

# Musculoskeletal disorders in nurses: hospital versus homecare

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## ABSTRACT

It's intended to make a comparison between hospital nurses and homecare nurses, regarding the risk of musculoskeletal disorders (MSDs). A study with homecare nurses carried out by the authors constitutes the basis for the comparison. In it was developed a questionnaire for the analysis of musculoskeletal complaints (MSCs). Was also applied the REBA technique (Rapid Entire Body Assessment) to evaluate the MSDs risk of in homecare nurses. Were found high prevalence rates of MSCs, especially for regions cervical and back. For most activities analyzed by REBA technique the MSD risk associated was medium, but for some of them was high. We compare these results and also the work conditions we found, with results of other authors. No significant differences were found with exception of the working conditions that in general are worse in home context. This may contribute for a higher risk of MSDs in nurses that provide homecare.

**Key-words**

MSDs, Nurses, Homecare, Hospital, Risk Assessment

## INTRODUCTION

There is no doubt about the fact that nurses are associated with a high risk of work related musculoskeletal disorders (WRMSDs). Several authors confirm this fact, referring in their studies high prevalence rates of lesions and also of the symptoms associated to them [1][2][3][4][5]. The risk factors responsible for WRMSDs in nurses are very diversified, however tasks involving lifting and moving patients (on transfers, repositioning and during the various treatments) are those which arise most often associated with back pain and other musculoskeletal problems [6][7][8].

Most of the investigations carried out about WRMSDs in nurses were performed in hospital context. Internationally, there is a scarcity of studies carried out in home context. In Portugal, there is only one study of this type that focused on nurses of Health Centers (primary care) in the northern region, which provided home-based care [9][10][11]. It's fundamental to develop more studies about the risk of WRMSDs in homecare nurses, partly because of the shortage of these studies and secondly because the context of work in the homes of the patients is totally different from the hospital context.

In a hospital setting, which is an entity organized under certain standards, rules and procedures are well defined, there is a certain homogeneity by furniture and equipment available and exist, in general, different auxiliary devices for moving patients. In a hospital setting, the work of nurses is not lonely, for even when nobody is helping them in certain task, there is always a colleague nearby, or any other kind of professional that, at any time, can help them. In opposition to the hospital settings, in patients' home, nurses often work alone and without auxiliary devices for moving patients [9][12]. In a home setting the work environment is unpredictable and, in general, is out of nurses' control. Homecare nurses are often confronted with hazards that are very specific of the home context: attacks from animals, scarcity of space for moving and also to correctly develop their activities, inadequate ventilation, inadequate beds, lack of arrangement and hygiene, violence from the part of the patient, from his family or even from someone who is visiting the patient. Can also occur falls to these nurses, either in the way to the patient's home or just in his house. Stairs, slippery floors, obstacles, among other things, may be responsible for the falls.

The patients' homes are far from being similar to a hospital. Galinsky and colleagues refer that despite the tasks undertaken by home care providers are identical to those performed by their colleagues in a hospital or in nursing homes, the musculoskeletal risk factors in patients' homes are exacerbated [13]. Some international studies show that WRMSDs are a serious problem for professionals who provide homecare, especially for nurses and nursing assistants [14][15][16][17]. There are also studies whose authors believe that nurses who provide homecare are subject to a lower risk of WRMSDs than their colleagues working in hospitals or nursing homes [18][12]. In a study that involved the comparative analysis of musculoskeletal disorders between Greek and Dutch nursing personnel belonging to hospitals and nursing homes, the authors refer that the work in nursing homes seems to entail the same risks that in hospitals, or perhaps a little more, since have a less controlled and standardized work environment, overloading the workers [1]. Following the reasoning of the authors, it can be assumed that the provision of homecare can lead to an even higher risk of WRMSDs, since patients' homes are an even less controlled work environment, without any kind of pattern.

