Neck and shoulder pain in nurses working in seven wards of Tygerberg hospital:

Quantifying the problem and exploring the risks

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DECLARATION

"I, the undersigned, hereby declare that the work contained in this thesis is my original work and that I have not previously in its entirety or in part submitted it at any university for a degree."

Signature: _____

Name in print: _____

Date: _____

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Dedication

This thesis is dedicated to my special husband, Manus and in memory of his mother, Marie Altmann who passed away during the course of this study

Abstract

Background

There is a high prevalence of musculoskeletal problems, including neck and shoulder pain (NSP) among nurses worldwide. Tygerberg hospital (TBH) is the second largest hospital in South Africa with a large complement of nurses. The prevalence of NSP and risks associated therewith have not previously been determined at TBH. It is unknown how the nurses at TBH experience NSP in their workplace.

Objective

This study questioned whether the 12 month prevalence of neck pain, shoulder pain and combined NSP is similar to worldwide reports, and questioned the degree of association of NSP with lower back pain and demographic risk factors in the nursing population at TBH. Thereafter the qualitative experiences of nurses with NSP at TBH were elucidated.

Methodology

A self-designed Neck and Shoulder Pain Questionnaire for nurses (NSPn) was distributed among seven wards of TBH from March to May 2009. The NSPn was compiled using the pain definition from the Nordic Musculoskeletal Questionnaire and elements of the Dutch Musculoskeletal Questionnaire. The NSPn gathered information regarding the presence of neck and shoulder pain as well as demographic and workplace risk factors. Thereafter semi-structured interviews were conducted with eight nurses working at TBH.

Results

The 12 month prevalence of neck pain, shoulder pain and combined NSP was 29%, 34% and 43% respectively among a sample of 143 nurses. A high correlation of neck pain with lower back pain and of neck pain with shoulder pain was observed. No significant associations were found between age, ward module, tenure of work, and the nurses' perception of their general health and fitness with the presence of NSP.

The qualitative results describe the conflict between the nurses' beliefs and their symptoms. The nurses named work-related stress as the most prevalent cause or aggravator of NSP. The main underlying cause of their stress was a shortage of nursing staff.

Discussion and Conclusions

The prevalence of neck pain (29%) and shoulder pain (34%) among the surveyed TBH nurses was lower than the worldwide prevalence summary statistic of 50% and 52% respectively. However, the NSP prevalence (43%) was within the range of three international studies, suggesting that NSP is a significant concern for TBH nurses. The nurses' desire to hide pain and continue working perpetuates the problem of NSP. The underlying causes of NSP are multifactorial, with physical factors interacting with psychosocial factors. Preventative drives need to consider staffing levels and nurses' methods of coping with stress along with improvements in manual handling practices.

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Abstrak

Agtergrond

Daar is 'n hoë voorkoms van muskulosketale probleme, insluitend nek en skouer pyn (NSP), by verpleegkundiges wêreldwyd. Tygerberg Hospitaal (TBH) is die tweede grootste hospitaal in Suid-Afrika met 'n groot aantal verpleegkundiges. Die voorkoms van NSP en risiko's verbonde daaraan, is nog nie voorheen by TBH vasgestel nie. Dit is nie bekend hoe die verpleegkundiges by TBH NSP in hulle werksomgewing ervaar nie.

Objektief

Hierdie studie ondersoek of die 12 maand teenwoordigheid van nekpyn, skouerpyn en gekombineerde NSP ooreenstem met wêreldwye aanmelding, en ondersoek die assosiasie van NSP met lae rugpyn en demografiese risiko faktore in die verpleegkunde populasie by TBH. Daarna is die kwalitatiewe ondervindings van die verpleegkundiges met NSP by TBH toegelig.

Metodologie

Die self-ontwerpde 'Nek en Skouer pyn in verpleegsters'(NSPn) vraelys, is onder sewe sale vanaf Maart tot Mei 2009 versprei. Die NSPn het die die Nordiese muskuloskeletale pyn definisie en elemente vanaf die 'Hollandse Bewegingsapparaat Vraelys' ingesluit. The NSPn het inligting oor die voorkoms van nek en skouer pyn , sowel as demografiese en werkplek faktore ingesamel. Daarna is semi-gestruktureerde onderhoude gevoer met agt verpleegkundiges wat by TBH werksaam is.

Resultate

Die 12 maand voorkoms van nekpyn, skouerpyn en gekombineerde NSP was 29%, 34% en 43% onderskeidelik in die steekproef van 143 verpleegkundiges. 'n Beduidende korrelasie van nekpyn met lae rugpyn en nekpyn met skouerpyn is waargeneem. Geen

betekenisvolle ooreenkomste is gevind tussen ouderdom, saal module, termyn van werk en die verpleegkundiges se persepsie van hulle algemene gesondheid en fiksheid, met die teenwoordigheid van NSP nie.

Die kwalitatiewe resultate beskryf die konflik tussen die verpleegkundiges se oortuigings en hulle simptome. Die verpleegkundiges noem stres as die mees algemene oorsaak of verergeraar van NSP. Die grootste onderliggende oorsaak van stres was die tekort aan verpleegpersoneel by TBH.

Bespreking en Gevolgtrekkings

Die voorkoms van nekpyn (29%) en skouerpyn (34%) was laer as die wêreldwye voorkoms opsommings statistiek van 50% en 52% onderskeidelik.

Maar die voorkoms van NSP(43%) was binne die grense van drie internasionale studies wat dui daarop dat NSP 'n merkbare kommer vir TBH verpleegkundiges is. Die verpleegkundiges se behoefte om die pyn weg te steek en aan te hou werk, vererger die problem van NSP. Die onderliggende oorsake van NSP is veelvoudig, met fisiese faktore en psigologiese faktore wisselwerkend op mekaar. Voorkomende veldtogte moet verpleegkundiges se stres en personeeltekorte saam met verbetering in manuele hanterings tegnieke in ag neem.

