MANUAL HANDLING OF PATIENTS: CLINICAL EVALUATION OF SOME PARAMETERS CLINICAL-ANAMNESTIC IN HEALTH CARE

MOVIMENTAZIONE MANUALE DEI PAZIENTI: VALUTAZIONE DI ALCUNI PARAMETRI CLINICO-ANAMNESTICI IN OPERATORI SANITARI

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Abstract

Background: The necessity to help hospitalized subjects with reduced or absent walking abilities exposes the workers to the risk of lesions, above all spinal lesions. It is essential therefore to reduce the risk through the introduction of correct procedures and devices as well as health surveillance and training. The Mapo index is a synthetic index to estimate the manual handling of patients assessment and it allows to give a quantitative valuation of risk level of health workers.

Objectives: To assess the incidence of musculoskeletal disorders of the spinal in subjects exposed to different risk classes, correlating it with the MAPO index.

Methods: We identified 53 male subjects more exposed and 26 male subjects less exposed and also 72 female subjects more exposed and 36 female subjects less exposed. These groups were made comparable as for age, working seniority, BMI and sport activities. The classification for spondylo-arthropathies (SAP) indicated by the SIMLII Guidelines for the prevention of disorders and musculoskeletal diseases of the spine by manual handling of loads was carried out.

Results: The results we obtained by comparing mean and standard deviation, gave $p > 0.05$. The comparison made through the χ^2-test showed no significance because the p was always > 0.05. In the end, the analyzed data showed no statistically significant correlation between musculoskeletal diseases and the classification of workers in the relative risk class.

Discussion and Conclusions: In our research the MAPO index did not turn out to be an exposure index correlated to a specific disease, because the workers at higher risk of band, compared to the workers at lower risk, use probably more correct procedures concerning the handling of hospitalized patients, conversely it can be supposed that there are less severe procedures and less compliance for the category of workers at lower risk.

Abstract

Introduzione: La movimentazione di pazienti ospedalizzati svolta da varie figure professionali, principalmente infermieri ed ausiliari, viene effettuata, essenzialmente, per i soggetti che presentano ridotte o assenti capacità deambulatorie. Lo svolgimento di questa attività espone gli operatori a rischio di lesioni soprattutto del tratto dorso-lombare del rachide. Risulta fondamentale quindi ridurre il rischio connesso alla movimentazione manuale dei pazienti, mediante l'introduzione di procedure corrette e di ausili, l'adeguamento delle strutture, la sorveglianza sanitaria e la formazione degli addetti. L' indice Mapo è un indice sintetico per la valutazione del rischio della Movimentazione Manuale dei Pazienti (MMP) e permette di dare una valutazione quantitativa del livello di rischio degli operatori sanitari.

Obiettivi: Valutare l'incidenza di patologie muscolo scheletriche a carico del rachide in popolazioni esposte con classi di rischio differenti, correlandola con l'indice MAPO valutato per ognuna delle classi di rischio.

Metodi: Sono stati individuati un gruppo di 53 soggetti di sesso maschile più esposti e un gruppo di 26 soggetti di sesso maschile meno esposti; un gruppo di 72 soggetti di sesso femminile più esposti e un gruppo di 36 soggetti di sesso femminile meno esposti. I due gruppi di sesso maschile sono stati resi paragonabili per età, anzianità lavorativa, BMI e attività sportiva; lo stesso procedimento è stato applicato per i due gruppi di sesso femminile. E' stata utilizzata la classificazione relativa alle spondiloartropatie (SAP) indicata dalle Linee Guida SIMLII per la prevenzione dei disturbi e delle patologie muscolo-scheletriche del rachide da movimentazione manuale dei carichi.

Risultati: Tutti i risultati ottenuti, confrontando media e deviazione standard, hanno una $p>0,05$, quindi non significativa. Il confronto effettuato mediante il test del χ-quadro, non ha evidenziato alcuna significatività per quel che riguarda il confronto tra i due gruppi di uomini e i due gruppi di donne dal momento che la p è sempre risultata $>0,05$. In pratica dai dati analizzati non è stata evidenziata alcuna correlazione statisticamente significativa tra patologie muscolo-scheletriche e inquadramento dei lavoratori nella relativa fascia di rischio.