The aim of this work is contribute in some way to the discussion of the theme, adding information about the risk of WRMSDs in nursing activities performed in home-based context, establishing connections and comparisons between our study [10][11] and similar studies performed both in hospital context (or similar, like

nursing homes) as in home setting, preferentially those have used similar methodologies to ours.

## METHODOLOGY

Following is a short description of the study developed by the authors which will highlight the methodology used and also, in a generic way, the mainly results. The study included the characterization of MSCs of nurses who work in Health Centers (primary care) of northern Portugal, specifically of those that provide homecare in addition to working in Health Centers [10]. Through an adaptation of the "Standardized Nordic Questionnaire" for the analysis of musculoskeletal symptoms [19], the respondents were characterized with regard to demographics, professional aspects related to homecare, musculoskeletal complaints, among other things. Also were characterized some aspects related to patients' homes and still some personnel aspects of patients and nurses [9].

Was obtained a sample of 147 nurses (response rate of 5.1%) that work in Health Centers of northern Portugal [female-128 (87.1%); male-19 (12.9%)]. The nurses' age ranged between 24 and 65 years old, the most common age was 26 years old and the average age was 35.7 years old (sd-8.9). On average, seniority in the profession was 12.8 years (sd-8.4). The body zones with higher prevalence of musculoskeletal complaints were the cervical region with 73.5%, the lumbar region with 64.6%, the dorsal region with 49.0% and the shoulders with 49.0%.

In the present study, we are going to give more importance to the results related only to the nurses that indicated provide homecare and that were 125 (85% of the total sample). So, for this group of nurses, the body zones with highest prevalence of musculoskeletal complaints were the same as for the total sample, but with minor differences in prevalence values: cervical region-73.6%; lumbar region-68.8%; dorsal region-50.0% and the shoulders-48.0%.

Through application of models of binary logistic regression it was detected a statistically significant association between "provide home-based care" and "to have complaints at the lumbar region" (OR=3.19 (p<0.05), 95% Confidence Interval [1.26; 8.08]). This indicates that nurses who provide homecare seem to have nearly triple of chance of having musculoskeletal complaints in the lumbar region than their counterparts of Health Centers.

The WRMSDs risk associated to nursing tasks performed in the patients' home was assessed using the technique of postural analysis REBA [20]. Were analyzed 16 activities performed by different nurses, mostly activities of treatment of wounds [11]. In fact, considering the answers to the questionnaire, the treatment of pressure ulcers and the implementation of dressings are the activities that nurses perform more frequently in their home visits (85.6%) [10]. Also were analyzed activities of vaccination and positioning of patient in bed. Activities examined by REBA technique were classified as having associated medium or high risk of MSDs.

Concluding, the aspects that pretend to compare in the present study are:

- Prevalence rates of musculoskeletal complaints or MSDs;
- Results from the application of REBA technique [20];
- Working conditions: availability of auxiliary devices for moving patients; have or not help from colleagues; characteristics of workplace; characteristics of the bed and of other equipments.

## RESULTS AND DISCUSSION

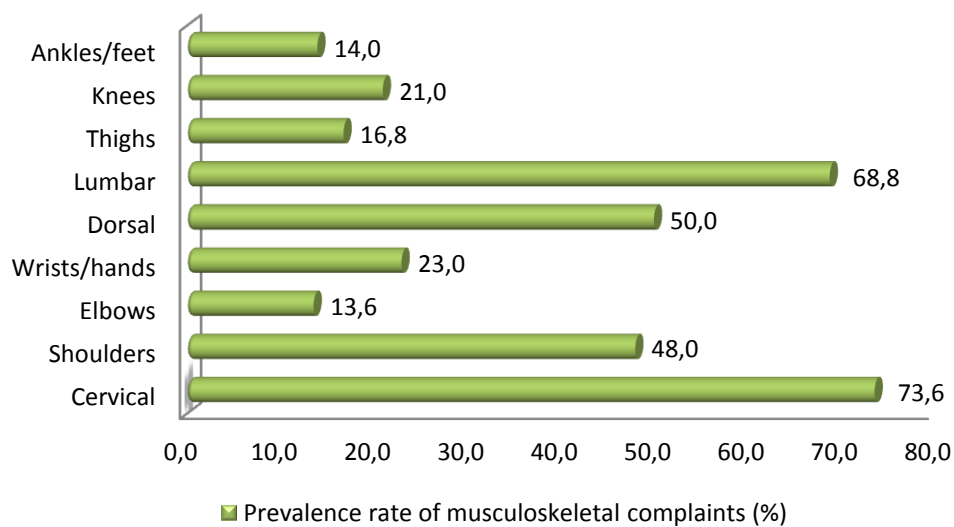
Before starting the comparison of results between studies it's important to highlight that some of them included only nurses, others included nurses and auxiliary