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Glossary

Acronyms and abbreviations

- TBH: Tygerberg hospital

- NSP:

    Neck and shoulder pain, a condition where either neck
    or shoulder pain or both neck and shoulder pain are
    present (Bos et al. 2007). For the purposes of this
    thesis, the acronym, NSP is used when studies
    observed a combination of neck or shoulder pain but did
    not report separate statistics for either neck pain or
    shoulder pain. Where individual studies addressed
    shoulder pain and neck pain separately, the terms
    'shoulder pain' and 'neck pain' are used.

- NMQ: Nordic musculoskeletal questionnaire(Kuorinka 1987)

- DMQ: Dutch musculoskeletal questionnaire (Hildebrandt 2001)

- NSPn: The neck and shoulder pain questionnaire for nurses

- U.S.A: United States of America

- U.K: United Kingdom

- neuro ICU: neurological intensive care unit

- OR: Odds Ratio, as used as a statistical measure of
    association between two variables

- LBP:

    Lower back pain, a condition where pain is experienced
    in the lumbar region of the spine (Louw et al. 2007).

Terminology

The following terms and conditions will be used for the purposes of this study:

Nurses: a registered nurse, staff nurse, nurse auxillary or nurse aid who is involved in health care within a hospital or clinic setting

Prevalence: the total number of cases reporting a particular condition over a specific period of time (this could be reported as 1 week, 1 month, 3 months, 12 months, or lifetime prevalence).

Shoulder pain: pain, stiffness, tingling, or discomfort experienced in the shoulder region up to the mid upper arm (definition of pain from the NMQ (Kuorinka 1987); area of pain defined by NMQ and adapted by Grimmer-Somers, Nyland & Milanese 2006); but can also include "aches, burning, numbness or swelling" (Kee 2007; Warming 2009) of the same area.

Neck Pain: pain, stiffness, tingling or discomfort experienced from the suboccipital line to T4 (Kuorinka 1987).

Chapter 1

Introduction

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Neck and Shoulder Pain (NSP) in the workplace has the potential to limit work capacity and hence financial stability of the individual worker as well as the community at large. A significantly higher prevalence of upper limb dysfunction has been found in a population of manual workers versus non-manual workers (Jester and Germann 2005). A manual workforce group which exhibits a high prevalence of NSP is the nursing population. Nurses who experience NSP work less efficiently placing greater strain on the remaining work force with subsequent reductions in patient care outcomes (Botha and Bridger 1998a, Josephson, Hagberg and Hjelm 1997). At worst, ongoing NSP may in turn lead nurses to leave the profession (Gilworth et al. 2007).

The state of health of nurses among nursing professionals in South Africa is a current concern (South African Nursing Council 2008). Health is defined as the state of complete physical, mental and social wellbeing and not merely the absence of disease and infirmity (World Health Organization, 1946). Nurses in the U.K. exhibit a high prevalence of musculoskeletal complaints and poor mental health (Nolan and Smojkis 2003). South African nurses are under considerable strain due to low staff to patient ratios, inadequate resources, poor remuneration and a high turnover of staff (SANC 2008). Furthermore, due to the shortage of nurses worldwide, the South African nursing sector has experienced a loss of nurses to countries where better remuneration is offered (Buchan 2007, Gilworth et al. 2007). The burden of NSP potentially adds to the strain on South African nurses, yet, the extent of the problem has not recently been explored in a South African context.

It has been suggested that being a woman increases the risk of NSP in general population studies (Grooten et al. 2007, Guez et al. 2002) as well as in South African manual industrial groups (Schierhout, Meyers and Bridger 1995). Women in South Africa have traditionally been marginalized (Lund and Budlender 2009). Recent labour law and policy changes in South Africa have aimed to improve the plight of working women, particularly those in the caring professions (Lund and Budlender 2009). As the majority of South African nurses are women (SANC, 2008), a higher prevalence of NSP is expected in this population group than the general population. Hence, it was deemed important to attempt to quantify the extent of NSP in the public hospital setting in South Africa.

Despite low back pain (LBP) receiving vast attention on the nursing research platform and in preventative initiatives, NSP, the prevalence of which follows closely behind LBP, has received less consideration. The prevalence of LBP among nurses in six teaching hospitals within the Durban area was reported at 68%, with 80% of these nurses complaining of low job satisfaction (Govender 2004). NSP was not assessed in this abovementioned study. However, it can be deduced from other studies reporting the comorbidity of LBP and NSP that NSP may have been highly prevalent in the Durban subject sample (Yeung, Genaidy and Levin 2004). The prevalence of NSP is between 30 and 60% in international nursing sectors (Engels, Senden & van't Hof 1996, Josephson, Hagberg & Hjelm 1997, Trinkoff et al. 2002a, Luime, Verhaar & Burdorf 2005, Luime et al. 2004b). NSP is approaching the prevalence of LBP which has a 12 month prevalence of 34-87% in the nursing population (Engels et al. 1996, Lorusso, Bruno and L'Abbate 2007, Daraiseh et al. 2010). LBP was also present in 10% of a Swedish nursing cohort who experienced ongoing shoulder pain (Josephson et al. 1997). It is unknown whether the risk factors associated with LBP are similar to risks for NSP. Further research specifically aimed at NSP is needed

to quantify the extent of the problem and begin to address the specific causes thereof.

It is plausible that physical factors such as poor ergonomic positions and a lack of physical strength may predispose the nurse to NSP (Luime et al. 2004b). Biomechanical studies have demonstrated strength, activation and movement deficits in general and athletic shoulder and neck pain populations (McClure, Michener and Karduna 2006, Cools et al. 2007, Faria et al. 2008). The biomechanical and neurophysiological relationship between the neck and shoulder may explain the frequent co-existence of neck pain and shoulder pain (Kebaetse, McClure and Pratt 1999, Weon et al. 2010, Natvig et al. 2010). Luime (2005) reported that 50 - 60% of all nursing subjects reporting neck complaints also experienced shoulder complaints in the previous year. It is known that nurses are exposed to significant manual handling risks for both neck and shoulder regions (Smedley et al. 2003). Nurses do not use their arms overhead in the same manner as overhead athletes or industrial workers (Hager 2007). However, certain nurses may hold elevated positions for long periods of time (such as theatre nurses) where fatigue of the upper limb musculature becomes a relevant concern (Bos et al. 2007). Additionally, nurses work long hours in awkward and possibly unpredictable ergonomic environments with distressed and resistant patients (Ahlberg-Hulten, Theorell and Sigala 1995, Hildebrandt 2005).

