

Perception of Occupational Hazards among Greek Hospital Workers: a Cross Sectional Study

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Abstract

To assess the level of risk as perceived by hospital workers and experts in Health and Safety (H&S) referring to occupational hazards, as a contribution to the improvement of the work conditions. A cross sectional study using triangulation in one general hospital and an oncology one, in two capital Greek cities. 447 hospital professionals randomly stratified by hospital service: nursing, medical, technical and administrative, filled in a developed Occupational Health and Safety Staff questionnaire. Two experts-occupational health nurse and safety engineer- assessed, through inspection, the working condition in hospital departments. Employees and experts differ in their assessment of risk level. Experience, education and specialty influenced, at statistically significant level, risk perceived in risk assessment process. Knowledge on health and safety issues is poor, training programmes on health and safety issues are therefore indicated. Active participation of health professionals in the risk assessment process will help achieve a more complete picture of the working conditions, adopt safe and healthy work behavior and will lead to risk reduction. It could also contribute to closing the research -practice gap depending on the commitment of the key persons within a hospital organization.

Keywords: Hospital workers, Occupational Hazards, Risk Assessment, Employee Health, Occupational Health Nursing

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1 Introduction

Hazards for workers in the hospital area vary from accidents, due to injury with a needle stick, to manual handling mostly of patients that lead to musculoskeletal pain and psycho-social consequences by working in such a demanding environment. There are also hazards related to contagious diseases, to exposure to toxic agents, or allergens. Many health professionals deal with occupational stress related to different demands of the job.

Risk assessment is a structured and systematic procedure that is dependent upon identification of the hazards and an appropriate estimation of risks in a workplace with a view to making inter-risk comparisons for purposes of their control or avoidance [1]. Obviously, it constitutes a tool of designing the strategy of treatment of occupational risk. To define the risk level, risk standards must be developed, which may represent people's opinion that set the rules and the range of acceptance or tolerance for each hazard [2]. Risk may be defined with qualitative, semi-quantitative (with decreased quantitative accuracy) and quantitative methods [3]. Qualitative methods could use an expert opinion by use of a check-list. Semi-quantitative methods arrange hazards into a comparative scale or by using a risk assessment matrix (RAM) [4]. Quantitative risk assessment is better applied for industrial hygiene measurements for chemical or physical hazards. Risk level will define the need for corrective or preventive measures. Combination of subjective staff's perception of risk level with inspection of departments by experts may improve the reliability and validity of data. Occupational health nurses that have access to the workplace and management must become effective observers who promote evidence based interventions to reduce risks at the workplace.

The present study proposes a method of risk assessment including inspection of group of hazards by experts and comparison of its results to subjective risk.

2 Methods

2.1 Study's Design

This study was conducted by risk assessment of hazards in two hospital working environments. It was designed as a cross-sectional survey by using triangulation of methods (observation, questionnaire) for data collection. It was conducted in a general hospital in Athens and an oncology one in Thessaloniki. Both hospitals applied a preventive policy according to the law and occupational safety professionals were employed according to Greek regulations. The study process comprised three phases [5]:

- 1 Detection of hazards, during the development of tools including the RAM used;
- 2 Analysis and identification of hazard exposure (during observation, filling in checklists by occupational safety professionals and questionnaires by staff); and
- 3 Evaluation of hazard exposure (risk level according to RAM used).

A risk assessment report, including written instructions for safe working tasks, was completed according European Union law and submitted to the employers [6].

2.2 Tools

Tools developed and used are:

a) An Occupational Health and Safety (OHS) Staff questionnaire (one general and two specific, one for operation theatres and one for clinical laboratories) was developed based on the available literature [4, 7-10] and was filled in by hospital staff in their work places. A pilot study was performed in order to check the validity and reliability of the newly developed tool of this study. Questionnaires were tested for internal consistency and were found acceptable with a very high Cronbach's α of 0.90 [11]. The first part of the questionnaire included a brief description of the groups of hazards, directions for filling in the answers and questions on nine work characteristics and demographic information [sex, age, years of working, years of working in the present hospital, years in the department, hospital service (nursing, administrative, medical, technical), level of education]. The second part included closed and positive questions of H&S referring to the following nine groups of hazards: Work environment- working equipment, Physical hazards (ergonomics were included in the group of work organization hazards), Electrical, Chemical, Biological, Fire safety, Work organization-working relations-ergonomics, Working with visual display units (VDU), and Waste management. These questions were answered by choosing one of the five possible answers: "Always", "Often", "Rarely", "Never" and "Do not know" for the cases with no hazard in their perception. Answers followed a Likert Scale (from 0= Always to 3=never), and corresponded, according to RAM, to three risk levels: "Always" and "Often"= 0-1, equal to low level (A), "Rarely"=2 equal to medium level (B), and "Never"=3 equal to high level (C). In addition, there was a sixth choice of answer, "No application", if a hazard is irrelevant to a hospital department and is not included in the Scale. Based on the answers given to the group of questions on hazards the staff's perception of risk level was evaluated as low, medium, or high according to the score that results from the median value of the answers.

b) General Inspection Checklist on H&S Hazards, to be filled in by occupational safety professionals. This is a record of quantification of evaluated hazards in the hospital working area and is filled in according to a developed guide/brochure. It is based on the theoretical models of risk evaluation and on educational instructions on hazards identification referring to safe and healthy conditions of working with physical hazards. The guide includes the RAM (Figure 1), which was based on existing literature and further developed for this study, and from which the risk level of each hazard results were taken [4]. The checklist is formed with five columns with the following contents: the hazards (the same as those referred to the nine groups of the staff's questionnaire), a brief description of activity or situation in which the hazards exist, the possibility of exposure to the hazard is written down, the risk consequences (0-4) due exposure to the hazard, and the corresponding risk level (A, B, C). There are also two special checklists with the same formulation, one for operation theatres and one for clinical laboratories.

				Possibility of Exposure				
Consequences				0	1	2	3	4
Degree of Consequences	Staff ¹	Equipment ²	Consequence ³	Never occurred in the hospital area (1/10 ⁶)	Has occurred (from 1/1000 to 1/10 ⁴)	Has occurred (from 1/100 to 1/1000)	Has occurred several times in the hospital area (from 1/10 to 1/100)	Has occurred several times in several hospitals (1/10)
0	No health effect	No damage	None	0 0	0 1	0 2	0 3	0 4
1	Slight health effect	Slight damage	Restricted	1 0	1 1	1 2	1 3	1 4
2	Severe health effect	Severe damage	Of important level	A 2 0	2 1	2 2	2 3	2 4
3	Permanent total disability or 3-4 deaths	Extreme damage	Crucial	3 0	3 1	B 3 2	3 3	3 4
4	Multiple losses	Extended damage	Catastrophic	4 0	4 1	4 2	4 3	C 4 4
00, 01, 02, 03, 04, 10, 11, 12, 20, 21, 30 (A) LOW RISK								
13, 14, 22, 23, 31, 32, 40, 41 (B) MEDIUM RISK								
24, 33, 34, 42, 43, 44 (C) HIGH RISK								

¹ Magnitude of consequences to staff's health resulting from exposure to hazards

² Magnitude of consequences to equipment's function resulting from exposure to hazards

³ Characterization of consequence resulting from staff's and equipment's exposure to hazards

Figure 1: Risk Assessment Matrix

2.3 Participants

a) Hospital personnel filled in the OHS Staff questionnaire in a period of six months. The sample was randomly selected by strata defined by hospital service (nursing, administrative, technical, and medical) and a third of the staff was included. The total sample in the general hospital included 360 subjects and 250 in oncology. Table 1 shows demographic data and work characteristics of hospital staff that participated in the study. The response rate was 68.9% in the general hospital (81.9% filled in the general questionnaire, 36% filled in the special questionnaire for operation room and 80% filled in the special questionnaire for clinical laboratory). In the oncology hospital, 199 workers participated (79.6%), from whom 104 filled in the general questionnaire (80%), 43 the special questionnaire for operation room (86%) and 52 (74.3%) the special questionnaire for clinical laboratory.