Discussione e Conclusioni: L'Indice MAPO nella nostra ricerca non si è rivelato un indice di esposizione correlabile con una patologia specifica. Questo potrebbe essere spiegato con il fatto che i lavoratori della fascia a maggior rischio rispetto ai lavoratori a minor rischio, probabilmente utilizzano procedure più corrette per quanto concerne la movimentazione dei pazienti ospedalizzati e di contro si può ritenere che vi siano procedure meno rigorose da parte delle strutture e minor compliance da parte degli operatori per la fascia a minor rischio.

Background

The handling of hospitalized patients, with reduced or, sometimes, absent walking abilities, carried out by hospital nurses and auxiliaries to give them care and therapies, exposes workers to lesion risk, that involve specifically dorsolumbar vertebrae of the spine, well known in literature, for the epidemiological studies and the analysis of potential biomechanical overload of intervertebral discs in the lumbar district (1, 2, 3). Indeed, a strong correlation between tipology and frequency of manual lifting and the onset of specific acute and chronic pathological forms of lumbar spine was pointed out as well as the exceeding of tolerable values. On the other hand, since it is not possible to delete the risk connected with these activities, which must assure all the care practices, it is fundamental to reduce the risk through a series of preventive actions as: 1) correct procedures; 2) use of aids; 3) adaptation of structures; 4) health surveillance; 5) training of workers.

Title VI of Legislative Decree 81/08 provides legislation related to manual handling of loads, due to biomechanical overload in the lumbar area (4).

The most common activities of health workers are represented by lift, shift of incapacitated patients (loads) and personal self, to accommodate them in most various suitable positions to perform their physiological needs; these operations cause a load for the spine, for lumbar spine particularly, or lesions of osteomyotendinous and neurovascular structures (5, 6, 7, 8, 9).

It's possible to identify some specific operations (care and therapies) that involve raising and shifting of patients, especially if they are carried by a single health worker without mechanical aids and in deficiency of a specific information and training (10, 11, 12, 13, 14, 15, 16,17,18).

In order to reduce the working risk (19, 20, 21), the health worker is exposed to, it's necessary to pay attention to the following solutions:

- provision of adequate mechanical auxiliaries;
- planning of suitable spaces and operative methods;
- programming of appropriate staff;
- information and training of staff for the correct use of available equipments in order to help patients;
- preventive and periodic health surveillance of staff.

Some authors suggest the use of MAPO index, that is a synthetic index for the risk assessment of manual handling of patients (MHP) and it allows to give a quantitative estimate of risk level in health workers, ascertaining different risk levels as a function of the environmental conditions present in the structure under examination (22, 23).

Objectives

The aim of our study was to estimate the incidence of spine skeletal-muscle diseases in populations subdivided in different risk classes according to the MAPO index.

The MAPO index as an exposure index related to a skeletal-muscle disease was evaluated (24, 25, 26, 27, 28, 29, 30).

Methods

The study was carried out in an important and highly specialized hospital in Rome.

The first objective was to identify in the hospital the departments more at risk and less at risk on the basis of the MAPO index. The inspections were conducted from September 2005 to February 2006, in following depts:

▪ Surgical Clinic
▪ I Surgical Clinic
▪ Gynaecological Sciences
▪ Department of Clinical Medicine
▪ Department of Psychiatric Sciences
▪ Department of Cell Biotechnology and Hematology
▪ Department of Clinical and Medical Therapy applied
▪ III Surgical Clinic
▪ Department of Cardiovascular and Respiratory Sciences
▪ Department of Surgical Sciences
▪ Pediatric Clinic (Tab.1)