Psychosocial risk factors for musculoskeletal complaints in nurses have frequently been reported in large studies conducted in Europe, the USA and Asia (Lagerstrom et al. 1995, Ahlberg-Hulten, Theorell and Sigala 1995, Lipscomb et al. 2004, Smith and Leggat 2004, Smith et al. 2004b). The influences of job strain, a loss of supervisor support, shift work, solitary work and increased job stress have been purported as significant risk factors for NSP in nurses and the general population (Grooten et al. 2007, Wiitavaara, Barnekow-

Bergkvist and Brulin 2007, Sim, Lacey and Lewis 2006). Nurses exhibit a profound culture of caring and commitment to their patients which is reinforced by their training and professional ethics (Myers and Lipscomb 2010). This commitment of the nurse leads to a potential conflict of caring for the patient versus caring for oneself. Beyond the expectations of the patient, the group dynamics exhibited in the team of nurses may encourage risky activities in order for a nurse to gain approval from his or her colleagues. This group dynamic has previously shown to have an impact on the injury ratings of shoulder and back pain in American nurses (Myers, Silverstein and Nelson 2002). It is unknown if the culture in South African nurses leads to similar behaviour and a resultant increased risk of NSP.

Cross sectional epidemiological findings do not add significantly to the understanding of the person who develops a musculoskeletal disorder such as NSP (Wiitavaara, Brulin and Barnekow-Bergkvist 2008). In contrast, qualitative study allows for the exploration into the personal experience of the development of pain for the sufferer of NSP (Wiitavaara, Brulin and Barnekow-Bergkvist 2008). A previous qualitative study revealed that nurses are exposed to excessive work demands, injustice and unfairness while experiencing high levels of musculoskeletal injury (Geiger-Brown et al. 2004). Nurses have been subject to health care system changes such as the reduction in staff numbers and the increase of patients' levels of illness. These changes have negatively impacted nurses' personal wellbeing (Lipscomb et al. 2004). It is imperative that nurses' personal concerns are heeded by nursing managers if the problem of NSP is to be successfully addressed (Wiitavaara, Barnekow-Bergkvist and Brulin 2007).

A better understanding of the prevalence of NSP and the unique multifactorial causes of NSP in nurses in a South African context is needed. Improved insight into the plight of nurses with NSP would assist and motivate policy and budget makers to judiciously reduce

the load of employee disability on the public health sector as well as to reduce the personal cost expended by the sufferers of NSP. No epidemiological or qualitative study of NSP has previously been undertaken among the Tygerberg hospital (TBH) nursing population. Figure 1.1 outlines the study componenets which will be reported in detail in the chapters two, three and four.

Neck and Shoulder Pain in nurses:
literature review
question defined

Systematic review of
NSP in nurses
worldwide

TBH study

Phase One:
questionnaire used to determine the prevalence of NSP in selected wards of TBH

Phase two:
interviews: semi-structured discussion on the experience of NSP and perceived workplace factors that are associated with NSP in nurses at TBH

Figure 1.1 Flow chart of the components of the study

Chapter 2

Systematic review of NSP in

nursing populations

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A systematic review of the worldwide prevalence and associated risk factors of Neck and Shoulder pain (NSP) among nurses will be presented in this chapter. This review was undertaken from June-November 2009.

2.1 Introduction

Prevention of musculoskeletal problems among nurses is of crucial concern (SANC 2007, Smedley et al. 2003, Tannenwald 2005, Trinkoff, Brady & Nielsen 2003). Reviews of epidemiological studies are required in order to quantify the extent of musculoskeletal problems prior to the implementation of preventative strategies. Nurses who are at an increased risk should be targeted for preventative initiatives. Work-related risks for nurses potentially include the type of the ward, rural or urban location of the workplace, physical or mental health of the nurse, rank, staff support structures or work organization factors (for example, the shift roster or the patient to staff ratio) (Lagerström, Hansson & Hagberg 1998, Lipscomb et al. 2004, Lorusso, Bruno & L'Abbate 2007, Letvak, Ruhm 2010). A better understanding of the prevalence and causation of NSP among nursing staff could lead to the implementation of effective preventative strategies. These strategies should reduce the loss of nurses from the workforce, improve productivity and general well-being and reduce compensation payments for injuries sustained in the workplace (Horneij et al. 2001).

NSP is a cause for concern in occupational settings (Waters et al. 2006). A South African study of factory floor workers reports a point prevalence mean of 14% acute and 19% chronic NSP (Schierhout, Meyers and Bridger 1995). The one month prevalence of NSP in a general working population in the United Kingdom was estimated at 44% (Sim, Lacey and Lewis 2006) whereas the one year prevalence of NSP in a general working population in Holland was 28.8% and 27.3% respectively (Reesink, Jorritsma & Reneman 2007). A review of shoulder pain alone reports a one year prevalence of between 4.7% and 46.7% (Luime et al. 2004a). Specific occupational groups across a variety of countries exhibit a range of NSP prevalence from 6% to 76% (Hamberg-van Reenen et al. 2007, Reesink, Jorritsma & Reneman 2007). Makela et al.(1991) estimated that at least two in

three people will experience one episode of neck or shoulder pain during their lifetime. Once a sufferer of NSP, the prognosis for full recovery is poor with only 36% being symptom free in a 5-6 year follow up study (Grooten et al. 2007). Hence, it appears that a large proportion of workers continue to live and work with NSP (Reesink, Jorritsma and Reneman 2007).

