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# Work-related musculoskeletal disorders of physical therapists in UST-CRS affiliated centers

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## ABSTRACT

**Objective:** To determine the 12-month prevalence of work-related musculoskeletal disorders (WMSD) among professional physical therapists (PTs) working in UST-CRS affiliated centers, their severity, associated factors and the PT's responses to injury. **Methods:** A 4-page self-administered questionnaire was used to gather demographic data, job-factor survey, body areas affected and their severity, injury prevention strategies and responses to injury. **Results:** Among the respondents, 87.23% (n = 41) experienced musculoskeletal symptoms in the past 12 months. The highest prevalence of WMSD among respondents was in the following anatomical areas: lower back (82.98%), upper back (57.45%), and neck (48.94%). Therapists with a severity score of  $\geq 3$  for WMSD were in the low back (71.79%), hips/thighs (57.14%) and wrist/hands (54.55%). The only specialty area related to WMSD was orthopedics with concurrent increased neck, low back, wrist/hand, knee, upper back, ankle/foot, and thumb symptoms. 88.24% (n = 15) of the identified job-related factors were associated with either upper back or lower back symptoms. Strategies used by therapists (89.36%; n = 42) in response to WMSD included the use of self-protective behaviors to reduce the work-related strain on their bodies. **Discussion and Conclusion:** WMSD among PTs working in UST-CRS affiliated centers were highest in the low back, upper back and neck. High severity scores associated to the low back, hips/thighs, and wrist/hands greatly affected their work, ADLs, and leisure. Almost all identified job-related factors were associated with spinal symptoms. Self-protective behaviors were often used by PTs to decrease the risk of WMSD.

**Keywords:** *Physical therapy, Work-related musculoskeletal disorders (non-MESH), Prevalence*

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## INTRODUCTION

Musculoskeletal disorders represent a wide range of disorders that may involve the nerves, tendons, muscles, and supporting structures such as ligaments and intervertebral discs, which can differ in severity from mild periodic symptoms to severe chronic and debilitating conditions. Examples include carpal tunnel syndrome, tenosynovitis, tension neck syndrome, and low back pain. Work-related musculoskeletal disorders (WMSD) are musculoskeletal disorders caused or made worse by the work environment.<sup>1</sup> They occur when there is a mismatch between the physical requirements of the job and the physical capacity of the human body. Specific risk factors associated with WMSD include repetitive motion, heavy lifting, forceful exertion,

contact stress, vibration, awkward posture and rapid hand and wrist movements.<sup>2</sup>

Previous studies regarding WMSD in physical therapists (PTs) were done in Australia<sup>3</sup>, Europe<sup>4-5</sup>, and in the United States.<sup>6</sup> However, there are a few published studies regarding WMSD concerning the PTs in the Philippines. Limited information is available as to the prevalence, severity and risks of these WMSD. There is also little information on how Filipino PTs treat or find means to prevent such injuries.

In the study of Bork et al (1996), the highest annual prevalence of WMSD was in the low back (45%), followed by the wrists/hands (29.6%), upper back (28.7%), neck (24.7%), and the shoulders, elbows, hips, thighs, knees, ankles/feet (each less than 20%). The prevalence of

WMSD in PTs was affected by work setting, practice specialty, age of patient, and gender of therapist. More female therapists had spinal symptoms and wrist/hand symptoms than male therapists. The job factor rated most likely to contribute to WMSD was "lifting or transferring dependent patients."<sup>6</sup>

In the study of Cromie et al (2000), 91% of the respondents reported experiencing work-related musculoskeletal pain or discomfort at some time in their working life. The most serious work-related problem concerned their low back (48%), neck (12.2%), upper back (12.2%), and thumbs (11.0%). These areas also follow the order in which symptoms have prevailed for 12 months. More than 80% of all therapists had musculoskeletal symptoms in at least one part of their body during the 12-month period preceding the study. This, however, was inversely related to age where analysis showed that younger therapists reported more neck, upper back, low back, and thumb symptoms than older therapists did.<sup>3</sup>

Participants in the study of Cromie et al (2002) did not anticipate WMSD and typically believed that their knowledge and skills would have prevented WMSD from occurring. They saw themselves as knowledgeable and caring and indicated that these characteristics were highly valued in their profession. The need to demonstrate these attributes sometimes resulted in behaviors that contributed to the development of their WMSD and made them worse after their onset.<sup>7</sup> This indicates that WMSD are really present in the work environment and unless measures are done to prevent or counteract them, these would still affect the PTs' work.

PTs utilize different methods in delivering their services to their clients. These may come in the form of modalities, exercises and manual therapy.<sup>8</sup> As they are subjected to perform repetitive motion, heavy lifting, forceful exertion, awkward posture and rapid hand/ wrist movements, physical therapists are prone to develop WMSD during their practice. Since most PT techniques performed in the clinics are standardized, Filipino PTs are most probably at risk of developing WMSD as well. However, little is known on how Filipino PTs actually respond to their injuries.

Aside from posing a great impact on the health and productivity of PTs, WMSD also affect the employers with the direct and indirect costs of

the injury such as worker compensation premium, medical costs, lost time wages, disruption and production due to injury, and the administrative costs. In the US alone, WMSD cost employers an estimated \$15 to \$20 billion in workers' compensation costs in 1995 and \$45 to \$60 billion more in indirect costs.<sup>2</sup>

The US National Institute for Occupational Safety and Health (NIOSH) has reviewed 2,000 studies on WMSD. In the Philippines, the Occupational Safety and Health Center (OSHC) of the Department of Labor and Employment (DOLE) has conducted several researches on WMSD since 1988, but no study has been published yet on the safety and work environment of health professionals in the country, particularly on Filipino PTs.<sup>9</sup> This underscores the need for a study on WMSD in Filipino PTs, for there to be an increased awareness about the prevalence, severity, associated factors and responses to injury.