nurses and others included only homecare workers that are not nurses. Since some tasks are common to nurses and other healthcare workers (for example tasks that include transfers, lifts and repositioning of patients), appear to be valid to establish some comparisons of results between the two professional groups.

### Prevalence of musculoskeletal complaints or MSDs

As was said above, to the group of 125 homecare nurses, the body regions with highest prevalence of musculoskeletal complaints were cervical, dorsal and lumbar regions and the shoulders [10]. Figure 1 illustrates the distribution of the complaints to nine body regions. Our results are consistent with those of other studies, as can see in Table 1. This table shows the results of several studies, both international as national, performed either in hospitals as in patients' homes, concerning prevalence of MSCs in nurses or in other related professionals.

Figure 1 – Distribution of musculoskeletal complaints [10]



For the comparison were considered only the studies that used the Nordic Questionnaire [19], or an adaptation of it, to obtaining prevalence rates. All prevalence rates are relative to the last 12 months, with the exception of the study of one [16], in which prevalence rates are relative to the last three months.

All the studies, developed both in the hospital environment as in the home-based context, are unanimous about the body areas most affected by MSCs in nurses: back (includes lower back, upper back, lumbar region, dorsal region), neck or cervical region and shoulders. There are two studies that come out a little bit of this pattern of distribution of prevalence among different areas of the body [15][21]. In the first, carried out with homecare nursing personnel, knees arise with a very high prevalence value (65.1%) and only the shoulders have a higher value (73.1%). In the second study, developed with hospital nursing staff, knees and hands/wrists arise as two of the four regions with the highest prevalence of musculoskeletal complaints.

By observing the results of several studies presented in Table 1, we cannot say that there are differences in prevalence rates complaints between nurses working in hospitals and nurses working in the home context. Both types of professionals have high prevalence of musculoskeletal complaints and the body areas with higher prevalence values are also identical for both types of professionals.