In both hospitals the percentage of female workers was almost double than that of male workers. Also, most workers were in nursing and medical service and graduated from technological foundation, with a mean value of age equal to 40 years old, having 12 years of working experience for the general hospital and 17 years, for the oncology one.

Table 1: Demographic and work characteristics of hospital staff

	General Hospital (n*=248) N(%)**	Oncology Hospital (n=199) N(%)
<i>Sex</i>		
Women	149 (60.8)	146 (73.4)
Men	96 (39.2)	53 (26.6)
<i>Hospital service</i>		
Nursing	66 (27.1)	86 (43.5)
Medical	93 (38.1)	63 (31.8)
Administrative	63 (25.8)	20 (10.1)
Technical	22 (9.0)	29 (14.6)
<i>Level of education</i>		
Primary	5 (2.0)	1 (0.5)
Secondary/High school	69 (28.3)	46 (23.1)
Technological Foundation	78 (32.0)	83 (41.7)
University	65 (26.6)	39 (19.6)
Postgraduate degree	27 (11.1)	30 (15.1)
<i>Age (years), mean (SD)</i>	37.2 (7.0)	41.3 (8.6)
<i>Total working experience (years), mean (SD)</i>	12 (7.3)	16.9 (9.0)
<i>Working experience in the present hospital (years), mean (SD)</i>	6.1 (3.4)	13.8 (9.0)
<i>Working experience in the present department (years), mean (SD)</i>	4.8 (3.2)	(8.3)

*n: total number of workers completed the study's questionnaire

**N (%): number of workers (percentage) of total number of workers completed the study's questionnaire

b) Occupational safety professionals (an occupational health nurse and a safety engineer) filled in, through observation, the Inspection Checklist on H&S Hazards in the different hospital departments.

2.4 Validity

Questionnaires were tested for internal consistency and were found acceptant to very high Cronbach's α , from 0.85 to 0.92 [12]. Also, an acceptable inter-rater reliability was found as the overall weighted Kappa was 0.80 (95% CI =0.71-0.94).

2.5 Analysis

Quantitative variables are presented with mean and standard deviation (SD). Qualitative variables are presented with absolute and relative frequencies. Weighted Kappa values were calculated in order to assess the agreement between the two experts for risk level and study inter-rater reliability. Kappa values greater than 0.4 indicate acceptable reliability [13]. In order to find independent factors associated with health and safety scores multiple linear regression analyses in a stepwise method (p for entry <0.05 and p

for removal <0.10) were performed. Regression coefficients (β) with their standard errors were produced from the results of regression analyses. All p values reported are two-tailed. Statistical significance was set at 0.05 and analyses were conducted using SPSS version 17.0 (SPSS Inc., Chicago, IL USA).

2.6 Ethical Issues

Necessary permissions were requested and granted from the scientific committees of the two hospitals. The questionnaires were anonymous and the participants were informed in writing about the study purposes and their voluntary participation.

3 Main Results

3.1.1 Qualitative risk assessment by hospital staff and experts

In the general hospital, staff perceived risk as of medium level, in hazards related to work organization, environment, equipment, and in electrical ones, which was in an agreement with expert evaluation. In the remaining groups of hazards as of high risk level, while, expert evaluated it, as of medium risk level except for hazards related to work with visual display units and around bed, which was evaluated as of low risk. In operation theatre and in laboratories in most cases, staff perceived risk as of high level whereas experts as of medium level (Table 2).

Table 2: Prescription of risk levels according to RAM¹ as defined by workers and experts

Group of hazards	General Questionnaire		General / Oncology hospital Operating Room		Clinical	laboratories
	Staff	Experts	Staff	Experts	Staff	Experts
Environment & Work equipment	B/B	B/B	B/A	B/B	C/C	B/B
Physical	C/C	B/B	C/C	B/B	C/C	B/B
Electrical	B/B	B/C	B/B	B/B	B/A	B/C
Chemical	C/C	B/C	C/-	B/C	C/C	B/C
Biological	C/C	B/B	B/-	B/B	C/B	B/B
Fire safety	C/C	B/C	B/C	B/B	C/C	B/C
Work management & ergonomics	B/B	B/C	C/C	C/B	B/C	B/C
Visual display units	C/C	A/B	C/C	B/B	C/B	B/B
Patient Bed	C/B	A/A	-/-	-/-	-/-	-/-
Waste management	C/B	B/B	C/C	B/B	C/C	B/C