The purpose of this study is to determine the prevalence and severity of WMSD in professional Filipino PTs working in various UST-CRS affiliated centers, including possible associated factors and individual responses to injury. The results of this study may be used by PTs and their employers as guide in the formulation of strategies on how to prevent and counteract WMSD. The development and use of these strategies can improve the therapists' work efficiency, overall health and well being. It will, in turn, decrease the potential health and labor costs brought about by WMSD.

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## METHODOLOGY

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Epidemiological survey using a questionnaire was considered as the most appropriate way of obtaining the prevalence of WMSD among professional Filipino PTs working in UST-CRS affiliated centers during the past 12 months. Ethical approval was obtained from the University of Santo Tomas - Faculty of Medicine and Surgery Research Committee on the Health Sciences. A summary of the procedures used for this study is shown in Figure 1.

### *Subject Selection and Recruitment*

Licensed PTs working in all UST-CRS affiliated centers were identified through the existing database used by the UST-CRS PT Department.

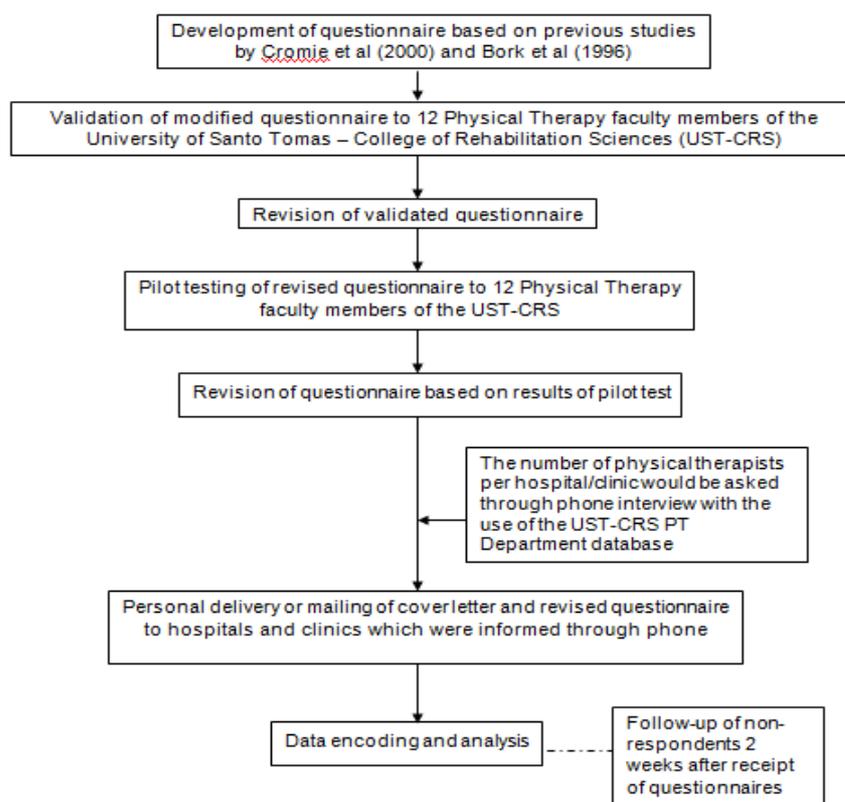


Figure 1. Research Procedure

A total of 98 PTs working in the centers listed were identified. Only those who have experienced any form of WMSD within the past 12 months were included in the study.

#### *Development of Questionnaire*

A self-administered 4-page questionnaire (Appendix A) was used. It consisted of closed and open-ended type questions, including the demographic data of the respondent such as age, gender, height and weight, educational background, employment history, total years of clinical practice and the number of hours of work in a week.

The standardized Nordic Questionnaire (SNQ), a widely used survey tool for screening musculoskeletal disorders and shown in several studies to be reliable and valid, consisted of a general questionnaire showing a body map diagram divided into 9 anatomic regions and asking about the presence of physical troubles including ache, pain, discomfort, etc. for the past 12 months and past 7 days in each of the body areas. It also included grades of severity by using a measure of functional status answerable by a yes or no response.<sup>10-12</sup>

The original SNQ was modified to include 10 different body areas at risk for WMSD for the past 12 months based on studies of Cromie et al (2000).<sup>3</sup> The extent of severity as to how it affected their activities of daily living (ADLs) and work, as well as the possible work-related risk factors and their responses to the symptoms rated using a 6-point Likert scale for ease of administration and analysis was also added. Open-ended questions regarding how they cope and prevent WMSD from occurring were also included in the revision.

#### *(1) Prevalence and severity of WMSD*

The 12-month prevalence of WMSD was investigated by using a table of body areas commonly affected based on the modified SNQ of musculoskeletal symptoms done by Cromie et al (2000).<sup>3</sup> Respondents were asked if they have experienced any "job-related ache, pain, etc." in the 10 anatomical areas stated. An option for other body areas that may be affected but are not included in the choices was provided. In addition, they were also asked if the symptoms have affected their work, ADLs and leisure; whether symptoms had lasted for three days; and

whether they had sought treatment in the preceding 12 months.

### (2) Factors associated with WMSD

Seventeen job-related factors as identified by Bork et al (1996)<sup>6</sup> were included in the questionnaire. A 6-point scale (0 = no problem, 5 = major problem) was used to indicate the degree to which they believed that the identified factors contributed to their WMSD. An option for other possible job-related factors not mentioned in the choices was also included.