The precise causes of occupational NSP are unclear. Two epidemiological reviews of the general working population give evidence supporting the association of neck and shoulder pain with the physical factors of highly repetitive work, forceful exertion, high levels of static muscle contractions and extreme working postures (Waters et al. 2006, Reesink, Jorritsma and Reneman 2007). A longitudinal study found that being exposed to two of the following biomechanical exposures: working with hands above shoulder level, manual handling and working with vibratory tools, was associated with a poorer prognosis for subjects with NSP (Grooten 2007). A study of both physical and psychosocial factors conducted on the general population in the United Kingdom demonstrated significant risk associations of NSP with repeated lifting of heavy objects (odds ratio (OR) =1.4),"prolonged bending" (flexion) of the neck (OR=2.0), repetitive use of arms above shoulder height (OR=1.3), low job control (OR=1.6), and little supervisory support (OR=1.3) (Sim, Lacey and Lewis 2006). Nurses may be exposed to a variety of these above mentioned risks dependant on the ward type, rank, equipment available and patient load (Walls 2001, Karasek et al. 1998). Modern wards in first world countries are managed using computerized work stations and hence managerial nurses may develop neck and shoulder discomfort as a result of sustained static positions. Nurses working on rehabilitation wards are involved in heavy lifting and use compromised ergonomic positions (Walls 2001). Additional to the biomechanical and psychosocial risks mentioned above, the nursing population, being predominantly female, is inherently more likely to report NSP (Letvak and Ruhm 2010, Reesink, Jorritsma and

Reneman 2007, Schierhout, Myers and Bridger 1993, Josephson et al. 1999).

LBP has received considerably more attention in the occupational health and specifically health worker setting (Lagerström, Hansson and Hagberg 1998, Walls 2001, Horneij, Jensen & Ekdahl 2001, Igumbor, Useh and Madzivire 2003, Govender 2004, Lorusso, Bruno and L'Abbate 2007, Daraiseh et al. 2010). The low back pain prevalence in Italian nurses ranges form 33% to 86% (Lorusso, Bruno and L'Abbate 2007). Various primary studies conducted worldwide suggest that the prevalence rates of NSP are close to those for LBP. However, the particular risk factors associated with LBP may not be those which are associated with NSP. It is possible that efforts to reduce LBP may in due course increase NSP. Nurses' use of assisted lifting equipment in the drive to reduce stresses on the lower back may shift the stress to the upper limbs (Smedley et al. 2003, Owen 2000a). Hence, it is essential that the specific risks associated with NSP are elucidated by epidemiological studies and then addressed by primary and secondary preventative initiatives (Li et al. 2010).

To date, no systematic review of the worldwide prevalence and risk factors for NSP in nurses was found. Li et al. (2010) and Simon et al. (2008) conducted an analysis of cross-sectional studies from 7 European countries. However their interest was in nurses leaving the nursing profession due to disability associated with both neck and/or lower back pain. The neck and shoulder region may be exposed to different physical forces and can be influenced by various psychosocial factors other than those associated with the lower back region, justifying the need for a review of NSP alone. Prevention of workplace morbidity related to NSP requires an in-depth understanding of its prevalence and specific exposures. This systematic review aims to provide an understanding of the worldwide prevalence and risk associations for NSP in nurses. This review

serves as a background for comparison of findings with the South African nursing population.

2.2 Methodology of systematic review

2.2.1 Objectives

The objectives of this review were

- to retrieve all available electronic literature resources relevant to nurses with NSP
- to critically appraise the methodological quality of the available literature regarding NSP in nurses
- to determine the estimated prevalence of NSP in the nursing population worldwide
- to ascertain the most commonly reported physical risk factors of NSP among nurses worldwide
- to ascertain the most commonly reported psychosocial risk factors for NSP among nurses worldwide.

2.2.2 Search strategy

Before commencing the review, the Cochrane, PEDro and Medline databases were searched for reviews conducted on NSP in nurses. No review was found up to the date of commencing the searches.

A comprehensive search of the literature was undertaken in June 2009 and repeated in November 2009. The search covered all published and indexed research reports available through the Faculty of Health Science Library, Stellenbosch University. .

The following electronic databases were included: PubMed (1950- November 2009), Pedro (1929- November 2009), CINAHL (1982- November 2009), Sport Discus (1800- November 2009), Science Direct (1823- November 2009), Proquest medical library and social sciences journals (1998- November 2009), and Cochrane(inception - November 2009). No retrospective date limits were set during

searching of the databases. Search terms differed for each database due to the characteristic differences of the databases..

During the search strategy the main search terms were considered and keywords identified were *shoulder pain, neck pain, nurses, risk factors, and prevalence.* MeSH terms were used where possible in PubMed and Science Direct. The specific search strategies for each database are illustrated in appendix A.

Secondary searching (known as PEARLing) was conducted in order to acquire other related papers from the reference lists of the first selection of abstracts. Authors who are well-known in the study of NSP in nurses were cited and searched in order to extract papers authored by them which were not found using the search strategy.

The titles of all hits were reviewed by the principal reviewer (JA) in order to exclude those titles which were obviously unrelated to this review. A secondary reviewer (KD) reviewed a sub-sample of 35 titles to validate the eligibility criteria applied by the principal reviewer.

2.2.2.1 Inclusion criteria

Cross-sectional epidemiological research articles that were available in the English language were selected for the review. Primary research studies focusing on the prevalence and associated risk factors of musculoskeletal problems among hospital nurses were eligible provided NSP was one of the outcomes measured. Studies of qualified hospital nurses across all ages, race groups and both genders were included.

To be eligible, articles reporting on a range of hospital personnel had to report on the findings pertaining to nurses only.

2.2.2.2 Exclusion criteria

Articles were excluded if (1) the population studied was predominantly nurses working in residential care homes or clinic settings;

(2) if the sample comprised of nursing students and not qualified nurses as student nurses are relatively less exposed to nursing duties compared with qualified nurses (3) if the study sample exclusively dealt with peri-operative assistants (the equivalent of theatre nurses in the Netherlands) as their training and function at work may differ to the general nursing training programs and functions (Bos et al. 2007); and (4) if the main aim of the paper was to validate a new questionnaire rather than obtain prevalence data.
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2.2.3 Methodological appraisal of Evidence

The methodological quality appraisal tool chosen for use in this review was an adaptation of a tool used in previous systematic reviews of global LBP and African LBP (Louw, Morris & Grimmer-Somers 2007; Walker, Muller & Grant 2004). The aforementioned tool was developed for the appraisal of LBP prevalence studies by Louw et al. (2007) and Walker, Muller & Grant (2004). The tool examines the representation of the target population to be studied, the quality of the data presented and the definition of low back pain. The tool was adapted for this study by replacing all terms relating to LBP with 'neck and shoulder pain' and by removing criterion eight and nine of the original tool as neither of them were relevant to the cross-sectional studies appraised which used questionnaires for measurement tools . The adapted version contained 10 criteria and hence each reviewed paper was scored out of a total of 10, where 10 was the best score.