**Table 1 –** *MAPO index values in the department object of study*

CALCULATION OF MAPO INDEX	
DEPARTMENT	MAPO INDEX
Pediatrics Department I infants	2,14
Pediatric Department II infants	1,46
Pediatric Surgery	1,68
Pediatric Oncology	1,8
Pediatric Emergency Room – Reception	1,11
Pediatric Intensive Care	2,7
Department Infants / Weaned	1,8
Surgical Sciences – Hospitalization men / women	1,75
Surgical Sciences – Hospitalization men	1,5
Surgical Sciences – Hospitalization women	1,75
Department of Cardiovascular and Respiratory Sciences – Angiology Service	2,7
Department of Cardiovascular and Respiratory Sciences – UTIC	2,6
Department of Cardiovascular and Respiratory Sciences – Hospitalization Cardiology	7,05
Department of Surgical Sciences – Hospitalizations	0,8
I Surgical Clinic – Hospitalizations	5,3
I Surgical Clinic – Hospitalizations	9,6
I Surgical Clinic – Hospitalizations	9
Dep. Gynaecological Sciences – Hospitalization Obstetrics	0,67
Dep. Gynaecological Sciences – Hospitalization Ginecology	2,4
Dep. Clinical Medicine – Hospitalization	0,38
Dep. Clinical Medicine – Hospitalization	1,25
Dep. Psychiatric Sciences and Neurology – Hospitalization	0,38
Dep. Psychiatric Sciences and Neurology – Hospitalization	2,25
Dep. Cell Biotechnology and Hematology – Transplants M.O.	0,38
Dep. Cell Biotechnology and Hematology – Hospitalization Adult	2,77
Dep. Cell Biotechnology and Hematology – Autologous Transplants	4,65
Dep. Cell Biotechnology and Hematology –Pediatric Hospitalization	0,6
Dep. Cell Biotechnology and Hematology – Emergency Room and DH	2,59
Clinical and Medical Therapy applied – Hospitalization	4,5
General Surgery and Organ Transplants – Hospitalization	7,5
General Surgery and Organ Transplants – Laparoscopic Surgery	3,5
General Surgery and Organ Transplants – Hospitalization Vascular	3

Surgery	

On the basis of results obtained from the evaluation of MAPO index, these departments were framed in three risk zones:
(Graphic 1)

Green Zone: MAPO index up to 1.5

Yellow Zone: MAPO index between 1.5 and 5

Red Zone: MAPO > 5

Graphic 1 - *Percentage Distribution of departments on the basis of MAPO index*
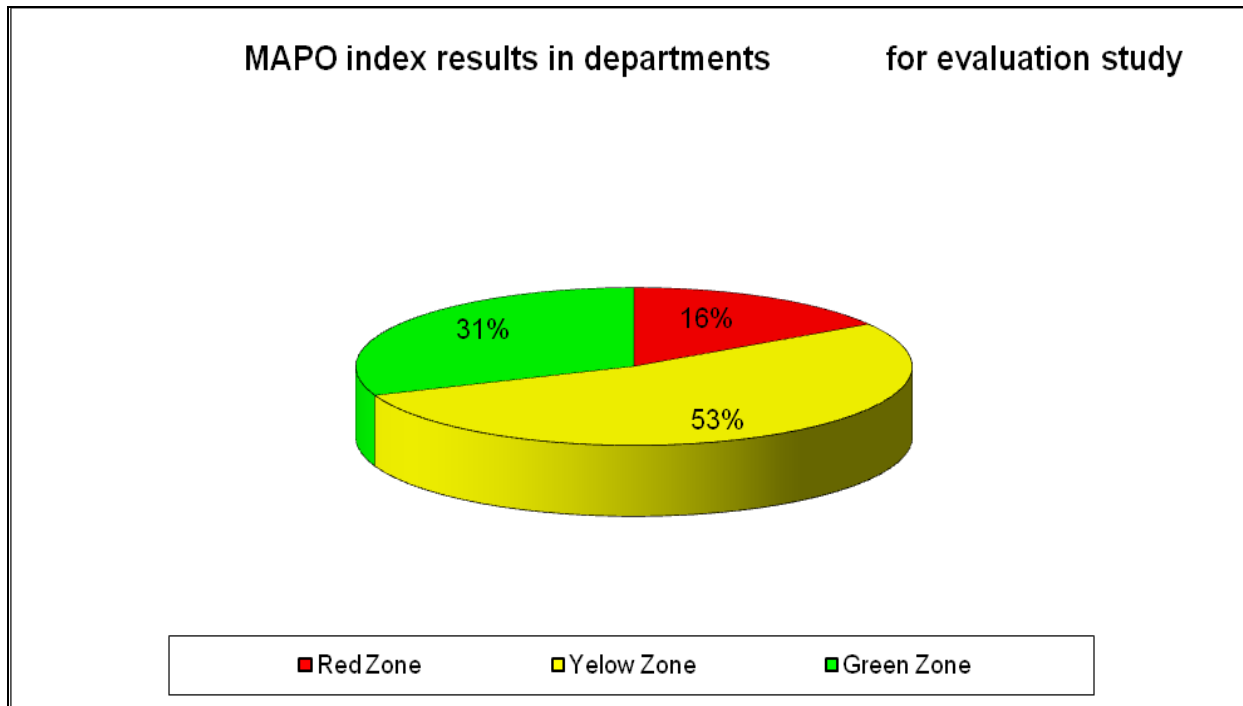
We analyzed the clinical records of a sample of 700 health workers exposed to manual handling of loads, in 2004, 2005, and beginning 2006, and identified the health professionals working in the departments, object of study (31, 32, 33, 34, 35).