### (3) Strategies in coping and preventing WMSD

Open-ended questions as to how PTs in UST-CRS affiliated centers cope with WMSD and ways to prevent WMSD from happening were included. Respondents were asked if they use self-protective measures to reduce the work-related strain on their body. If yes, 10 choices were provided as to what technique they have used. They were also asked as to how often they use the said techniques by checking the appropriate box (almost always, sometimes, almost never).

A consent form which stated that all the information provided will be treated with utmost respect and confidentiality and may be used by any means by the researchers in order to achieve the goals of the study was included. The consent form was written in English and Filipino to ensure understanding of the document.

### Validation and Pilot testing of Questionnaires

Validation and pilot tests were conducted separately to a random sample of Filipino PTs in various rehabilitation centers. An explanatory letter was included asking the respondents to comment on the questionnaire's format, face and content. They were asked to add possible related questions that may contribute to the achievement of the study's aims if needed. Revisions were then made based on the results of the pilot study.

### Distribution & Administration of Questionnaires

The revised questionnaires were distributed through personal delivery to different UST-CRS affiliated rehabilitation centers. The survey questionnaire included a cover letter, which stated the purpose of the survey and the declaration of confidentiality. It also provided information that the respondents were encouraged to return the questionnaire within 1 week after distribution. Follow-up calls were

done to ensure compliance 2 weeks post distribution.

### Data Analysis

Data regarding musculoskeletal symptoms experienced by the respondents were encoded and analyzed using Microsoft<sup>®</sup> Excel 2003. The percentage of all the PT professionals who experienced WMSD in the past 12 months and the prevalence of these symptoms in each of the 10 body areas were computed. Chi square analysis was utilized to examine the association between WMSD and the specialty area and strategies used by the subjects. Prevalence odds ratios with 95% confidence intervals (CI) were computed to determine the relationship of identified job-related factors with WMSD. The relationship of different responses or self-protective behaviors of the subjects to their symptoms were also determined using the Chi Square test.

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## RESULTS

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Based on the updated database of UST-CRS PT Department, a total of 98 PTs were identified as working in the 14 UST-CRS affiliated rehabilitation centers. Only 63 out of the 98 PTs (64.29%) agreed to participate in the study. Reasons for not participating included strict research protocol of the center (n=1), inability to meet the deadline (n=7), currently on leave of absence (n=2), or were too busy to answer the questionnaire (n=12).

Of the 63, 49 PTs returned the answered the survey questionnaires on time (77.78%). However, 2 questionnaires were excluded due to incomplete answers, giving a response rate of 74.6% (n=47).

Eighty-seven per cent (n=41) of the respondents (46% male & 54% female) reported experiencing work-related musculoskeletal pain or discomfort in the past year.

### Prevalence, severity of WMSD

Table 1 shows the 12-month prevalence of WMSD among physical therapists, as well as the percentage of respondents with symptoms lasting >3 days and the severity of their symptoms. The top 2 areas rated with scores of  $\geq 3$  (moderately severe) on the severity scale were the lower back (47.62%) and neck (9.52%). All other body areas had moderately severe symptoms of less than 5% of respondents.

**Table 1. Percentage of therapists reporting musculoskeletal symptoms, therapists reporting symptoms lasting more than 3 days; and therapists with a severity score of 3 or greater.**

Body area	12-month prevalence (%)	Symptoms lasting >3 days (%)	Therapists with severity score of $\geq 3$ (%)
lower back	82.98	53.85	71.79
upper back	57.45	29.63	33.33
neck	48.94	21.74	26.09
ankle & feet	25.53	25.00	33.33
shoulders	23.40	18.18	18.18
wrist & hands	23.40	27.27	54.55
thumbs	23.40	18.18	27.27
knees	23.40	18.18	27.27
hips or thighs	14.89	14.29	57.14
elbows	12.77	33.33	16.67
Total	87.23	68.09	68.09

The prevalence of symptoms was not different between male and female therapists in most areas [Fig. 2]. Male therapists were more likely to report symptoms involving the elbow (POR=2.32, 95% CI=0.38-14.08), wrist/hand (POR=1.34, 95% CI=0.35-5.20), thumb (POR=3.73, 95% CI=0.85-16.45), low back (POR=1.75, 95% CI=0.37-8.37), hip/thighs (POR=1.47, 95% CI=0.29-7.45), and ankle/feet (POR=2.67, 95% CI=0.68-10.54). Female

therapists, on the other hand, were more likely to report symptoms involving the neck (POR=1.09, 95% CI=0.35-3.43), upper back (POR=1.53, 95% CI=0.48-4.89), shoulder (POR=1.2, 95% CI=0.31-4.65), and knee (POR=1.2, 95% CI=0.31-4.65).

Symptoms in the lower back was reported by 59.57% (n=32) of the respondents to have a severity score of  $\geq 3$ . Majority of the respondents reported a severity score of < 3 in the upper back (38.3%) and neck (36.17%).

#### Specialty areas & WMSD

Majority of the respondents specialize in orthopedics (30%) and neurological rehabilitation (20%). Chi square analysis between specialty areas and WMSD revealed a significant association between orthopedics and the prevalence of WMSD ( $\chi^2=13.85$ ,  $p=0.05$ ).

Respondents specializing in orthopedics reported symptoms on the neck, low back, wrist/hand, knee, upper back, ankle/foot and thumbs, which showed significant association with the specialty area. The association between WMSD and other specialty areas did not reach statistical significance.