A.	**Is the final sample representative of the target population?**
1	At least one of the following must apply in the study: an entire target population, randomly selected sample, or sample stated to represent the target population
2	At least one of the following: reasons for non-response described, non-responders described, comparison of responders and non-responders, or comparison of sample and target population.
3	Response rate and, if applicable, drop-out rate reported.
B	**Quality of the data?**
4	Were the data primary data of neck and shoulder pain or was it taken from a survey not specifically designed for that purpose?
5	Were the data collected from each adult directly or were they collected from a proxy?
6	Was the same mode of data collection used for all subjects?
7	At least one of the following in case of questionnaire: a validated questionnaire or at least tested for reproducibility.
C	**Definition of neck and shoulder pain (NSP)**
8	Was there a precise anatomic delineation of the neck and shoulder area or reference to an easily obtainable article that contains such specification?
9	Was there further useful specification of the definition of NSP, or question(s) put to study subjects quoted such as the frequency, duration or intensity, and character of the pain. Or was there reference to an easily obtainable article that contains such specification?
10	Were recall periods clearly stated: e.g. 1 week, 1 month or lifetime?

Table 2.1: The critical appraisal tool (Walker, Muller & Grant 2004)

The primary reviewer (JA) independently appraised the quality of evidence of all the studies.

2.2.4 Evidence hierarchy

The level of evidence for each selected study was determined using The hierarchy of evidence outlined by Sackett et al (2000)(Table 2.2). Prevalence studies are represented by the third level of evidence as they are observational of nature. This poorer level of evidence increases the level of bias likely to be present within the reviewed studies, although this aspect is unavoidable in epidemiological study designs.

Level 1 Meta-analysis of randomized controlled clinical trials

Level 2a One randomized controlled clinical trial (RCT)

Level 2b One non-randomized, or non-controlled, or non-blinded clinical trial

Level 3 Observational studies

Level 4 Pre-post test clinical trials

Level 5 Descriptive studies

Level 6 Anecdotal evidence

Table 2.2: Hierarchy of evidence (Sackett et al. 2000)

2.2.5 Data extraction

A purpose built MS Excel spreadsheet was used to summarise all data extracted from the reviewed studies. The data that was extracted from the reviewed studies was as follows: author, year of publication, country, study design, sample size, age, gender, study setting, data collection period, definition of NSP, NSP recall time period, severity classification and rate, reliability and validity of the measurement tools, statistical tests, NSP prevalence of various periods, risk associations, and clinical implications. The MS Excel spreadsheet summarizing the data extraction is presented in appendix B.

2.2.6 Data analysis

Comparisions across prevalence statistics were made according to the primary elements for homogeneity of the data. These elements were: mean ages of the participants, gender, recall times, definition of NSP and the questionnaires used to capture prevalence of NSP, the population studied and the setting of the study. It was considered to group together the studies exclusively dealing with female gender for comparison with the studies exploring both genders as female gender is known to be a confounder in studies of pain (Josephson et al. 1999). However, the sample populations in all studies comparing both genders were predominantly female with very small percentages of male nurses. Hence the analyses included data from studies of both genders. The prevalence data for both rural and urban populations were grouped together for the analysis as removing the rural studies from the analysis did not significantly change the overall prevalence or the statistical heterogeneity.

Studies with identical recall periods were analysed in separate groups. A meta-analysis was performed for the 12 month prevalence of neck pain and shoulder pain respectively. Only studies scoring over 70% in the critical appraisal were included in the meta-analysis. Random effects meta-analysis was conducted because there was evidence of substantial statistical heterogeneity following the I-square test. Those studies found to be methodologically unacceptable were included in a sensitivity analysis in order to determine if differences in results would have occurred had these papers been included.

The Odds ratio's found to be significant to the 95% significance level were included in the summary of risk associations.

2.3 Results

2.3.1 Search results

The search strategy yielded 2194 hits of which 2157 were excluded as the titles did not conform to the review objectives. A further 14 titles were excluded due to the abstract and article content not meeting the inclusion criteria for the review. Figure 2.1 summarises the process whereby 26 papers were selected for inclusion in the review. Of these 26 studies, three studies were excluded from the prevalence summary as they used a duplicate data set. They were however included in the review of risk factors and are hence included amongst the total reviewed papers.

Pubmed (n = 301) Cinahl (n = 312) Science direct (n = 1488) Cochrane (n = 31) Proquest (n=37) Sport Discus (n=25) 2193 Titles were screened by 1 reviewer. The titles were controlled by a second reviewer	
→ ↓	Excluded Articles (n = 2139) Articles excluded based on the title that did not meet inclusion criteria Duplicates in other data bases (n=18)
36 Abstracts were retrieved and read by 1 reviewer, selection of abstracts reviewed by second reviewer	
→ ↓	Excluded Abstracts (n = 3) **Reasons:** Research not reporting on qualified nurses working in hospital setting (n=2). Studies in foreign language (n=1).
33 potential papers	

	1 full text paper unavailable in South African libraries (Smith, 2005: Korean population) 5 papers found by pearling
37 Full text articles retrieved and read by 2 independent reviewers	
	Excluded (n=11) **Reasons** Study primarily reporting on student nurses (n=2) Study pain definition not aligned with review aims (n=1) Study reporting on peri-operative nurses in Holland (n=2) Research not reporting on nurses working in hospital setting (n=2) Duplicate data set (n=1) Study design not aligned with aims of review (n=3)
26 papers included in final review (3 of which were excluded from prevalence summary due to duplication of data sets, but included in analysis of risk factors)	

Figure 2.1 Flow chart of database search results

2.3.2 Critical appraisal findings of methodological quality

The frequency of positive responses to each criterion of the critical appraisal tool is depicted in figure 2.2.