Table 1 – Results of several studies concerning prevalence of MSCs or MSDs

Short description of study	Prevalence by body region
<p><b>Takala &amp; Kukkonen, 1987 [22]</b>            • 143 nurses (qualified and unqualified nurses and students - all had to lift patients) of seven wards of five <b>hospitals</b> (only one ward wasn't geriatric);</p>	<p>neck 59.5%; back 63.0%; shoulders 65.5%.</p>
<p><b>Knibbe &amp; Friele, 1996 [16]</b>            • 189 <b>homecare</b> nurses and 165 <b>homecare</b> nurse auxiliaries;</p>	<p>back 51.8%; neck/shoulders 34.9%; arms 11.7%; knees 18.4%.</p>
<p><b>Trinkoff et al., 2002 [5]</b>            • 1163 nurses;            • <b>Hospital</b> nurses-57.5%; <b>Home health agency</b> nurses-6.6%; <b>other type</b> of nurses-35.9%;</p>	<p>neck 45.8%; back 47.0%; shoulders 35.1%.</p>
<p><b>Smith et al., 2004 [23]</b>            • 180 nurses of five wards of a teaching <b>hospital</b>;</p>	<p>neck 42.8%; Upper back 38.9%; lower back 56.7%; shoulders 38.9%; elbows 10.0%; wrists 27.8%; thighs 22.8%; knees 31.1%; ankles/feet 34.4%.</p>
<p><b>Alexopoulos et al., 2006 [1]</b>            • Dutch (D) nursing personnel (129 nurses and 264 caregivers from 4 <b>nursing homes</b> and 3 <b>homes for the elderly</b>) and 351 Greek (G) nurses from 6 large general <b>hospitals</b>;</p>	<p>back 62% (D); 75% (G); neck 39% (D); 47% (G); shoulders 41% (D); 37% (G).</p>
<p><b>Cheung et al., 2006 [15]</b>            • 406 <b>homecare</b> nursing personnel from Community Nursing Services (75.9%) and Community Psychiatric Nursing Services (24.1%) dependent on the Hong Kong Hospital;</p>	<p>(n=372)            neck 62.9%; shoulders 73.1%; elbows 17.3%; wrists/hands 30.3%; upper back 51.2%; lower back 55.9%; hips/thighs 27.7%; knees 65.1%; ankles/feet 53.4%.</p>
<p><b>Fonseca &amp; Serranheira, 2006 [24]</b>            • 507 nurses of different services of five <b>hospitals</b> in Portugal;</p>	<p>cervical 55%; dorsal 37%; lumbar 65%; shoulders 34%; hands/wrists 30%.</p>

Table 1 – (continued from previous page)

Short description of study	Prevalence by body region
<b>Smith et al., 2006 [25]</b> • 884 nurses of a large teaching <b>hospital</b> ;	neck 54.7%; Upper back 33.9%; lower back 71.3%; shoulders 71.9%.
<b>Barroso et al., 2007 [3]</b> • 251 workers (nurses and auxiliary staff) from 9 wards and 5 auxiliary units of a public <b>hospital</b> ;	cervical 48%; dorsal 27.7%; lumbar 50.5%; elbows 12.3%; shoulders 26.2%; hands/wrists 21.4%; thighs 12.8%; knees 13.4%; ankles and feet 13.5%.
<b>Kee &amp; Seo, 2007 [21]</b> • 162 nursing personnel (nurses-84%; nursing managers-7.7%; nursing aids-7.1%) from different <b>hospital</b> services;	neck 17.3%; shoulders 27.2%; elbows 7.4%; wrists/hands 21.6%; fingers 13.6%; upper back 12.9%; lower back 23.4%; hips/thighs 9.9%; knees 24.7%; ankles/feet 17.3%.
<b>Barroso &amp; Martins, 2008 [2]</b> • 176 nurses from 3 wards (surgery, orthopaedics and medicine) of a public <b>hospital</b> ;	lumbar region 72.7%; cervical, shoulders and neck 52.4%; dorsal 32.2%; upper limbs 22.6; lower limbs & feet 20.3%.
<b>Mehrdad et al., 2010 [26]</b> • 317 nurses of the largest <b>hospital</b> of Tehran, Iran;	neck 46.3%; Upper back 43.5%; lower back 73.2%; shoulders 48.6%; elbows 16.6%; wrists 42.2%; thighs 28.8%; knees 68.7; ankles/feet 39.3%.
<b>Cotrim et al., 2011a [27]</b> • 126 nurses from 8 wards of a <b>hospital</b> ;	(n=124) neck 45.2%; shoulders 35.5%; dorsal spine 39.5%; lower back 66.9%.
<b>Cotrim et al., 2011b [28]</b> • 716 Portuguese nurses across the country ( <b>hospital</b> -61.3%; <b>primary care units</b> -24.9%; <b>others</b> -13.8%);	cervical region 48.6%; dorsal region 40.2%; lower back 58.6%.