Three groups of subjects were created:

1. Highly exposed subjects: professional nurses working in the departments with MAPO index > 5;
2. Exposed subjects: professional nurses working in departments with MAPO index between 1.5 and 5;
3. Less Exposed subjects: professional nurses working in departments with MAPO index between 0 and 1.5.

Since the number of highly exposed subjects was not sufficient, for statistical estimate, the two more exposed groups were redistributed in a group of medium-highly exposed subjects (more exposed) and a group of less exposed.

These two groups were then subdivided, on basis of sex, because the incidence of spine diseases is different between sexes.

From clinical records age, working seniority, physical activity and BMI were deduced.

The subjects, presenting the following characteristics, were excluded:

● Working seniority < 5 years;

● BMI > 30;

● Suitability with prescription for MMC;

● Traumas of spinal column in medical history.

In the end a group of 53 more exposed male subjects and a group of 26 less exposed male subjects, a group of 72 more exposed female subjects and a group of 36 less exposed female subjects, were identified.

The groups were compared for age, working seniority, BMI and sporting activity.

The statistical analysis was carried through *Student T-test* and *X ²-test*.

The clinical records were analysed and past medical history/ near medical history with the reported signs in section on physical examination were examinated.

The spondylo-arthropathy classification (SAP), indicated by the SIMLII Guidelines for the prevention of disorders and muscle-skeletal diseases of the spine due to manual handling of loads was carried out (Table 2).

Table 2 – *Spondylo-arthropathy Classification (SAP)*

	1º DEGREE	2º DEGREE	3º DEGREE
CERVICAL SPINE	Cervical disorders higher than "anamnestic threshold " (or lower but with use of drugs)	Cervical disorders higher than "anamnestic threshold " (or lower but with use of drugs) **AND** Pressure pain of two cervical intervertebral spaces at least **OR** Palpation pain of the cervical musculature	Cervical disorders higher than "anamnestic threshold " (or lower but with use of drugs) **AND** Pressure pain of two cervical intervertebral spaces at least **OR** Palpation pain of the cervical musculature **AND** Pain for at least 3 movements of the cervical spine.
DORSAL SPINE	Pressure pain of two dorsal intervertebral spaces at least **OR** Palpation pain of the dorsal musculature	Dorsal disorders higher than "anamnestic threshold " (or lower but with use of drugs) **AND** Pressure pain of two dorsal intervertebral spaces at least **OR** Palpation pain of the dorsal musculature	Dorsal disorders higher than "anamnestic threshold " (or lower but with use of drugs) **AND** Pressure pain of two dorsal intervertebral spaces at least **OR** Palpation pain of the dorsal musculature **OR** Pain during a rotation plus lateral inclinations
LUMBO	Lumbar disorders	Lumbar disorders	Lumbar disorders

SACRAL SPINE	higher than "anamnestic threshold" (or lower but with use of drugs)	higher than "anamnestic threshold" (or lower but with use of drugs) **AND** Pressure pain of two lumbar intervertebral spaces at least **OR** Palpation pain of the lumbar musculature	higher than "anamnestic threshold" (or lower but with use of drugs) **AND** Pressure pain of two lumbar intervertebral spaces at least **OR** Palpation pain of the lumbar musculature **AND** Pain during flexion and extension **OR** Pain during lateral inclinations plus flexion **OR** Lasegue (or Wassermann positive)

Statistical Analysis

The statistical analysis of data was based on the calculation of the mean, standard deviation, distribution, frequency, and range according to the single variables.

The differences between averages were compared using *Student T-test* for continuous data and X^2-*test* for dichotomous data.

In the presence of values with $P < 0.05$, the differences were considerate significant. The data were elaborated using PRIMER program.

Results

The mean and standard deviation of age, working seniority, and BMI for every group was calculated and deduced from clinical records; these values were compared through the *Student T-test* in order to make the two groups comparable.

The X^2-*test* was used for comparing physical activity.

By comparing mean and standard deviation the results gave $p > 0.05$, therefore no significant as indicated in Table 3.

Table 3 – *Comparison between groups*

	More Exposed Men (53)	Less Exposed Men (26)	T-test	More Exposed Women (72)	Less Exposed Women (36)	T-test
Age	46±6	47±8	0,5377	41±7	40±7	0,428
Working Seniority	21±7	20±10	0,6007	16±8	17±11	0,591
BMI	25±2	25±3	1	23±3	23±3	1
Sport			0,0068			0,766

On the basis of the Spondylo-arthropathy Classification (SAP), the number of cases and the percentage, indicated in Table 4, were identified.