Criterion 1 assessed the degree to which the sample population represented the target population of the study. Sixteen of the reviewed studies reported that their sample populations were representative of the target population. However none of the reviewed studies employed randomised sampling procedures. Although five studies claimed to have 100% response rate (Hernandez et al. 1998, Daraiseh et al. 2003, Tezel 2005, Kee, Seo 2007, Warming et al. 2009,), the nurses sampled in these studies had responded to invitations to participate in the research and hence participated as volunteers.
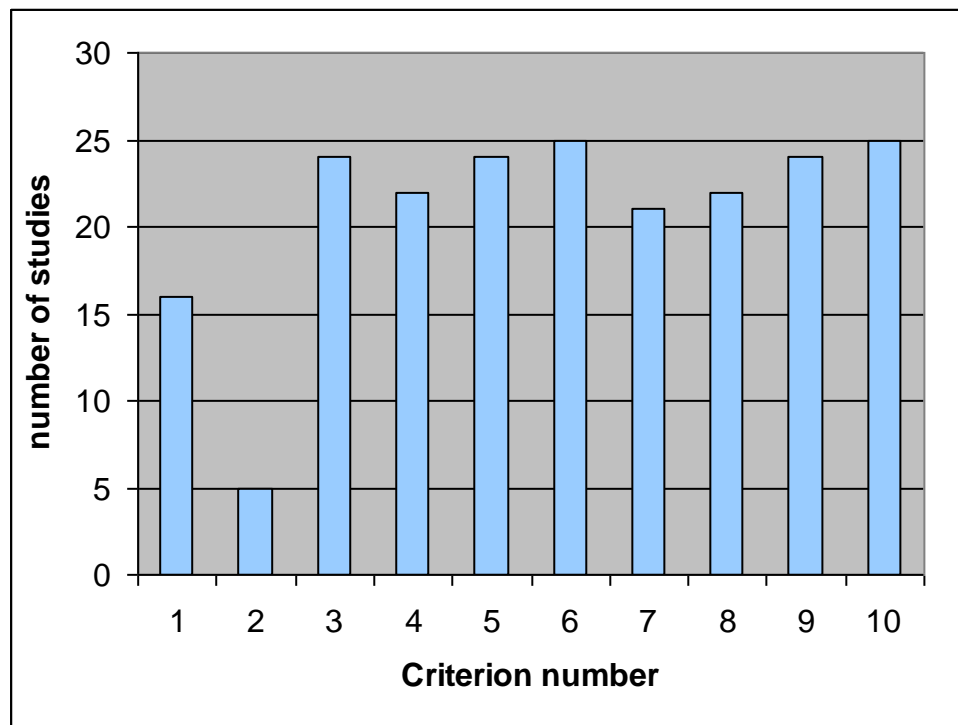
Figure 2.2 Critical appraisal of epidemiological studies (n=26)

Criterion no.	1	2	3	4	5	6	7	8	9	10	%	MA
Ahlberg-Hulton 1995	0	0	1	1	1	1	0	0	1	1	60%	n
Alexopolous 2003	0	1	1	1	1	0	1	1	1	1	80%	y
Ando 2000	1	0	1	0	1	1	0	0	1	1	60%	n
Bos et al 2007	1	0	1	1	1	1	1	1	1	1	90%	y
Botha 1998	0	0	1	0	1	1	0	0	0	1	40%	n
Daraiseh 2003	0	0	0	0	1	1	1	1	1	1	60%	n
Eriksen 2003	1	0	1	1	1	1	1	1	1	1	90%	y
Harcombe 2007	0	0	1	1	1	1	1	1	1	1	80%	y
Hernandez 1998	0	0	1	1	1	1	1	1	1	1	80%	y
Hou 2006	1	0	1	1	1	1	1	1	1	1	90%	y
Josephson 1997	1	1	1	1	0	1	1	1	1	1	90%	y
Kee 2007	0	0	0	1	0	1	0	1	1	1	50%	n
Lagerstrom 1995	1	1	1	1	1	1	1	1	1	0	90%	y
Lipscomb 2004	1	0	1	1	1	1	1	1	1	1	90%	y
Smedley et al. 2003	1	0	1	1	1	1	1	1	1	1	90%	y
Smith 2003a	1	0	1	1	1	1	1	1	0	1	80%	y
Smith 2003b	1	0	1	1	1	1	1	1	1	1	80%	y
Smith 2004a	1	0	1	1	1	1	1	1	1	1	90%	y
Smith 2004b	1	0	1	1	1	1	1	1	1	1	90%	y
Smith 2006	1	0	1	1	1	1	1	1	1	1	90%	y
Tezel 2005	0	1	1	1	1	1	1	1	1	1	90%	y
Trinkoff 2002	1	0	1	1	1	1	1	1	1	1	90%	y
Trinkoff 2003a	1	0	1	1	1	1	1	1	1	1	90%	y
Trinkoff 2003b	1	0	1	1	1	1	1	1	1	1	90%	y
Warming 2009	0	1	1	0	1	1	0	0	1	1	60%	n
Yeung 2004	0	0	1	1	1	1	1	1	1	1	80%	y
	16	5	24	22	24	25	21	22	24	25		

key: 1= criterion fulfilled, 0=criterion not fulfilled
Y=methodologically acceptable, N=methodologically unacceptable

Table 2.3 Quality scores obtained by reviewed articles (n=26)

The lowest scores were recorded for criterion 2 (reasons for non-response) and 7 (validation of questionnaires). Criterion 2 was fulfilled in five of the studies (Lagerstrom et al. 1995, Tezel 2005, Warming et al. 2009, Josephson et al. 1997, Alexopoulos, Burdorf & Kalokerinou 2003). Criterion 2 relates to the reasons for a response or lack of response from the sampled population which is difficult to achieve in cross sectional studies, especially when anonymity is offered to the respondents. However the lack of information on non-responders renders these studies as potentially biased, as those with NSP would be more likely to respond to a questionnaire on NSP as they may have an increased awareness thereof.