#### Factors associated with the prevalence of WMSD

Lifting or transferring dependent patients was associated with upper back symptoms (POR = 1.28, 95% CI = 0.37-4.4) and low back symptoms (POR = 2.55, 95% CI = 0.54-12.01). Assisting patients during gait was associated with shoulder symptoms (POR = 1.68, 95% CI = 0.43-6.54) and

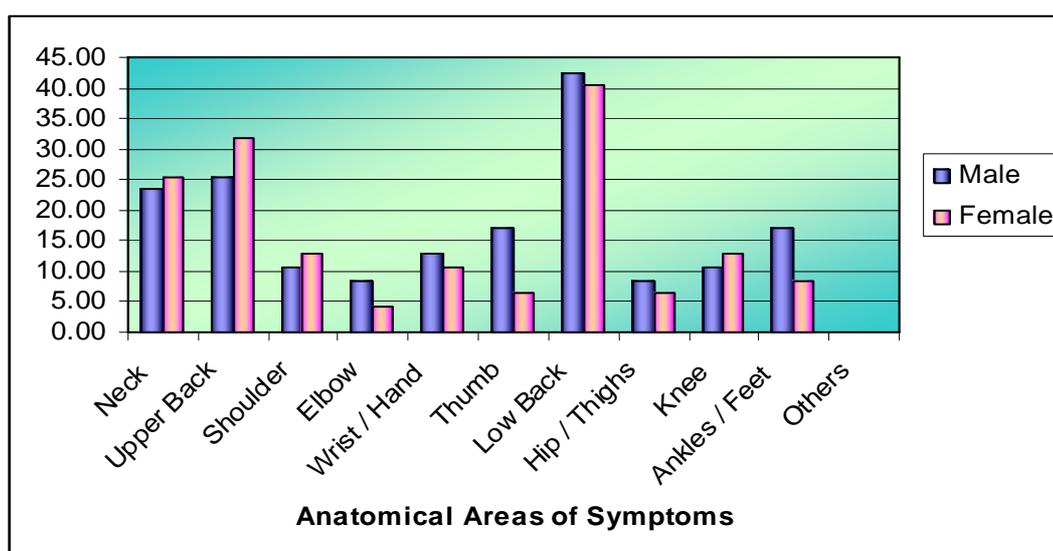


Figure 2: Comparison between male and female physical therapists of the 12-month prevalence of WMSD in 10 body areas (n =47)

low back symptoms (POR = 2.57, 95% CI = 0.46-14.37). Carrying, lifting, moving heavy materials or equipment was associated with low back symptoms (POR=1.29, 95% CI=0.28-5.94) and ankle/foot symptoms (POR=1.05, 95% CI=0.28-3.97). Working with confused or agitated patients was also associated with low back symptoms (POR=1.04, 95% CI=0.22-5.01). Performing manual orthopedic techniques was associated with thumb symptoms (POR=1.04, 95% CI=0.27-4.05) and low back symptoms (POR=1.94, 95% CI=0.41-9.29). Unanticipated sudden movement or fall by a patient was related to upper back symptoms (POR=1.87, 95% CI=0.55-6.33), shoulder symptoms (POR=1.31, 95% CI=0.34-5.12) and lower back symptoms (POR=2.32, 95% CI=0.42-12.96) [Table 2].

Postural factors were associated with spinal symptoms. Bending or twisting the back in an awkward way was associated with upper back symptoms (POR=1.64, 95% CI=0.50-5.38) and low back symptoms (POR=3.33, 95% CI=0.69-16.16). Reaching or working away from your body was connected to upper back symptoms (POR=2.17, 95% CI=0.64-7.33) and low back symptoms (POR=2.32, 95% CI=0.42-12.96). Working in the same positions for prolonged periods (e.g. standing, bent over, sitting, kneeling) was associated with neck symptoms (POR=1.17, 95% CI=0.32-4.2) and low back symptoms (POR=1.53, 95% CI=0.31-7.51). Working in awkward and cramped positions was also associated to neck symptoms (POR=1.32, 95% CI=0.41-4.2) and low back symptoms (POR=2.67, 95% CI=0.56-12.82).

Almost all identified workload risk factors were associated with at least one body part with increased risk of WMSD. Treating an excessive number of patients in one day was associated with lower back symptoms (POR=1.2, 95% CI=0.25-5.82), hip/thigh symptoms (POR=1.56, 95% CI=0.28-8.72), and ankle/foot symptoms (POR=1.04, 95% CI=0.26-4.18). Performing the same task repetitively was related to wrist/hand

**Table 2: Job-related risk factors identified as major contributors to their WMSDs and their relationship to particular musculoskeletal symptoms**

	<b>Job-related factors</b>	<b>Affected areas</b>
<b>Activities</b>	Lifting or transferring dependent patients	upper back, low back
	Assisting patient during gait	shoulder, low back
	Carrying, lifting, moving heavy materials or equipment	low back, ankle/foot
	Working with confused or agitated patients	low back
	Performing manual orthopedic techniques	thumbs, low back
	Unanticipated sudden movement or fall by patient	upper back, shoulder, low back
<b>Position/posture</b>	Bending or twisting back in an awkward way	upper back, low back
	Reaching or working away from your body	upper back, low back
	Working in the same positions for long periods	neck, low back
	Work in awkward and cramped positions	neck, low back
<b>Workload issues</b>	Treating an excessive number of patients in 1 day	low back, hips& thigh, ankle/foot
	Performing the same task over and over	shoulder, wrist & hands, hips/thighs, low back
	Not enough rest breaks or pauses during the day	shoulder, wrist & hands, low back
	Work scheduling (overtime, irregular shifts, length of workday)	low back
<b>Personal work factors</b>	Working near or at your physical limits	upper back, low back, ankle/foot
	Continuing to work while injured or hurt	low back
	Inadequate training on injury prevention	none

symptoms (POR=1.64, 95% CI=0.40-6.71), hip/thigh symptoms (POR=1.41, 95% CI=0.25-7.86), and low back symptoms (POR=2.32, 95% CI=0.42-12.96). Not enough rest breaks during the day was related to shoulder symptoms (POR=1.07, 95% CI=0.28-4.16), wrist/hand symptoms (POR=1.42, 95% CI=0.34-5.88) and low back symptoms (POR=2.16, 95% CI=0.45-10.32). Work scheduling issues such as overtime, irregular shifts, or length of workday was associated with low back symptoms (POR=1.25, 95% CI=0.20-7.68).

