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RESEARCH ON RISK ASSESSMENT OF THE WORKPLACE IN AN EMERGENCY COUNTY HOSPITAL

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ABSTRACT

In hospitals crisis conditions, in Romania, it is necessary along with the implementation of a correctly medical act, applied to patients and security measures relating to the employment for staff involved. The work shall be reviewed at all risks to which complexity is exposed a medical assistant when practicing in a hospital emergency department in infectious diseases. Assessment of the risk of workplace division of infectious diseases, for workers involves analysis of all factors and conditions in accordance with their respective internal rules and European ones.

KEYWORDS: emergency county hospital, medical assistant, work risk

1. Introduction

Emergency hospitals are equipped with materials and medical staff which should satisfy most types of medical emergencies which may arise. Specialist medical staff shall carry out their activity inside of the emergency County Hospital. The main components of the system work: equipment for primarly imedical investigation (Electronic tensometru, stethoscope, syringe, sterile bandages, disinfectant, antibiotics), electric shock unit, adjustable beds lounge, computer and printer, desktop, locker for acts.

1.1. Analysis of risk factors for occupational illness

Risk factors acting on the performer by two main components: gravity consequence/event) and probability of occurrence (events/time unit). Combining these components determine the level of risk itself.

Risk factors are all components of the system's own job.

The risk factors are classified as follows:

a. Physical risk factors include: excessive air temperature (high/low); improper air humidity (high/low); high speed air currents, they define the microclimate and the working environment; excessive air pressure (high/low); inadequate lighting; noise; radiation, vibration, electrostatic potential, natural disasters, aggression to aggression in the workplace.

b. Risk factors of chemical which include: gas, vapours, aerosol dust and toxic, pneumoconiogene. Between the contractor and the collectivity and within which they operate to create links, dependencies and interference that varies depending on the level of integration in the communit and which exerts a decisive influence on his behavior. Concepts and habits within a unit, as well as how that group appreciates the risk, determines in a very large measure behavior in terms of safety at work.

Risk factors (potential causes) of system components that form the basis of accidents at work and occupational diseases as well as preventive measures, schematic, are presented in Fig. 1.

Complete presentation of all the risk factors on the 4 components of the system is given in Table 1.

Risk factors are all factors likely work system to act on the health or integrity of injuries to workers. It's about what the majority of people in the current parlance, they are considered hazards or dangerous situations. In this respect the European norm EN 292-1 defines danger [1], dangerous situations or events related to hazardous work (risk factors) as being a "reason capable of causing an injury or a sickness attack". This definition is a qualitative risk assessment commonly used in its identification.

Security is defined as the fact of being sheltered from any danger. Risk and security are closely interrelated and mutually exclusive.

Risk is defined in accordance with the European standard EN 292-1, [2] as "the combination of the probability and severity of an injury or sickness attack that can occur in a dangerous situation". This is

a quantitative definition of risk that can be used in prioritizing risks. In other words, the risk is the likelihood of a specific gravity of damage during exposure to the risk factor.

Consequently, professional risk associated with a particular situation or a particular technique from combining the following elements:

- foreseeable consequence severity (severity of the most likely consequence);
- the likelihood of such consequences.

Thus defined, the risk can be assessed quantitatively, if severity and probability have been quantified themselves. Quantitative assessment (evaluation) can be used to compare different risks within a system and to determine the priorities of intervention or to compare risk levels before and after the implementation of measures to prevent the manifestation of him.

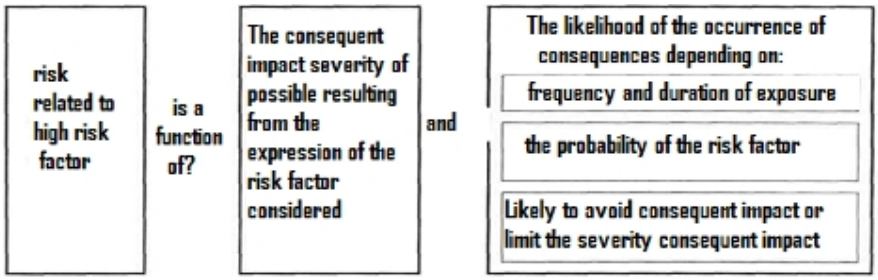


Fig. 1. *Defining the risk according to severity and probability of work place* [1]

The absence of a system of review, a small number of accidents or occupational diseases, low severity of consequences of accidents should not be automatically regarded as a presumption of a low risk.