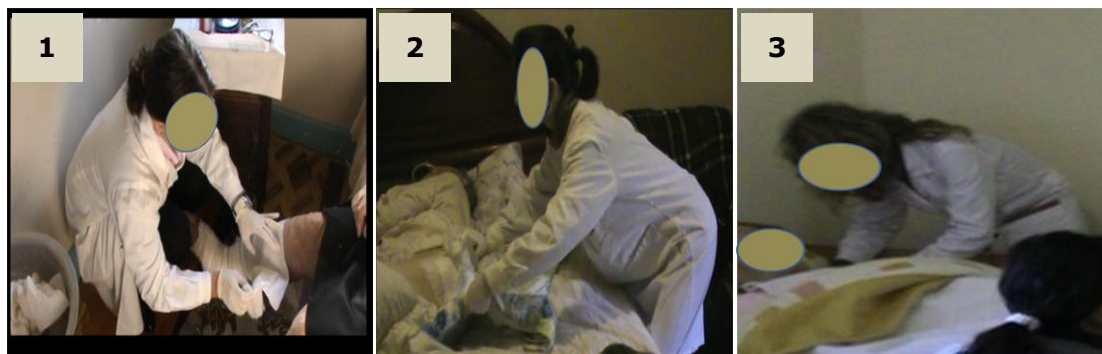
## Application of REBA technique

As done for the prevalence of MSCs, we are going to start by refer the results of our study in what concern the application of REBA technique [20]. Were analyzed 16 nursing activities developed in the home-based context, performed by different nurses [11]. Mostly the activities (12) consisted in treatment of wounds (three to independent patients and nine to dependent patients), but also vaccination (1) and positioning of the patient in bed (3). The final score (REBA) can vary between 1 and 15 points. The higher is the score, the greater is the MSDs risk and also the level of action (0 to 4) [20]. This level indicates the degree of urgency to undertaking a more detailed study and of implementing changes to the activity in question.

The values of REBA obtained for the various activities analyzed ranged from 4 to 9 points. Thus, to the activities of treatment of wounds, REBA values varied between 4 and 8, corresponding to risk levels between medium and high, for activities of positioning of patients in bed were obtained REBA values between 6 and 9, corresponding to risk levels between medium to high and for vaccination activity was obtained a medium risk level (REBA = 5). A medium risk level indicates that it is necessary an intervention in the workplace, although it's not urgent. A high risk level indicates that it is necessary a short-term intervention in the workplace.

Figure 2 depicts some of the postures with highest REBA scores, to each type of activity analyzed at patients' homes.

Figure 2 – Postures with highest REBA scores: 1-treatment of wounds; 2-positioning in bed; 3- vaccination.



We found some studies concerning the application of REBA technique [20] in nurses however, none of them relates to nurses who provide home-based care. The results are at Table 2.

The results from the studies reveal the existence of musculoskeletal risk that ranges from medium to very high, indicating there is need of implementing changes to the activity or to the workplace in question, sometimes with urgency, in order to minimize the risk. Like our results vary between medium and high risk, so they are in accordance with results obtained in hospital environment. The values of REBA we have obtained for the activities of treatment of wounds varied between 4 and 8 as the values obtained by Barroso and colleagues [3] and by Barroso & Martins [2] for the same type of activities (treatments in patient's bed and treatments on treatments' room) but developed in hospital environment. In the study of Hignett & Crumpton [29] it appears that when tasks are performed manually, without auxiliary devices for moving patients, the values of REBA are considerably higher and therefore the risk of LMELT is also superior. In all the studies and for all the activities analyzed, the average risk of MSD ranged from medium to very high, with exception of some specific activities from physical medicine and rehabilitation that include ultra sound treatment, ionization treatment, physiotherapy and cinesiotherapy [3]. For these activities and also for an activity of treatment on

treatments room of the same study, the risk was considered low (REBA score ranged between 2 and 3).

Table 2 – Results of several studies in what concerns the application of REBA technique.