Table 4 - *Number of SAP cases in study groups*

	MORE EXPOSED MEN	LESS EXPOSED MEN	MORE EXPOSED WOMEN	LESS EXPOSED WOMEN
SAP I	8 (15%)	4 (15%)	15 (21%)	7 (19%)
SAP II	2 (4%)	3 (11%)	2 (3%)	1 (3%)
SAP III	1 (2%)	1 (4%)	1 (1%)	1 (3%)

The comparison carried out through the χ^2-*test*, showed no significance between the two groups of men and the two groups of women being *p* always > 0.05.

Discussion

As to the risk assessment, through MAPO index, clear inadequacies appeared in all the departments; in the first place, a total lack of helping equipments like lifters, was found; in the second place, environmental structural deficiencies, were detected.

Training of the staff and information are other fundamental elements, if we want to have the participation of workers in a preventive process.

If we consider all departments, a prevalence of diseases is not present in the bands at higher risk (red and yellow), instead the highest percentage of disorders was sometimes detected in the band at lower risk (green).

No statistically significant correlation, between musculoskeletal diseases and arrangement of workers in relative risk band, was found.

First of all, examining the problems connected with the classification of the exposure measurement, attention should be paid on the criteria used in first band, with lower exposure.

Indeed, by applying MAPO index formula, it's possible that exposure index is ≤ 1.5 when one of the following combinations happens: presence of uncooperative patients in absence of lifters, while all others factors (wheelchairs, environment and training) are adequate. In this situation, the relation between the number of uncooperative patients or partially cooperative patients and operators, become a decisive element. A second and not negligible aspect is the exposure of single health care, that is calculated on the basis of a " presumed " patients handling, and not on the direct observation of quality and quantity of handling operations (impossible thing). The advanced hypothesis implies that in all situations, where not self-sufficient patients are present, all health workers perform a substantially homogeneous activity, with a minimum number of lifts-shifts, as for example the personal hygiene operations (36, 37, 38, 39, 40, 41).

Conclusions

If we consider that musculoskeletal injuries of lumbar spine, related or not with the manual handling of loads, are quite widespread and produce many cases of working unsuitability or suitability with prescriptions or limitations, we realize how this problem can be conducted only through adequate plans of preventive interventions (42, 43, 44, 45, 46, 47). Since the manual handling of patients completely uncooperative or partially cooperative can cause discal loads higher than the breaking load, the health professionals working with only one of these patients, should be considered exposed (48, 49, 50, 51, 52, 53, 54, 55,56,57).

The professional exposure of workers, the effects on their health and among these the effects of hematopoietic system were studied by our group (58, 59, 60).

In our research, the MAPO index, evaluated for health workers, is not related with specific disease because the workers of the group at higher risk use probably procedures which are more correct concerning handling hospitalized patients (61, 62, 63, 64, 65), and conversely it can mean that there are less rigorous procedures and lower compliance for the category of workers at lower risk (66, 67), however, the application utility of MAPO index is not invalidated in the field of risk assessment, or in preventive field (68, 69, 70).

The MAPO index allows to estimate all the factors, that contribute to cause the risk (71,72). The MAPO index can be used both for assessing the status quo, to calculate, therefore, the actual exposure and identify the wards at higher risk, and for a preventive calculation of the single intervention effect. Indeed, it's possible to calculate the reduction of exposure index on basis of the effected correction and to decide reasonably on the costs of the various interventions, by planning application priority (73, 74, 75). If a mathematical simulation is performed in the examined departments, by correcting the factors lifters, the minor aids, the wheelchairs, the training and by assigning demultiplicative values of an optimal situation (FL=0,5; FA=0,5; FW=0,75; FT=0,75), in over 90% of the cases, the MAPO index would be in negligible risk zone, (MAPO 0-1.5) while only in some wards there is the problem of an adequate review of staff in order to bring the exposure to a negligible level. The introduction of adequate mechanical aids, moreover, in the wards at higher risk, will help to reduce the number of working situations " at risk ", allowing the reintegration of suitable and unsuitable health workers with prescription or with limitation. In this way, the turn-over of staff from the departments at higher risk to those at lower risk, will also decrease, above all for workers with serious diseases of the spine, from wards to ambulatories, keeping qualified staff in the same department longer.

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