Working near or at their physical limits was related to upper back symptoms (POR=1.78,

95% CI=0.55-5.72), low back symptoms (POR=1.17, 95% CI=0.26-5.35), and ankle/foot symptoms (POR=1.18, 95% CI=0.31-4.44). Continuing to work while injured or hurt was related to low back symptoms (POR=2.55, 95% CI=0.54-12.01). The only job-related factor that was not related to any WMSD was inadequate training on injury prevention.

#### Responses to WMSD

Forty-two out of the 47 respondents (89.36%) reported use of self-protective behaviors to reduce the work-related strain on their bodies. Majority (95.1%, n=39) reported modifying the patient's or therapist's position.

The self-protective behaviors, such as outsourcing, preventive and reactive strategies were associated with particular WMSD [Table 3]. Acquiring the help of PT assistants when performing physically stressful tasks was

associated with the presence of lower back symptoms among therapists ( $\chi^2=5.85$ ,  $p=0.05$ ). Getting someone else to help in handling a heavy patient was also associated with presence of elbow symptoms ( $\chi^2=8.46$ ,  $p=0.05$ ).

Preventive strategies are self-protective behaviors wherein there is modification of technique or the environment. Modifying the patient's position or the therapist's position was associated with presence of lower back symptoms ( $\chi^2=3.89$ ,  $p=0.05$ ), hip/thigh symptoms ( $\chi^2=3.89$ ,  $p=0.05$ ), and ankle/foot symptoms ( $\chi^2=6.29$ ,  $p=0.05$ ). Warming up to stretch before performance of manual techniques was related to presence of upper back symptoms ( $\chi^2=5.00$ ,  $p=0.05$ ).

Reactive strategies are responses to discomfort or injury. Stopping a treatment if it causes or aggravates the therapist's discomfort was

**Table 3. Relationship between self-protective behavior PTs are using and WMSD**

Strategy	Self-Protective Behavior	Related to symptoms:
Outsourcing	I use PT assistants to perform physically stressful tasks	lower back
	I get someone else to help me handle a heavy patient	elbow
Preventive	I pause regularly so I can stretch and change posture	none
	I adjust plinth/bed height before treating a patient	none
	I modify my position/patient's position	lower back, hip & thigh, ankle & foot
	I warm up and stretch before performing manual techniques	upper back
Reactive	I stop my treatment if it causes or aggravates discomfort	thumb, hip & thigh
	I use electrotherapy instead of manual techniques to avoid stressing an injury	neck, elbow
	I select techniques that will not aggravate or provoke my discomfort	none
	I use a different part of my body to administer a manual technique	elbow

**Table 4. Consequences of musculoskeletal symptoms over the last year (n=41)**

	Prevented from Working (%)	Prevented from ADLs (%)	Prevented from Leisure (%)	Sought Treatment (%)
Lower Back	66.67	46.15	41.03	35.90
Thumbs	63.64	9.09	9.09	27.27
Ankles & Feet	58.33	25.00	25.00	8.33
Neck	47.83	21.74	17.39	17.39
Upper Back	37.04	33.33	18.52	22.22
Shoulders	36.36	9.09	9.09	9.09
Wrist & Hands	36.36	18.18	0.00	9.09
Knees	36.36	36.36	9.09	9.09
Hips & Thighs	28.57	14.29	28.57	14.29
Elbows	16.67	0.00	0.00	16.67

associated with the presence of thumb symptoms ( $\chi^2=3.90$ ,  $p=0.05$ ) and hip/thigh symptoms ( $\chi^2=6.27$ ,  $p=0.05$ ). Using electrotherapy instead of manual techniques to avoid stressing an injury was related to those with neck symptoms ( $\chi^2=3.84$ ,  $p=0.05$ ) and elbow symptoms ( $\chi^2=4.67$ ,  $p=0.05$ ). Using a different part of the body to administer a manual technique was related to those with elbow symptoms ( $\chi^2=8.46$ ,  $p=0.05$ ).

Respondents who complain of low back symptoms had the highest percentage of those who were prevented from working (66.67%), ADLs (46.15%), leisure (41.03%) and had sought treatment (35.90%) [Table 4].

## DISCUSSION

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WMSD were seen in majority of the respondents. All PTs included in this study had reported musculoskeletal symptoms of pain and discomfort for the past 12 months in their work on the major body areas from the neck down to the ankles and feet. These WMSD interfered with their work, ADLs and leisure activities. A major finding of this study, similar to the studies of Cromie et al, was the high prevalence of low back pain among PTs followed by upper back and neck pains. This may be due to the techniques, intervention strategies or preference of position of the PTs.<sup>3,7</sup>

There was also a significant relationship seen between WMSD and therapists being involved in the orthopedic field of specialty. Orthopedic PTs have reported pain in the neck, upper back, wrist/hand, thumb, low back, knee and ankle/foot. There were significant relationships seen between manipulation and mobilization techniques with thumb and low back symptoms. Low back symptoms were seen to be related to the 4 main categories of job-related factors included in this study, namely activities, position/posture, workload and personal work factors. The study of Cromie et al has shown that only position/posture-related factors were related to low back symptoms.<sup>3</sup> This relationship noted between these factors and WMSD suggests that injury prevention techniques may be applicable in reducing the probability of these symptoms to affect the PTs.