1: Risk Assessment Matrix

A: Low Risk Level

B: Medium Level

C: High Level

Are you informed on hazards of non-ionizing radiation?	38(15.6)/ 7(2.9)	15(6.2)	44(18.1)	31(12.5)	19(9.6)/6(3.0)	17(8.6)	49(24.9)	32(16.2)
Are you educated on safety measures about use of non ionizing radiation?	11(4.6)/31(12.9)	17(7.1)	66(27.5)	24(10.0)	17(8.7)/14(7.2)	7(3.6)	69(35.4)	26(13.3)
Are you informed on how to use safely the table of Laser machine?	6(2.6)/1(0.4)	2(0.8)	18(7.6)	59(25)	3(1.6)/5(2.6)	4(2.1)	19(9.9)	51(26.7)
Are you informed on safe use of cables in the laser room area?	6(2.6)/(0.9)	2(0.9)	18(7.7)	58(24.7)	3(1.6)/4(2.1)	4(2.1)	19(9.9)	52(27.2)
Are you informed on safe use of sockets and plugs in the laser room area?	7(3.0)/1(0.4)	2(0.9)	18(7.7)	58(24.7)	3(1.6)/3(1.6)	4(2.1)	19(9.9)	53(27.7)
Are you informed on safety measures about cold water's pressure in laser room area?	5(2.1)/1(0.4)	2(0.9)	20(8.1)	58(24.7)	4 (2.1)/2(1.0)	4(2.1)	19(9.9)	53(27.7)
Are you informed or educated on safe use of chemicals?	12(5.0)/16(6.6)	29(12.0)	72(29.9)	25(10.4)	24(12.3)/19(7)	27(13.8)	78(40.0)	19(9.7)
Are you informed and educated on safe preparation and administration of drugs?(e.g. Chemotherapy, use of Personal Protective equipment-PPE, special rooms)?	35(14.6)/24(10.0)	17(7.1)	46(19.2)	31(12.9)	29(14.9)/25(12.9)	26(13.4)	39(20.1)	25(12.9)
Are you informed on ways of transmissions of diseases through blood, air and skin contact?	46(19.1)/43(17.8)	51(21.2)	68(28.2)	7(2.9)	25(12.9)/54(27.8)	47(24.2)	44(22.7)	11(5.7)
In your work area are you informed on diseases transmitted by bacteria?	19(7.9)/39(16.2)	54(22.4)	84(34.9)	8(3.3)	26(13.4)/27(13.9)	60(30.9)	57(29.4)	9(4.6)
In your work area, are you informed on diseases transmitted by fungus?	20(8.3)/38(15.8)	54(22.4)	84(34.9)	8(3.3)	26(13.4)/26(13.4)	59(30.4)	59(30.4)	9(4.6)