Description of study	REBA score (Rs):
<p><b>Barroso et al., 2007 [3]</b> A range of nursing activities was observed and analyzed across the different healthcare units of a public hospital.</p>	<p>(<b>A</b>-average; <b>m</b>-minimum; <b>M</b>-maximum).</p> <p>Treatments in patient's bed</p> <ul style="list-style-type: none"> <li>• Medicine unit – <b>Rs</b>: A=5; m=1; M=9</li> <li>• 4 Surgery units: <b>Rs</b>: A=4-9; m=1-9; M=8-11</li> <li>• Orthopaedics unit: <b>Rs</b>: A=4; m=1; M=4</li> </ul> <p>Movement/transfer of patients</p> <ul style="list-style-type: none"> <li>• 2 Medicine units: <b>Rs</b>: A=5-7; m=1-3; M=10-12</li> <li>• Orthopaedics unit: <b>Rs</b>: A=8; m=4; M=9</li> </ul> <p>Treatments on treatments' room</p> <ul style="list-style-type: none"> <li>• 2 Surgery units: <b>Rs</b>: A=3-6; m=1-3; M=8-10</li> </ul> <p>Hygiene care in patients' bed</p> <ul style="list-style-type: none"> <li>• 2 Medicine units: <b>Rs</b>: A=5-6; m=1-2; M=8-9</li> <li>• Surgery unit: <b>Rs</b>: A=5; m=3; M=7</li> <li>• Orthopaedics unit: <b>Rs</b>: A=4; m=1; M=8</li> </ul> <p>Specific activities from Physical Medicine and Rehabilitation</p> <ul style="list-style-type: none"> <li>• <b>Rs</b>: A=2-3; m=1-2; M=4-5</li> </ul>
<p><b>Hignett &amp; Crumpton, 2007 [29]</b> Two nursing risky tasks developed by two nurses:</p> <ul style="list-style-type: none"> <li>• Sitting-to-standing transfer;</li> <li>• Repositioning-in-sitting.</li> </ul> <p>Sixteen healthcare organisations in the UK participated from the acute and primary healthcare sectors.</p>	<p><b>Average Rs:</b></p> <p>Sitting-to-standing:</p> <ul style="list-style-type: none"> <li>• With belt: 3.4</li> <li>• Manually: 7.4</li> </ul> <p>Repositioning-in-sitting:</p> <ul style="list-style-type: none"> <li>• With belt: 3.5</li> <li>• With hoist: 4.0</li> <li>• With slide sheet: 5.0</li> <li>• Manually: 7.5</li> </ul>
<p><b>Barroso &amp; Martins, 2008 [2]</b> A set of representative nursing activities was assessed to nurses from 3 wards (surgery, orthopaedics and medicine) of a public hospital.</p>	<p><b>Average Rs:</b></p> <p>Hygiene care in patients' bed: 5-6</p> <p>Treatments in patient's bed: 5-9</p> <p>Patient transfer from bed to chair: 7-8</p>
<p><b>Dias &amp; Nunes, 2012 [30]</b> Nurses and assistant nurses of a health unit of physical medicine and rehabilitation. Were analyzed tasks that involved moving and transferring patients.</p>	<p>The results present the average of the individual results obtained for the different activities:</p> <ul style="list-style-type: none"> <li>• <b>Rs</b> ranged between 4 and 11, which corresponds to a risk level of medium to very high, respectively.</li> </ul>



By observing the results of the several studies presented and comparing them, it is not possible to establish differences to the risk of MSDs between hospital nurses and nurses who provide homecare. However, the truth is that it seems there is risk of MSDs in nursing profession, with or without providing of homecare.