1.2. Severity

Shall be assessed in accordance with MIL-STD-882 C by evaluating the consequences of the most serious accident that could have caused the risk factor.

Consequence severity (severity of the damage possible) can be estimated by considering the following:

- the nature of the protected object (persons, property, environment);
- severity of injuries or damage to health (easy - normally reversible serious - normally irreversible, death);
- the magnitude of manifestation the consequent impact (a person, more than one person).

Categories of severity of consequences allow assigning a qualitative size potential accidents due to human error, environmental conditions, non-compliance project, procedural deficiencies or damage and organ dysfunction product, sub-assemblies or its components.

The product manager, the manager the quality assurance program of safety of the product and the one who carried out the product should be able to lay down exactly what is meant by destroy the product, by major consequences/minor to product/environment and by occupational disease or serious injury. Gravity can be defined on the basis of criteria such as:

- temporary incapacity (ITM), permanent work incapacity (disability), death;
- health effects, reversible or not, for risk factors likely to have psychological effects;
- interference with the comfort, satisfaction, worker motivation for social risk factors and organizational.

1.3. Probability

Probability means in accordance with MIL-STD-882 C frequency of occurrence of the event unwanted and can be described as potential occurrence in the unit time or reported from the population, item or situation [2].

Probability is conditional on even terms of work processes: reliability of technical equipment, materials, organization of work, time constraints, etc.As with the severity of the consequences for estimating the probability of occurrence of consequences can use multiple grids of appreciation. For a more accurate estimate of the probability of occurrence of consequences is recommended to be taken into consideration:

a) the frequency and durationof exposure that are determined by:

- need access to the danger zone (normal operation, maintenance or repairs);
- nature of access (eg manual feed materials);
- time spent in the danger zone;
- the number of people who register;
- frequency of access.

b) probability of occurrence dangerous due to:

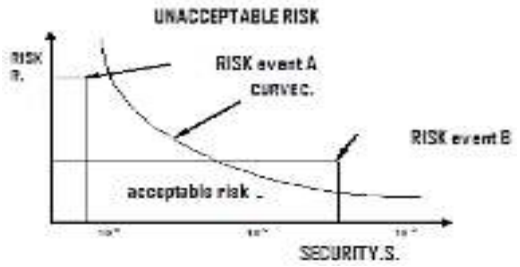
- technical equipment reliability and other statistical data;
- statistical data related to the frequency of accidents and occupational diseases;
- comparing the risks of system already accepted analyzed risks of systems.

c) the possibilities to avoid or limit the consequence of a hazardous event by:

- executing (which can be qualified or unqualified person can perform the task supervised work or not, etc.);
- rate of occurrence of the event estimated dangerous (sharp, fast, slow);
- any form of risk awareness (through general information by direct observation, by means of warning and indicating devices),
- possibilities to avoid or limit performer consequence (eg reflexes, the skill saving opportunities that make the chances contractor to avoid or limit the result to be possible in certain circumstances possible, impossible);
- practical experience and knowledge of the performer (on the job examined, on a similar work process or inexperienced).

1.4. Level of risks

The level of risk [3] is an indicator quantity absolutely once rated allow knowing to what extent the security of a system, in terms of the possibility of accidents and occupational diseases, it is acceptable or not. In practice it is considered that a system is secure, if having a non-zero risk, but small enough, known as residual risk or acceptable.In the absence of corrective interventions while the residual risk increases as the work degrade and age under the law of increasing entropy.Notions of security and risk are opposites being connected by a hyperbolic equation R = (S Security R - risk), like in Fig. 2.



y = f(x)

Fig. 2. *Relationship Risk – Security* [2]

Where the risk cannot be null (infinite security) must be determined which couples probability of occurrence/consequences can provide an acceptable level of risk.