Although some validation or reproducibility was mentioned in all but four studies, the validity of questionnaires was questionable. The rigour of the validation process was not elucidated by the critical appraisal tool. Despite the widespread use of the Nordic Musculoskeletal Questionnaire (NMQ) for the extraction of prevalence data, many studies failed to report the validity of the questionnaire for their specific target population and language group. Face and content validity was attempted in the Asian studies, all of whom used translations of the NMQ. Translations were back translated and re-checked by the original author of the NMQ (Smith et al. 2004b, Kee, Seo 2007, Smith et al. 2006, Smith et al. 2004, Smith et al. 2003a, Smith et al. 2003b, Yeung, Genaidy & Levin 2004, Ando et al. 2000). Hou and Shiao (2006) used focus groups which included occupational health experts and health care workers to assess the case validity and content validity of their questionnaire. They proceeded to conduct a test-retest reliability study, reporting a correlation of 0.9.of pre and post test results. Yeung et al. (2004) reported on the reliability of their questionnaire, providing a test-retest correlation co-efficient for being a shoulder case of 0.60 and a neck case of 0.68.

The 'Job Content Questionnaire' of Karasek (1998) formed the basis for the risk association assessment in seven studies (Smith et al. 2004b, Lagerstrom et al. 1995, Josephson et al. 1997, Alexopoulos, Burdorf & Kalokerinou 2003, Smith et al. 2004, Trinkoff et al. 2003, Smith et al. 2006). Alexopoulos, Burdorf & Kalokerinou (2003) tested their questionnaire for comprehensibility and relevancy in nine Greek nurses. Three Asian studies which used a translated version of the original 'Job Content questionnaire' (Karasek 1998), gave no information about internal validity and reliability (Smith et al. 2004a, Smith et al. 2004b, Smith et al. 2006). However, the original 'Job Content Questionnaire' has been widely used and has been tested for validity and reliability in a variety of occupational groups, including nursing (Pelfrene et al. 2001).

2.3.3 General study description

All selected articles used observational study designs and were thus designated level three ranking on the evidence hierarchy scale according to Sackett et al (2000) (Refer to table 2.2). Five studies (Ahlberg-Hulten, Theorell & Sigala 1995, Lagerstrom et al. 1995, Engels et al. 1996, , Josephson et al. 1997, Botha & Bridger 1998) were published before the year 2000 whilst seven studies had been published within the past five years (2005-2009) (Tezel 2005, Hou & Shiao 2006, Smith et al. 2006, Bos et al. 2007, Kee & Seo 2007, Warming et al. 2009, Harcombe et al. 2009).

Four papers reported on the same study population and reported different outcomes of this large study (Trinkoff et al. 2002, Lipscomb et al. 2004, Trinkoff, Brady & Nielsen 2003, Trinkoff 2006). The findings of these studies will be presented as one main study (Trinkoff et al. 2002) for the prevalence data. The other three papers dealt with various categories of risk associations and will be discussed in section 2.3.8.

Sample sizes ranged from 14 nurses (Hernandez et al. 1998) to 6485 (Eriksen 2003) nurses. The response rates varied from 53% (Smedley et al. 2003) to 100 % (Tezel 2005, Kee, Seo 2007, Warming et al. 2009, Hernandez et al. 1998, Daraiseh et al. 2003). Those studies reporting a 100% response rates had requested voluntary participation or informed consent to be signed prior to participation.

Six studies stipulated that only registered nurses were included in the study sample group (Hernandez et al. 1998, Daraiseh et al. 2003, Smith et al. 2003, Ando et al. 2000, Smith et al. 2004a, Smith et al. 2004b). The study by Eriksen (2003) was concerned only with nurse aides. Bos et al.

(2007) surveyed a variety of health professionals including operation room nurses and Xray technologists, from which only the data pertaining to nurses was extracted

The mean age of nurses across the reviewed studies ranged from 29-45 years. Three studies failed to report the mean age of the sample population (Josephsen et al. 1997, Eriksen 2004, Hou &Shiao 2006).

Ten studies included male and female nurses (Ando et al. 2000, Trinkoff et al. 2002a, Lipscomb et al. 2004, Trinkoff, Brady & Nielsen 2003, Alexopoulos, Burdorf & Kalokerinou 2003, , Trinkoff et al. 2003, Eriksen 2003, Bos et al. 2007, Warming et al. 2009) whilst two failed to report the gender of their population (Botha & Bridger 1998, Hernandez et al 1998). The remaining studies excluded males due to the potential for confounding as they are a minority group in the nursing workforce.

Most of the studies were conducted in urban centres or a combination of rural and urban settings. Smith (2003a) and Smith (2003b) studied rural nursing populations in Japan. All but two studies were conducted in the Northern hemisphere with nine from Europe, four from the United States of America, nine from Asia, and one from the Middle East. One reviewed article was conducted in South Africa (Botha & Bridger 1998), and one in New Zealand (Harcombe et al 2009).

Only one of the reviewed studies (Hou &Shiao 2006) selected a random sample of hospitals. Three studies took random samples from their respective state or countries' nursing council register (Eriksen 2003; Harcombe et al 2009; Lipscomb et al. 2004). The remaining studies did not employ randomization, but 12 studies were concerned with nurses from a variety of hospitals in their respective districts/nations. The settings of studies are summarized in table 2.4.