In your work area, are you informed on diseases transmitted by endotoxines;	9(7.9)/40(16.6)	53(22.0)	83(34.4)	8(3.3)	24(12.4)/25(12.9)	61(31.4)	60(30.9)	9(4.6)
In your work area, are you informed on diseases transmitted by viruses?	20(8.3)/35(14.5)	57(23.7)	83(34.4)	9(3.7)	24(12.4)/25(12.9)	62(32.0)	58(29.9)	10(5.2)
In your work area are you informed on the risk of transmission of rubella?	21(8.7)/32(13.3)	57(23.7)	89(36.9)	11(4.6)	22(11.3)/20(10.3)	43(22.2)	84(43.3)	11(5.7)
In your workplace are you informed on the risk of transmission of tuberculosis?	18(7.5)	36(14.9)	47(19.5)	10(4.1)	22(11.3)/24(12.4)	44(22.7)	80(41.2)	10(5.2)
In your work place are you informed on hazards that cause allergies?	14(5.8)/32(13.2)	52(21.4)	105(43.2)	9(3.7)	16(8.2)/27(13.8)	50(25.5)	74(37.8)	15(7.7)
Are there any lessons on fire safety?	8(3.3)/11(4.6)	16(6.6)	170(70.5)	22(9.1)	6(3.1)/8(4.1)	26(13.3)	139(70.9)	14(7.1)
In your workplace, are there any exercises of evacuation of building?	28(11.6)/30(12.4)	11(4.6)	6(2.5)	137(56.8)	1(0.5)/3(1.5)	24(12.2)	146(74.1)	21(10.7)
Are you trained in safety and health issues in your workplace?	7(2.9)/15(6.2)	43(17.7)	154(63.4)	14(5.8)	11(5.6)/24(12.2)	49(24.9)	91(46.2)	21(10.7)
Have you accept counselling on issues on work organization?	19(7.9)/40(16.6)	49(20.3)	125(51.9)	6(2.5)	21(10.8)	56(28.7)	33(16.9)	82(42.1)
Are you educated periodically on use of computer?	12(5.0)/26(10.8)	91(37.8)	69(28.6)	7(2.9)	11(5.6)/23(11.8)	49(25.1)	89(45.6)	7(3.6)
Are you informed on procedures of waste management?	15(6.2)/27(11.2)	42(17.4)	105(43.4)	17(7.0)	16(8.2)/34(17.4)	47(24.1)	71(36.4)	9(4.6)
Are you informed on different categories of hospital waste (clinical, infectious, pathological, pharmaceutical, sharp, chemical, radioactive)?	15(6.2)/13(6.2)	30(12.4)	106(43.8)	40(16.5)	14(7.2)/19(9.7)	48(24.6)	60(30.8)	36(18.5)

Table 4: Results from stepwise regression analysis concerning staff's perception scores about the nine groups of hazards

Group of hazards	Working environment		Physical		Electrical		Chemical			
	$\beta \pm SE^*$	P	$\beta \pm SE$	P	$\beta \pm SE$	P	$\beta \pm SE$	P		
Sex										
Men reference	0.108±0.52	0.028	0.99±0.46	0.030						
Women										
Hospital service										
Administrative reference										
Nursing	-0.175±0.68	0.007	-0.76±0.63	0.230	0.129±0.44	0.045				
Medical	-0.273±0.67	0.000	-0.85±0.62	0.171	0.206±0.44	0.001				
Technical	-0.211±0.88	0.000	-1.81±0.79	0.022	-0.199±0.58	0.000				
Level of education										
Technological Foundation			0.42±0.54	0.440						
University/ Postgraduate degree			1.14±0.58	0.049						
Hospital										
General, reference										
Oncology			-1.23±0.43	0.004			-0.14±0.39	0.004		
Working experience in the present department (years)										
			0.04±0.02	0.040						
Group of Hazards	Biological		Fire		Work organization		Computer		Waste management	
	$\beta \pm SE^*$	P	$\beta \pm SE$	P	$\beta \pm SE$	P	$\beta \pm SE$	P	$\beta \pm SE$	P
Hospital service										
Administrative reference										
Nursing	-0.274±1.09	0.000	-0.218±0.50	0.001	0.254±1.42	0.021	0.175±0.80	0.001	-0.713±1.07	0.001
Medical	-0.219±1.10	0.001	-0.181±0.49	0.005	-0.039±1.42	0.721	0.114±0.81	0.207	-0.609±1.04	0.002
Technical	-0.088±1.37	0.119	-0.262±0.65	0.000	-0.017±1.67	0.841	-0.012±1.42	0.875	-0.382±1.16	0.005
Level of education										
Primary/Secondary/High school, reference	0.036±0.96	0.000								
Technological Foundation	-0.108±0.90	0.053								
Working experience in the present department (years)										
									-0.288±0.04	0.015

*regression coefficient±standard error

In both hospitals response rates were good. In the general hospital, workers in clinical departments perceived hazards that refer to work organization and environment as of medium risk level, a finding that was unexpected, since hospitals is a work place with work around the clock and serious staff shortages [14-16]. This finding may be due to the fact that this hospital is relatively newly built (20 years old, comparing to the average age of 50 years of Greek hospitals) offering health services that cover all medical cases. In the remaining groups of hazards, risk was perceived by staff as of high level whereas, by experts as of medium level. This finding may be interpreted by the fact that experts were external agents who evaluated the risk level in a specific period of time without the possibility of re-evaluation. In clinical laboratories there was also difference between staff and expert evaluation which was lower. In the operating theatre, staff perceived hazards related to work with computer, waste management, work organization, physical and chemical as of high risk level, probably due to the fact that hospital workers have more intensive working rhythms. In the rest, risk was perceived as of medium level, in agreement with expert's evaluation.