Graphic representing acceptable risk in the form of rectangles with areas equal to F1 = F2 = F3. gravity/probability, data in Fig. 3 the curve that show the variation in the severity of consequences with the probability of occurrence what unites top right corners of the quadrilaters areas under the curve for the acceptability of the risk, according to CEN 812/85. (The Farmer) [3].

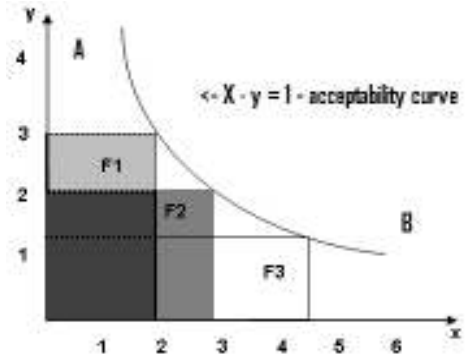


Fig. 3. *The depending between risk at work place and severity of consequences of risk factors on the human. A-acceptable risk; B-unacceptable risk* [3]

Under the curve (A) the risks are acceptable, and above the curve (B) the risks are unacceptable. The curve in Fig. 3 called risk acceptability curve and corresponding function p hyperbole. g = const. In Romania currently accepted value of this constant is to be 3.5.

The main objective of the evaluation is to establish acceptable risk and bringing in acceptability.An acceptable risk may be characterized by a probability of occurrence (frequence), but the seriousness of the consequences (F1) - nuclear accidents, or vice versa-a high frequency with low severity of consequences (F3) - traffic accidents. Risk level assessment method and its classification as acceptable or unacceptable risk has the advantage that it can be applied both to existing employment systems and those in construction-design phase.Establish risk acceptability curve (delineating acceptable risks) is a difficult issue. This is done through a strategic decision be based on the cost of human life, whether from the comparison with other risks already accepted.

1.5. Exposure

Exposure to risk factors, represents the duration in the time or frequency in time at which the contractor is exposed to a risk factor and the level to

which it is exposed. Assessment of exposure may be carried out, in some cases, in terms of quantitative metrics. Needs analysis can choose diverse exposure assessment rubrics. Exposure is often integrated into the concept of probability, the assessment of risk, taking into account the duration or frequency of exposure. Consideration of exposure, in a separate probability is subtle and it requires a complex approach for assessing occupational risks.

2. Work environment and identified risk factors for place of work named main medical assistance

The risk factors are divided in: mechanical, electrical, physical factors, biological factors, factors shuffle, factors of the work task.

2.1 Mechanic risk factors

F.1. - pedestrian movement on the access roads inside the unit by means of transport (supply, delegate, service providers etc.);

F.2. - Bumping, or crushing grip in traffic accident at the movement in the interests of the service (for action);

F.3. - Defect-parts and mechanisms, the deviation from the normal trajectory of movement, impact, overthrow;

2.2. Electric risk factors

F.4. - Electrocution by direct accidental unprotected pathways voltage at the venue of the activity: plugs damaged makeshift cables stripped portion, makeshift electrical connections, etc.;

2.3. Physical risk factors

F.5. - Alternate interior exterior temperature;

F.6.- Air current on corridors or rooms, or the simultaneous opening of doors and windows;

F.7. - drop at the same level, through the slip, due to the condition of the roadway, the climate conditions (ice), wet floors, etc.;

2.4. Biological risk factors

F.8.-Contamination caused by the presence of patients carriers of viruses, bacteria, etc.;

2.5. Shuffle risk factors

Wrong actions:

F.9. - Moving, staying in hazardous areas, in the vicinity of access roads, roadway in access of the gauge;

Omissions:

F.10. - Skip taking measures to prevent traffic accidents at pedestrian movement (insurance, diminished, crossing through illegal places, meaning failure indicators, etc.);

2.6. Risk factors of the work task

F.11. - Psychic stress due to this solicitation of patients, relatives, media;

F.12. - Failure to take measures to prevent the movement of pedestrian traffic accidents (insurance, diminished attention, crossing the forbidden places, etc.);

F.13. - Due to this mental stress of patients, relatives, media;

F.14. - Stress caused by the intense pace of work, quick decisions in a short time and negotiation.