### **Working conditions**

At this point, several factors are going to be analyzed and discussed. One of them is the availability of assistive devices for moving patients. In our study, 97.6% of nurses reported that in general there are no assistive devices for lifting/transferring of patients and 92.8% of nurses reported that usually they need to move the patient to treat him, having to do it manually [10]. If we look at the results of the study of Hignett and colleagues [29] it seems that these devices may contribute to the reduction of the risk of MSDs, since the REBA scores were lower when assistive devices have been used in the tasks. In fact several authors refer that, whenever possible, should be used assistive devices for tasks that involve handling of patients in order to decrease the possibility of musculoskeletal problems [12][25]. As in the home context not always exist such devices, or when exist many times there is difficulty to use them because of the scarcity of space [13], we may think that in this context the risk of MSD might be higher than at the hospital environment or similar, where according to some studies the existence and use of assistive devices for handling patients is more usual [2][3][31].

Another aspect we want to discuss is the possible influence that the help from colleagues during nursing activities may have on MSDs risk in nurses. In our work, most of nurses work alone at the patients' house, 32.8% of them say they never have help from colleagues and 38.4% said they rarely have help. The remaining 28.8% are distributed by the other categories: have help with some frequency, often and always [10]. In a hospital, even though certain task has been planned for just a nurse, in an emergency, nurses can count with the help of colleagues, nurses or auxiliary nurses. For Brulin and colleagues [14] a feeling of loneliness could have many dimensions, such as uncertainty regarding the procedures in special work situations as the colleagues are not available for discussions. According to Myers and colleagues (1993), cited by Galinsky and colleagues [13], bad working conditions common to home care situations, including working alone, are indeed associated with increase of injury rates. For the same authors, 88% of the home health aides' patient handling injuries occurred while they were working alone. By contrast, 39% of the hospital aides' patient handling injuries occurred while working alone.

In relation to the characteristics of the workplace in patients' homes, we verified that nurses' opinion was not very positive. They characterized three parameters: disposition of furniture and equipment, available space for moving around the patient and arrangement and hygiene. They used a likert scale with five levels (1-bad; 2-mediocre; 3-satisfactory; 4-good; 5-very good). Best or least bad classification was assigned to the "arrangement & hygiene" with 64% of the nurses attributed "satisfactory". Yet 29.6% attributed "mediocre." For the "disposition of furniture" and "availability of space" were almost 50% of nurses to ascribing "mediocre" [10]. Sometimes, the lack of enough space for the nurse to move around the patient and a poor organization of the workspace, force the professional to adopt inappropriate postures that can lead to the appearance of musculoskeletal complaints [3][14][32]. According to Galinsky and colleagues [13], hospitals have more control over the patient's surroundings, and thus are more able to arrange furniture and equipment to make it as easy as possible for workers to reach patients. They also usually have adjustable beds that may lessen the workers' physical strain during patient transfers. By contrast, in home settings, beds are often not adjustable. In our study we found in general low beds, not adjustable beds, double beds and also some adjustable beds. Only 18.4% of nurses consider

the height of the bed appropriate [10]. Previous study already revealed the height of the bed as a cause of awkward postures and consequently of MSCs [33].

## CONCLUSIONS

It weren't founded visible differences between the two types of nurses under comparison at the level of WRMSDs prevalence and also at the level of REBA scores calculated for different activities of nursing. Both types of professionals have high prevalence of musculoskeletal complaints, mainly in the back, neck (cervical region) and shoulders. For the different nursing activities analyzed by REBA technique at both contexts (hospital and home) the risk level of WRMSDs ranged from medium to very high with few exceptions, for example for some specific activities from Physical Medicine and Rehabilitation where the average risk was low [3].

However, since the working conditions in home environment generally seem to be worse than in hospitals or in similar institutions, we think that the risk of WRMSDs in nurses who provide homecare may be higher than that of their peers who don't provide this type of health care.

Further studies related to the risk of WRMSDs in nurses who provide homecare are needed, in order to better understand how far worst and unpredictable working conditions in patients' homes may contribute to the increased risk of WRMSDs in these professionals. Risk factors must be properly identified in order to be able to act on them and thus contribute to reduce the risk of MSDs.

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