*Distribution, Prevalence and Severity of WMSD*  
The majority of the respondents (87.23%) reported that they had experienced WMSD at

some time for the past 12 months. The WMSD were related to gender, specialty areas and the specific tasks performed by the respondents in their respective fields. Workload issues such as number of patients treated per day and hours of work were identified as being highly related to the presence of WMSD both in the upper & lower body areas. Cromie et al's studies have shown that these factors were particularly related to upper body symptoms.<sup>3,7</sup>

The high prevalence of low back symptoms (82.98%) was consistent with the results of several studies on other health care professionals.<sup>13,14</sup> Smedley et al,<sup>11</sup> who surveyed female nurses, reported a 12-month prevalence of low back pain of 45%.

The relationship between the prevalence of WMSD and age of physical therapists, although was not investigated in this study, is considered an important factor. The age range of respondents who participated in this study is from 21 to 34 years of age. This is a relatively young and active population of PTs. This age range may be due to the fact that a majority of our senior PTs are practicing their profession abroad.

This study found that male PTs were more likely to develop thumb and ankle/foot symptoms as compared to females who were more likely to develop upper back, elbow, low back and knee symptoms. On the contrary, male PTs in the study of Cromie et al experienced more neck, wrist/hand, and thumb symptoms than female PTs did.<sup>3</sup>

The association of low back symptoms with almost all of the factors noted in this study suggests probable strong implications on how PTs work. PTs should practice proper body mechanics and limit the number of times or hours they perform high-risk activities.

WMSD, particularly low back symptoms, have affected the respondents in varying levels. Low back, thumb and ankle/feet symptoms have prevented a majority of the respondents from working. Low back, knee and upper back symptoms have prevented a majority of the therapists from performing their ADLs. Low back pain had also prevented a majority of the therapists from enjoying their leisure activities.

Respondents, who had low back (36%), thumb (27%) and upper back (22%) symptoms have also sought treatment. Bork et al<sup>6</sup> found that the most common WMSD causing respondents to

see a physician were in the low back (2.9%) and in the wrist/hands (2.3%). These values imply that the issue of musculoskeletal injuries in the physical therapy profession is not only widespread among the therapists but usually entails additional cost for seeking medical treatment.

#### *Specialty areas, tasks, risk factors and development of WMSD*

Involvement of therapists in the field of orthopedics was seen to be highly related to WMSD ( $\chi^2 = 13.85$ ,  $p = .05$ ). Cromie et al's studies, on the other hand, showed that WMSD were highly related to sports physical therapy, private practice and pediatrics.<sup>3,7</sup> The increased prevalence of these symptoms among the therapists practicing in orthopedics may be associated to the type of tasks they perform and the type of patients that they handle.

PTs may be exposed to the various job-related factors. Lifting and transferring dependent patients has been associated with low back symptoms based on this study and on other studies as well.<sup>3,7,13,16</sup> But the results of this study has also revealed its association with upper back symptoms as well. In a survey of PTs, Molumphy et al<sup>14</sup> found that the most common mechanism of injury reported by PTs was lifting with sudden maximal effort and bending or twisting. Biomechanical investigations have confirmed that lifting and transferring patients generate high spinal stresses.<sup>18-22</sup> However, given that therapists self-identified the contributing factors, the association may have been due to bias and what therapists believed to be true, rather than the actual contribution this factor made to their injuries. Cromie et al suggest that this finding should thus be viewed cautiously until it is independently verified.<sup>7</sup>

Assisting patients during gait activities resulted to shoulder and low back symptoms. This may be due to the level of assistance provided by the therapists on patients from passive walking to close guard assist. Carrying or moving materials or equipment was related to lower back and ankle/foot symptoms. This risk may be due to improper body mechanics of the therapist during the task or the weight of the equipment itself. Manual orthopedic techniques have shown to affect the thumbs and the low back. Lastly, unanticipated or sudden falls by the patient was related to upper back, shoulder and lower back symptoms. This may be due to the physical stress on the therapist when

making quick sudden motions to support the patient or a probable mismatch on the size of the therapist to the patient.

Position/posture risk factors have been closely related to neck, upper back and low back symptoms. This may be attributed to the severe stress applied by improper position to the therapists' axial skeleton and musculature causing the injury. Work load issues and personal work factors showed a variety of body areas affected. This may be due to the therapists' subjective view of his/her physical limits, number of patients treated, rest breaks, work schedules and the number of times the task is performed over and over. The exact number of hours of work per day/week, type of patients handled and other factors such as sports and the setup of the practice may also influence the development of these symptoms. These factors, however, were not included in this study.

Personal work factors such as psychological distress, depression, self-efficacy beliefs, subjective work prognosis, low reward and poor management quality have been identified in other researches as major factors related to WMSD.<sup>23-24</sup> These factors, however, were not considered in this study. The researchers did not take into account the reflective, dynamic and reciprocal nature of human behaviour that may lead to the development of or recovery from a pain problem.

#### *Strategies used by physical therapists to minimize effects and risks in the development of WMSD*

The majority of the respondents used some aids, techniques and sometimes other people to reduce strain on their bodies during performance at work. The most commonly used technique was to modify the position of the therapist and the patient. This may be used to employ the position offering the greatest mechanical advantage to deliver the technique properly without sacrificing the therapist's comfort and position. However, there are also associated risk factors other than posture named in this study. These include activities, workload issues and personal factors. These risk factors also play a role in developing WMSD and should also be considered in strategizing to minimize the effects and risks in the development of WMSD.