In the oncology hospital, workers in clinical departments perceived hazards that refer to work organization, fire safety, work with computer, physical, chemical, biological as of high level, whereas experts, as of medium level, a finding that is in agreement with similar studies [17-19]. In the remaining groups of hazards, the risk was perceived as of medium level, in agreement with experts. In clinical laboratories, staff perceived risk as of high level, whereas experts as of medium one, for the half of the groups of hazards. Finally, in the operating theatre, staff perceived electrical and related to work environment hazards as of medium level, for the rest of hazards, risk was perceived as of high level, in disagreement with experts who evaluated risk as of medium level. The higher risk level in the cancer hospital may be interpreted by the fact that some of the hazards are more prevalent, such as radiation and anticancer agents, as well as by the fact that the building was much older than the general hospital included in this study and with a very broad geographic area.

As a final outcome, it can be supported, that in both hospitals occupational hazards were assessed as of medium risk level, for the majority of them. This evaluation is in agreement to existing classifications that rate hospitals as work places with medium risk.

3.2.1 Factors influencing staff's perception of risk

In both hospitals variables that were studied were level of education, sex, total years of work, years of work in the present hospital and in the department and professional specialty. Factors found to have a statistically significant influence in some groups of hazards were specialty, educational level, experience and sex. Nursing staff perceived high level risk level for biological hazards and VDU work, obviously because they are dealing with these hazards. It could be argued that highly educated workers demand better working conditions protected by physical hazards (such as lighting, microclimate conditions, noise) in order to concentrate and offer more qualitative services (caring of patients, preparing clinical reports or analysis samples). In contrast, lack of knowledge referring to ways of transmission of biological agents may contribute to a high perceived risk level by hospital workers with basic education. Men, who are the majority in technical and medical hospital services, perceived of high risk level hazards that are commonly faced during their tasks, such as fire and electrical ones. Also, physicians, perceive of high risk level environment and work equipment hazards, may be due to the

fact that their tasks demand modern, high technology equipment and facilities. In addition, workers of oncology hospital perception of higher risk level physical and chemical agents may be due to the oldness of the building and to an increased sense of risk when working with radioactive radiation or chemotherapy agents.

In relation to staff's answers in the questions referring to education and information on health and safety issues, it was found that workers in both hospitals were not adequately educated and informed. This is one of the reasons for over-estimating the risk level. This finding underlines the need for better organized training programmes so that staff could contribute to the elimination of occupational hazards.

Tools developed for the present study are very useful because they facilitate experts - occupational nurses as well as safety officers- to perform the required risk assessment studies with the contribution of staff, who by their active participation can help on one hand in a more complete report and on the hand in applying control measures [20].

3.2.2 Limitations

The present study was designed and implemented as a cross sectional survey, due to time limitations, which limit the findings of the study in this specific time and place. Another limitation was the development and testing of new tools. Although their reliability was found satisfactory in the sample that participated in the study, it is not possible to support that the findings are representative for the hospital sector. It is a need therefore, for further investigation with the use of the method and instruments.

4 Conclusion

The role of employees in the risk assessment procedure is useful for the complete appreciation of the impact of each hazard; additionally it promotes and strengthens their roles in understanding and developing safety culture in a workplace such as the hospital. There is a need of training programs that promote information and education on H&S issues. Staff's lack of awareness may contribute to over-estimation of risk level. Experts, as external evaluators, on the other hand, may under-estimated the existing risk level. Occupational Health Nursing through assessing, monitoring and promoting the health status of the workers, in regional or international area, may have real impacts on developing strategies to improve the working conditions.