Table 1.

Work system components	**Identified risk**	**Actual form of risk factors (description, parameters)**	**Maximum predictable consequence**	**Severity class**	**Class of probability**	**Partial risk level**
0	1	**2**	**3**	**4**	**5**	6
Means of production	Mechanical risk factors	F.1. - Pedestrian movement on the Impact of access roads inside the unit by means of transport (supply, delegate, service providers etc.);	Lethal	**7**	**1**	3
		F.2. - Bumping, or crushing grip in traffic accident at the movement in the	Lethal	**7**	**1**	3

		interests of the service (for action);				
		F.3. - Defect-parts and mechanisms, the deviation from the normal trajectory of movement, impact, overthrow;	ITM 3-45 days	**2**	**4**	2
	Electric risk factors	F.4. - Electrocution by direct accidental unprotected pathways voltage at the venue of the activity: plugs damaged makeshift cables stripped portion, makeshift electrical connections etc.	Lethal	**7**	**1**	3
	Physical risk factors	F.5. - Alternate interior exterior temperature	Negligible	**1**	**5**	1
Own environmental risk factors of work	Physical risk factors	F.6. - Currents of air corridors or rooms, or the simultaneous opening of doors and windows;	ITM 3-45 days	2	2	2
		F.7. - Drop at the same level, through the slip, due to the condition of the roadway, the climate conditions (ice), wet floors, etc.	ITM 3-45 days	2	5	3
		F.8. - Contamination caused by the presence of patients carriers of viruses, bacteria, etc.	ITM 3-45 days	2	4	2
	Biological risk factors	F.9. - Moving, staying in hazardous areas, in the vicinity of access roads, roadway in access of the gauge;	ITM 3-45 days	2	4	2
Contractor's own risk factors	Wrong actions	F.10. - Skip taking measures to prevent traffic accidents at pedestrian movement (insurance, diminished, crossing through illegal places, meaning failure indicators, etc.);	Lethal	7	1	3
		F.11. - Psychic due to this solicitation of patients, relatives, media;	ITM 3-45 days	2	4	2
	Omissions	F.12. - Failure to take measures to prevent the movement of pedestrian	Lethal	7	1	3

		traffic accidents (insurance, diminished attention, crossing the forbidden places, etc.);				
Risk work factors task	Psychic stress	F.13. - Due to this mental stress of patients, relatives, media;	ITM 3-45 days	2	2	2
		F.14. - Stress caused by the intense pace of work, quick decisions in a short time and negotiation.	ITM 3-45 days	2	2	2

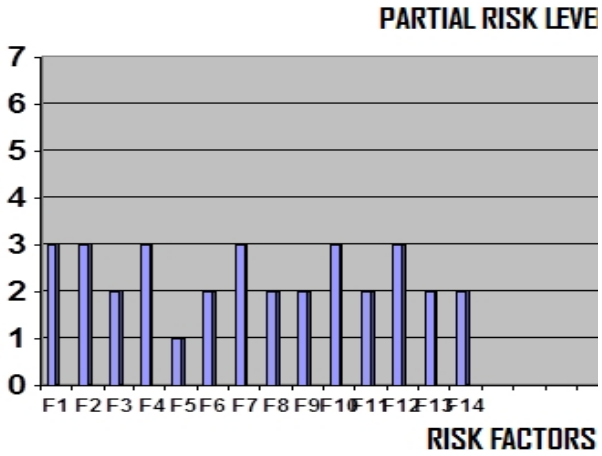


Fig. 4. *Partial risk levels on risk factors*

For calculus of **global risk level** "*Nrg"* is used the formula:

$$N_{rg} = \frac{\sum_{i=1}^{14} r_i \cdot R_i}{\sum_{i=1}^{14} r_i} = \frac{6\,(3 \times 3) + 7\,(2 \times 2) + 1\,(1 \times 1)}{6 \times 3 + 7 \times 2 + 1 \times 1} = 2.51$$

The global risk level has the value 2.51.