Another frequently used strategy was modification of the patient's position. This still supports that the therapists use a comfortable position and also has the greatest mechanical advantage in delivering the treatment to the

patient. However, in the studies of Cromie et al, the respondents used outsourcing options in minimizing the risks of developing WMSD.<sup>3,7</sup> The least used strategy was the use of electrotherapy instead of manual techniques to avoid stressing the injury. This finding may suggest that the respondents would not compensate the effectiveness of therapy by using electrotherapy to the patient instead just because of their injury.

Another strategy noted, although not frequently used, was adjustment of plinth and bed height by the therapists. Some reported, however, that the plinths in their centers are fixed in height so they cannot be adjusted. This suggests that improvements in work ergonomics of plinth/bed height may be done as part of the strategies in minimizing WMSD.

No strategy is exclusive to a certain body part affected. The interaction of the several risk factors noted in the study would play a role in the development of WMSD. This would suggest that strategies in minimizing WMSD for the therapists is specific to the tasks the therapists perform, body parts involved and other factors that may play a role in the development of WMSD.

Having mentioned the potential WMSD risks brought about by emotional stress and demands, perceived personal work-related problems should be recognized early. Strategies targeted toward reducing emotional stress and demands brought about by work, and improving reward and management quality should also be considered.

## CONCLUSION

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The prevalence of WMSD among PTs working in UST-CRS affiliated centers were highest in the low back, upper back and neck. Based on the results of the survey, high severity scores associated to the low back, hips/thighs, and wrist/hands greatly affected the quality of the therapists' work, ADLs, and leisure. Almost all job-related factors were associated with spinal symptoms. As their response to injury, self-protective behaviors were often utilized by the therapists.

The type of activities performed and postural risk factors may be major contributing factors to WMSD. It is therefore recommended that self-

protective behaviors such as seeking help from PT assistants and modifying the therapist's or patient's position be used in order to decrease the risk of WMSD especially in the low back area.

Even in a limited setting, the identified prevalence and severity of WMSD in PTs pose a great impact on the health and productivity of the therapists. There is indeed a need to develop preventive measures to preserve the health of PTs and reduce their risks for WMSD. The development and use of these strategies can improve the therapists' work efficiency, and well being. It will also decrease the potential health and labor costs.

### *Limitations of the Study, Recommendations & Suggestions*

The questionnaire utilized in this study failed to consider that musculoskeletal disorders experienced by the respondents may have been caused by other factors. Worth mentioning are psychological factors such as satisfaction with work, emotional stress and demands, and depression. These factors have been identified as major factors leading to WMSD in other studies.<sup>23-24</sup> Questions regarding the activities that subjects engage in outside work should have been included as well to make certain that the musculoskeletal disorders are work-related.

Because of the possible frailty of human memory, some of the responses may have not presented accurately the occurrence of WMSD in the past 12 months. Issues such as 'memory decay', wherein the respondents remember only the major aches and pains over the 12-month period rather than the less severe pains, and 'forward telescoping', wherein the respondents include pains that may have occurred more than 12 months ago may have lead to inaccurate responses.

Some information obtained by the researchers, which are deemed important contributing factors to WMSD such as the respondent's age, work set-up (in-patient vs. outpatient, etc.), were not investigated in this study. Future researches to establish the relationship among the hours of work and patients treated per day to the severity of WMSD are strongly recommended.

Though several factors have been found by this study to be associated with the presence of WMSD among physical therapists, it is still recommended that longitudinal studies be done in the future in order to establish causal relationships. These studies should be done on

a wider population scale that is more representative of physical therapists working in the Philippine setting.

Since the researchers were able to identify the prevalence, severity and risks of WMSD of PTs in a limited setting, preventive measures to preserve the health of PTs and reduce their risks for WMSD must therefore be utilized.

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**APPENDIX - QUESTIONNAIRE**

“Work-related musculoskeletal disorders (WMSDs) in professional Filipino physical therapists working in UST-CRS affiliated centers: Prevalence, severity, risks & responses”

Full Name: \_\_\_\_\_  
 Date of Birth: \_\_\_\_\_ Age: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Tel. No.: \_\_\_\_\_ Mobile No.: \_\_\_\_\_  
 E-mail Address: \_\_\_\_\_

Gender:  Male  Female

Anthropometric Measurements:  
 Height (in cm): \_\_\_\_\_ Weight (in kg): \_\_\_\_\_

Educational Background: (Check all that apply)  
 Bachelor’s Degree in Physical Therapy:  
 School Attended: \_\_\_\_\_ Year completed: \_\_\_\_\_  
 Masteral Degree (Pls. Specify): \_\_\_\_\_  
 School Attended: \_\_\_\_\_ Year completed: \_\_\_\_\_

Employment History (Starting from most recent):

Inclusive dates (mm/yy)	Institution	Position

Total Years of Professional Clinical Practice: \_\_\_\_\_

How many patients do you treat in a day?:  
 1 – 3  4 – 6  7 – 9  ≥10 (Pls. Specify): \_\_\_\_\_

How many hours do you work in a week?:  
 8 – 16  17 – 32  33 – 48  ≥49 (Pls. Specify): \_\_\_\_\_

Current Areas of Specialty (Check all that apply):  
 Orthopedics  Pulmonary Rehabilitation  
 Pediatrics  Sports Physiotherapy  
 Geriatrics  Ergonomics  
 Neurology  Manipulation  
 Cardiac Rehabilitation  Others (Pls. Specify): \_\_\_\_\_

Have you suffered from any work-related musculoskeletal disorders in the last 12 months?