References

- [1] W. Sinclair, Introduction in: Sinclair W. *The hazards of hospital work*, Allen Unwin ed, 1988.
- [2] I. Ashton and S.F. Gill, *Monitoring for Health Hazards at Work* 3rd ed. Oxford, Blackwell Science, 2000.
- [3] H.Raafat and S. Sadhra, Risk characterization. In: Rampal, Sadhra. *Occupational Health. Risk assessment and Management*, 4th Edition, Blackwell Science Ltd, Oxford, 1999.
- [4] S.S. Sadhra and G.K. Rampal, Basic Concepts and Developments in health Risk Assessment and Management, In: Rampal, Sadhra. *Occupational Health Risk*

- Assessment and Management*, 4th Edition, Blackwell Science Ltd, Oxford, UK, 1999.
- [5] S. Drivas, K Zorba and M. Koukoulaki, *Methodological guide in evaluating and preventing occupational risk*. Greek Institute in Health & Safety, Athens, 2000. Greek.
- [6] E.G. Velonakis and F. Tsalikoglou, *System of health and safety administration in hospital working area*, Ed. Parisianou, Athens, 2005. Greek
- [7] *European year on safety, hygiene and health in workplace- A Guide on Working with hazardous products*. Luxembourg: Ed, Service of Official Editions of European Communities 1992.
- [8] *Europe on health and safety in workplace. Four indicatory guides on enforcement of Guideline "temporary or mobile building sites*. Luxembourg: Ed, Service of Official Editions of European Communities 1993.
- [9] Groupement professionnel de formation de l' hospitalisation privée du Sud-Est (GPFHP). *La prévention des risques professionnels dans les établissements hospitaliers privés. Guide d' evaluation*, 1997. French
- [10] M. Sandford, Checking your way to working safely, *Australian Nursing Journal*, **5**, (1), (1997), 15-24.
- [11] S. Tziaferi, P. Sourtzi and E. Velonakis, Pilot study of risk assessment in the hospital area, *Nosileftiki*, **45**, (2005),380-390.
- [12] S. Tziaferi, *Risk Assessment of Occupational hazards in the hospital area*. PhD Thesis. National and Kapodistrian University of Athens, Dep. of Nursing. (2006). Greek
- [13] J.R. Landis and G.G. Koch, The measurement of observer agreement for categorical data, *Biometrics*, **33**, (1977), 159–74.
- [14] P.J. Carrivick, A.H. Lee and K.K. Yau, Consultative team to assess manual handling and reduce the risk of occupational injury, *Occupational and Environmental Medicine*, **58**,(50), (2001), 339-344.
- [15] D. Gimeno, S.Felknor, K.D. Burau and G.L. Delclos, Organizational and occupational risk factors associated with work related injuries among public hospital employees in Costa Rica. *Occupational and Environmental Medicine*, **62**, (5), (2005), 337-43.
- [16] J. Smedley, H. Inskip, F. Trevelyan, P. Buckle, C. Cooper and D. Coggon, Risk factors for incident neck and shoulder pain in hospital nurses, *Occupational and Environmental Medicine*, **60**, (2003), 864-9.
- [17] A. Fasunloro and F.J. Owotade, Occupational hazards among clinical dental staff, *Journal of Contemporary Dental Practice*, **5**, (2004), 134-52.
- [18] O. Menoni, N. Battevi, D.Colombini, M.G. Ricci, E. Occhipinti and G.Zecchi, The assessment of the risk due to the manual lifting of patients: the initial descriptive and analytical results on exposure levels, *La Medicina del lavoro*, **90**, (1999),191-200.
- [19] S. Saint, M.T. Greene, R.N.Olmsted ,V. Chopra, J. Meddings, N.Safdar and S.L. Krein, Perceived strength of evidence supporting practices to prevent health care-associated infection: Results from a national survey of infection prevention personnel, *American Journal of Infection Control*, **41**,(2), (2013), 100-106.
- [20] S.G.Tziaferi, P.Sourtzi, A. Kalokairinou, E.Sgourou, Em. Koumoulas and EmVelonakis, Risk assessment of Physical Hazards in Greek Hospitals Combining Staff's perception, Experts' Evaluation and Objective Measurements, *Safety and Health at Work*. **2**, (3), (2011), 260-272.