By using the scale of severity of quotation probability consequences of risk factors on the human body for the place of work named „main medical assistance" we see in the Table 2 the framing that corresponding at value of 2.51.

Table 2.

Probability classes		**The probability of consequences**
Class	**Events**	
1	Extremely rare	Probability of producing extremely small P-1 10 </year

2	Very rare	Probability of occurrence of the consequences of the very small 10-1 < 5-1 P </year
3	Rare	Probability of occurrence of the consequences of short 5-1 < 2-1 P </year
4	Uncommon	Probability of occurrence of the consequences of an average 2-1 P-1 << 1/year
5	Frequently	Probability of occurrence of the consequences mean 11 P < F1 </year
6	Very common	Probability of producing very large consequences > l-1 P/month

In conclusion the severity of consequences for the place work named "main medical assistance" is framing between small and average.

3. Conclusions and measures to avoid the work risk

Table 3.

Nr. crt.	Indicated risk factors	Risk level	Nomination proposed measures to prevent
1.	F.1. - Pedestrian movement on the impact or access roads inside the unit by means of transport (supply, delegate, service providers etc.);	3	*Technical measures:* - Maximum speed control vehicle access inside the unit by placing limit signs at the entrance to the establishment; - Restrict access of vehicles depending on unit needs; *Organizational measures* - Training of workers on safety consequences of failure to movement restrictions inside the unit; - Preparation of instructions / procedures on the conduct domestic workers (general obligations, and pedestrian travel by car, etc.);
2.	F.2. - Bumping, or crushing grip in traffic accident at the movement in the interests of the service (for action);	3	*Organizational measures* - While moving on road traffic routes shall comply with road traffic regulations - Rules of the Road; - Thematic training plan will include provisions of traffic law section *Other road users.*
3.	F.4. - Electrocution by direct accidental unprotected pathways voltage at the venue of the activity: plugs damaged makeshift cables stripped portion, makeshift electrical connections etc.	3	*Technical measures* - Maintaining electrical work equipment by specialized and authorized personnel; *Organizational measures* - Daily visual check of the integrity of the casing cord electrical work equipment, the condition of the outer casing and power plug; - The use of extension cords provided with protective null; - Supply of equipment for electrical work and will be only effectuated with extension cords from outlet provided with protective null;
4.	F.10. - Skip taking measures to prevent traffic accidents at pedestrian movement	3	*Organizational measures* - While moving on road traffic routes shall comply with road traffic regulations (insurance, diminished, crossing through illegal places, meaning failure indicators, etc.);

5.	F.12. - Failure to take measures to prevent the movement of pedestrian traffic accidents (insurance, diminished attention).	3	*Organizational measures* - While moving on road traffic routes shall comply with road traffic regulations - Rules of the Road; - Thematic training plan will include provisions of law traffic section other road users.

References

[1]. ***, *European norm EN 292-1*.
[2]. ***, *Eurostandard occupational ilness work MIL-STD-882 C*.
[3]. ***, *Directive 2000/39/EC establishing a first list of indicative limit values for occupational exposure in implementation of Council Directive 98/24/EC on the protection of the health and work safety against the risks related to chemical agents at work*.
[4]. ***, *Directive 2006/15/EC for the establishment of a second list of indicative professional limit values and exposure application. Council Directive 98/24/EC and for transposition of the Directives 91/322/EEC and 2000/39/EC. Guide of good practice concerning coordination of social security and health*.
[5]. ***, *Instrument for the assessment of the risk (Parts I and II) Executive Decision (EC) No 1091/2006 concerning the minimum safety and health requirements for the workplace.*