhaustion, 0,5 almost exhaustion) 63,05% report emotional exhaustion with the work they perform
Guimarães et al[19]	-	-

Source: Research data (2020).

Chart 4 - Summary of the studies included in the review that addressed the personal protective equipment. (n=6).

AUTHOR	PERSONAL PROTECTIVE EQUIPMENT (PPE)	
	USE	AVAILABILITY
Leite et al.[10]	100% jumpsuit only 85,5% gloves 84,1% mask 69,6% boots 40,6% glasses 23,2% hats and only 10,1% all types of PPE	-
Nascimento; Araújo[11]	50% PPE in general	14,3% lack of PPE

Santos Júnior; Silveira; Araújo[12]	95% PPE in general 66% glove, mask and boots 34% glove, mask, boots and overalls	-
Mafra et al.[15]	100% boots 100% gloves 100% jumpsuit 41,6% masks 16,6% glasses	Minority report lacking adequate material
Melo et al[16]	100% PPE in geral 4 8,3% all PPE (overalls, glove, glasses, mask and boots)	100% said they always find the PPE available
Guimarães et al.[19]	Report use of PPE (gloves, boots and overalls)	They report that the service only provides procedure gloves to professionals

Source: Research data (2020).

was not specified, in the case of Alves et al. [17] exposure to climate change was presented, and Leite et al. [10] pointed noises from the ambulance siren and high temperature. The physical risks mentioned corroborate the study by Costa et al. [20], in which traffic and siren noise were considered to have the greatest potential to cause accidents in the pre-hospital environment. As a preventive measure to hearing problems, of professionals who work in mobile support units, it is recommended that they undergo periodic audiometry exams, in addition to the use of equivalent PPE. [20]

The ergonomic risks presented in this study were: weight lifting, inadequate posture and muscle fatigue. [10,12] In addition to these, the study by Nascimento and Araújo [11] highlighted the exposure to ergonomic risk, but did not mention the situations. It is worth noting that ergonomic risks are frequent in rescuers who work in pre-hospital care, so that the physical effort required during the movement and removal of patients has a decisive influence on the appearance of muscle pain, which can cause postural problems, fatigue, hernias, fractures, sprains, contusions, low back pain and varicose veins. [21]

Regarding the biological risks found, it was found: contact with blood, vomiting, saliva, secretions and body fluids. [10,11,15,19] This type of risk varies according to the different professional categories, the activities performed by the professional and the sectors of activity within the health services. Thus, according to Fernandes et al. [7], the most exposed professionals are those who deal directly with patients, performing invasive procedures of different degrees of complexity, suffering accidental occupational exposure through blood or body fluids. These professionals are at risk of infection to numerous pathogens, with human immunodeficiency viruses, hepatitis B or C being considered the most relevant, given their prevalence among patients. [22]

It is worth mentioning that some factors act as predisposing factors for biological risk: insufficient number of workers, overwork, stressful hours, continuity of assistance in shifts and night shifts, physical and emotional stress, deficient technical training, lack of attention, excess confidence, use of inappropriate materials, stress and failure to adopt standard precautionary measures. [23]

With regard to chemical risks, it was observed in this study: dust, gases, contaminated water and chemical products. [10,11,15,19] Exposure to chemical agents is responsible for 80% of occupational dermatoses, in addition it can cause burns, headache, bronchial asthma, neurological, renal, liver, gastric and intestinal diseases, among others. Such agents are usually in the work environment in the form of gases, dust, fumes, vapors and mists. [24]

In relation to accident risks, it was identified: car collision, ironmongery accident, inadequate lighting, inadequate physical installation and unhealthy work environment. [10,11,15,17,18] Traffic accidents involving ambulances and other vehicles are considered frequent in the work practice of these professionals, triggered mainly by traffic, as well as the population's misunderstanding about the need for fast ambulance displacement. The brevity of the ambulance's arrival at the accident site is fundamental for the patient's good prognosis, however, at high speed, it puts the team at risk of an accident, due to the particularities of the work inside the ambulance, which has limited space, with little ventilation, dynamics of traffic movements and sharp curves. [25]

Finally, psychosocial risk was mentioned in all selected jobs, with a predominance of night work, extended working hours, impaired interrelationships with colleagues and superiors, stressful situations with the population, among others. [3,10–19] To Ueno et al.[26], stress in the work activity compromises not only the productive performance of the worker, but also the physical and emotional balance, with repercussions in his personal life. In this context, there are physiological responses to different types of stressors and each person has a different way of feeling and interpreting the sources that cause stress.

These results corroborate the study by Carvalho et al. [18] on factors related to occupational stress of the SAMU

nursing team, in which participants report factors related to sleep quality, that is, working in inadequate physical facilities, in an unhealthy environment, having a restriction of professional autonomy and feeling of emotional exhaustion with the work that the team performs.

In turn, a study carried out with doctors, nurses and nursing technicians working at SAMU, with the objective of assessing the level of occupational stress of this team, the results obtained indicated a high percentage of workers who did not present stress, attributing this determination, mainly to factors such as: low age, since 62,5% of the participants were inserted in the age group between 20 and 30 years, in addition to little time working in the service. [27] Thus, the fact that they are young may have contributed to the organism being more resistant to stressors, thus obtaining a greater willingness to carry out its activities.

PPE

Chart 4 shows the use and availability of PPE that were mentioned in 6 studies. [10–12,15,16,19] Thus, most of the study participants reported the use of overalls, boots, gloves and glasses, although regarding the availability of this equipment, in some studies the participants reported the lack of these.

The standardization for the use of PPE by SAMU professionals is established by the Visual Identity Manual of the SAMU 192 Network and by Ordinance No. 2048 of November 5th, 2002, which guides the use of overalls and boots for mandatory use, adding the need surgical mask, goggles and procedure glove, especially when in contact with the patient.[1,28] This standardization does not restrict the services from having individual characteristics regarding the use of PPE according to the role that is played in local service, as long as they follow the regulatory rules in force in the country.

The use of PPE does not eliminate all the risks to which workers are exposed, but it reduces the possibility of accidents occurring. [29] This is one of the biosafety measures, ensured by Regulatory Standard [32 30], which aims to promote the protection of workers in health services.

The urgency and emergency sector, both in pre-hospital care and hospital care, is considered an unhealthy environment, as it houses people with various types of infectious diseases and the risks inherent in the procedures performed by health professionals. Thus, when PPE is adopted and used correctly, professionals avoid major complications in relation to their health. [31]

Finally, it can be said that the result of this study, in a comparative degree, is in line with what is expected in the literature and also with what occurs in the work process of health professionals who work at SAMU. Such professionals, when providing direct assistance to patients with varying degrees of severity, may suffer accidents during the handling of equipment, sharps, preparation and administration of medications, in addition to factors related to access to the service location, such as the risk of an ambulance collision and the relationship with the population.

CONCLUSION

In this review, it was evident that health professionals who work at SAMU, due to the nature of their work, are constantly exposed to occupational risks, such as: physical, ergonomic, biological, chemical and psychosocial risks. Among the physical risks cited by the professionals are: noise from the ambulance siren and high temperature; the ergonomic risks mentioned were inadequate posture, weight lifting, and muscle fatigue; the most pointed biological risks were: contact with blood, vomiting, saliva, secretions and body fluids; chemical risks include contact with dust, gases, contaminated water and chemicals, and lastly psychosocial risk, in which there was a predominance of night work, prolonged working hours, impaired interrelationships with colleagues and superiors, stress with the population, among others. ■

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