Yes       No

Have you experienced any work-related symptoms such as "job-related ache, pain, etc" in the past 12 months?

Yes       No

If yes, please specify the body area it has affected (Check all that apply)

	If affected, how does it affect your work? Pls. <b>encircle</b> your choice:*	Did it require you to consult a physician? (Yes or No); if yes, what was the diagnosis given?
<input type="checkbox"/> Neck	1    2    3    4    5	
<input type="checkbox"/> Upper back	1    2    3    4    5	
<input type="checkbox"/> Shoulders	1    2    3    4    5	
<input type="checkbox"/> Elbows	1    2    3    4    5	
<input type="checkbox"/> Wrists & Hands	1    2    3    4    5	
<input type="checkbox"/> Thumbs	1    2    3    4    5	
<input type="checkbox"/> Lower back	1    2    3    4    5	
<input type="checkbox"/> Hips / Thighs	1    2    3    4    5	
<input type="checkbox"/> Knees	1    2    3    4    5	
<input type="checkbox"/> Ankles & Feet	1    2    3    4    5	
<input type="checkbox"/> Others (Pls. Specify):		
_____	1    2    3    4    5	_____
_____	1    2    3    4    5	_____
_____	1    2    3    4    5	_____

\*Where:

- 1= slight affectionation [symptoms are present but barely noticed during performance]
- 2= mild affectionation [symptoms are present and are noticed during performance]
- 3= moderate affectionation [symptoms are present and performance has some degree of impairment]
- 4= great affectionation [can still go to work but performance is greatly impaired]
- 5= severe affectionation [prevents you from going to work]

With regards to the different body areas affected,

BODY AREAS (Pls. <b>check</b> the ones as above)	Did the symptoms interfere with your... (If yes, pls. <b>check</b> all that apply)			Pls. specify in <b>hours or days</b> how long the symptoms lasted:	Have you sought treatment in the preceding 12 months? (Yes or No) If yes, pls. specify (Meds, PT, etc.?)
	Work?	ADLS?	Leisure ?		
<input type="checkbox"/> Neck					
<input type="checkbox"/> Upper back					
<input type="checkbox"/> Shoulders					
<input type="checkbox"/> Elbows					
<input type="checkbox"/> Wrists & Hands					
<input type="checkbox"/> Thumbs					
<input type="checkbox"/> Lower back					
<input type="checkbox"/> Hips / Thighs					
<input type="checkbox"/> Knees					
<input type="checkbox"/> Ankles & Feet					
<input type="checkbox"/> Others (Pls. Specify):					
_____					_____
_____					_____
_____					_____

**JOB FACTOR DECIPTION**

This list describes things at work that could contribute to job-related pain and injury. Please indicate, on a scale of 0 to 5, how much of a problem (if any) each item is for you by **encircling** the appropriate number.

- |   |                     |   |                      |
|---|---------------------|---|----------------------|
| 0 | - "no problem"      | 3 | - "moderate problem" |
| 1 | - "minimal problem" | 5 | - "major problem"    |

Performing the same task over and over	0	1	2	3	4	5
Treating an excessive number of patients in 1 day	0	1	2	3	4	5
Performing manual orthopedic techniques (joint mobilizations, soft tissue mobilization)	0	1	2	3	4	5
Not enough rest breaks or pauses during the workday	0	1	2	3	4	5
Working in an awkward and cramped positions	0	1	2	3	4	5
Working in the same positions for long periods (e.g. standing, bent over, sitting, kneeling)	0	1	2	3	4	5
Bending or twisting your back in an awkward way	0	1	2	3	4	5
Working near or at your physical limits	0	1	2	3	4	5
Reaching or working away from your body	0	1	2	3	4	5
Continuing to work while injured or hurt	0	1	2	3	4	5
Lifting or transferring dependent patients	0	1	2	3	4	5
Working with confused or agitated patients	0	1	2	3	4	5
Carrying, lifting, or moving heavy materials or equipment (e.g. continuous passive motion machines)	0	1	2	3	4	5
Unanticipated sudden movement or fall by patient	0	1	2	3	4	5
Assisting patients during gait activities	0	1	2	3	4	5
Work scheduling (overtime, irregular shifts, length of workday)	0	1	2	3	4	5
Inadequate training on injury prevention	0	1	2	3	4	5
Others (Pls. Specify):						
_____	0	1	2	3	4	5
_____	0	1	2	3	4	5
_____	0	1	2	3	4	5

What are the ways in which you cope with the WMSDs you encounter?

\_\_\_\_\_

\_\_\_\_\_

What do you do to prevent WMSDs from happening to you?

\_\_\_\_\_

\_\_\_\_\_

Do you use various self-protective behaviors to reduce work-related strain on your body?

- Yes       No

If your answer is yes please **check** on how often you employ the given techniques listed below:

Self-protection technique	How often do you use these techniques? Please check if this applies to you.		
	Almost always	Sometimes	Almost never
I use a different part of my body to administer a manual technique			
I stop my treatment if it causes or aggravates discomfort			

I use physical therapy assistants to perform physically stressful tasks			
I pause regularly so I can stretch and change posture			
I modify my position/ patient position			
I warm up and stretch before performing manual techniques			
I get someone else to help me handle a very heavy patient			
I adjust plinth/bed height before treating a patient			
I use electrotherapy instead of manual techniques to avoid stressing an injury			
I select techniques that will not aggravate or provoke my discomfort			

Comments or suggestions?

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I hereby attest that all the above information are true and correct. I give the researchers my full consent in using all the pertinent information in any way they can for the fulfillment of this study.

\_\_\_\_\_  
Signature over printed name

\_\_\_\_\_  
Date