study	country	population	setting	sample size
studies of high quality according to critical appraisal				
Ahlberg-Hulten 1995	Sweden	registered nurses and nurse aides	various wards in variety of hospitals	90
Alexopolous 2003	Greek	nurses	6 general hospitals	351
Bos et al 2007	Netherlands	for review extracted nurses and ICU	8 university hospitals	2502
Eriksen 2003	Norway	random sample vocationally active nurse aides belonging to nurses union	nurses belonging to a nurses union	6485
Harcombe 2009	New Zealand	nurses randomly selected from Nursing Council of NZ Register	nurses off the Nursing Council of NZ register	181
Hou 2006	Taiwan	nurses employed at the hospitals	16 randomly selected hospitals	3950
Josephson 1997	Sweden	various ranks of nurses	1 county hospital	565
Lagerstrom 1995	Sweden	registered nurses, state registered auxillary nurses	medium sized town	688
Lipscomb 2004	U.S.A	random sample of registered nurses from 2 state registers	variety	1163
Smedley et al. 2003	United Kingdom	all nurses providing in-patient care excluding mental health nurses, students, agency staff and community staff	2 similar acute hospitals	1157
Smith 2003a	Japan	registered nurses (surgery, ICU, internal, general, obs and gynae, psychiatry)	rural teaching hospital	363
Smith 2003b	Japan	nurses employed at 3 hospitals	3 affiliated hospitals	247
Smith 2004a	China	registered nurses within the hospital (surgery, ICU, miscellanous, gynaecology, internal medicine)	large teaching hospital	282
Smith 2004b	China	registered nurses within the hospital (surgery, ICU, miscellanous, gynaecology, internal medicine	tertiary teaching hospital	180
Smith 2006	Japan	all nurses employed at the hospital	large teaching hospital	844
Tezel 2005	Turkey	nursing staff from surgery, medical, obstetric and gynaecology, psychiatry, paediatric or neurology wards	4 large general hospitals	120
Yeung 2004	Hong Kong	registered nurses sampled from all units (rehabilitation, ICU, Geriatrics, surgery, outpatients, medical, others)	2 local hospitals	97
studies not meeting quality eligibility criteria				
Ando 2000	Japan	registered nurses	university hospital	457
Botha 1998	South Africa	full time nurses	3 private hospitals	100
Daraiseh 2003	U.S.A	registered nurses	2 private hospitals	34
Hernandez, 1998	Kuwait	registered nurses	not given	14
Kee 2007	Korea	Various wards	hospitals	162
Warming 2009	Denmark	nurses	university hospital	148

Table 2.3 Country of origin, sample size and setting.

2.3.4 Definition of neck and shoulder pain

All but four (Ahlberg-Hulten, Theorell & Sigala 1995, Botha, Bridger 1998, Ando et al. 2000, Warming et al. 2009,) of the reviewed papers used the NMQ or a modified version thereof. Hence, the definition of NSP was well defined for these studies as a body chart with a clear anatomical delineation of the neck and shoulder area is used in to define the area of NSP in the NMQ. The reviewed studies used a variety of pain ratings regarding severity, duration and intensity to classify NSP cases. Two studies stipulated that the pain should have lasted at least a few hours to be report-worthy (Tezel 2005, Alexopolous 2003) while two studies stated that the subject's pain was to have lasted for longer than a day to be described as a case (Smedley 2003, Harcombe 2009).

In addition to using the NMQ to identify prevalence of general symptoms of NSP, seven studies requested for reports of severe pain (Kee 2007, Bos 2007, Eriksen 2003, Josephson 1997, Lagerstrom 1995, Trinkoff 2002, Yeung, 2004) whilst two provided a prevalence rate for chronic pain (Tezel 2005, Alexopolous 2003). Trinkoff (2002) defined the duration of pain as pain lasting one week with an intensity of 3/5 or more, as the criteria for a NSP case.

2.3.5 Data collection procedures

Questionnaires were utilized as the method of data collection in all but one study. Warming (2009) used logbook data collection whereby each nurse completed her own logbook over a three day period and prevalence data was taken as the prevalence over three days. Except for one study where surveys were undertaken by the chief nurse (Kee 2007) the questionnaires were self administered.

Twenty two studies used the standardized or modified version of the NMQ (Kuorinka et al. 1987) to assess the prevalence of musculoskeletal pain. Eight studies used elements of the 'Job Content Questionnaire' (Karasek et al. 1998) to measure psychosocial risk associations (Ahlberg-Hulten, 1995)(Smith et al. 2004b, Lagerstrom et al. 1995, Josephson et al. 1997, Alexopoulos, Burdorf & Kalokerinou 2003, Smith et al. 2004, Trinkoff et al. 2003, Smith et al. 2006). This questionnaire distinguishes three psychosocial risk areas: job demand, lack of control (decision latitude) and lack or co-worker or supervisor support (Karasek et al. 1998, Pelfrene et al. 2001).

The recall periods varied from point prevalence to three days, seven days, one month, six month, 12 month or lifetime prevalence of NSP. Eleven of the sound methodological studies (see figures 2.1 and 2.2) and four of the poor methodological studies (Botha and Bridger 1998, Kee and Seo 2007, Hernandez et al. 1998, Daraiseh et al. 2003) reported a 12 month recall period.

2.3.6 The Prevalence of NSP in nurses

Recall periods reported varied from point prevalence to lifetime prevalence and included one month, six month and 12 month reports. Twelve month prevalence was most commonly reported. Prevalence will be discussed according to recall periods.

2.3.6.1 <u>Point prevalence</u>

One methodologically sound study provided retrospective 14 day prevalence for neck pain of 53.5% and for shoulder pain of 47.1% (Eriksen 2003).

2.3.6.2 One month prevalence

Two methodologically sound studies provided a one month prevalence for neck pain of 25% and 38% and for shoulder pain of 12% and 38% respectively (Ahlberg-Hulten 1995, Yeung 2004). The one month prevalence of a combination of neck and shoulder pain was reported in one study as 22% (Smedley 2003).

2.3.6.3 Six month prevalence

Tezel (2005) reported six month prevalence for neck pain at 46% and shoulder pain as 54% while chronic neck pain had a prevalence of 25% and chronic shoulder pain, 33%. In this study, chronic pain was described as pain which was felt almost every day for the previous 6 months with a minimal presence for at least 3 months (Tezel 2005).

2.3.6.4 Twelve month prevalence

Ten studies reported a twelve month prevalence for both neck pain and shoulder pain (Alexopolous 2003, Harcombe 2009, Josephsen 1997, Lagerstrom 1995, Lipscomb 2004, Smith 2003a, Smith, 2003b, Smith, 2004c, Smith, 2004b, Smith 2006, Trinkoff 2002, Yeung 2004), two of which also provided a prevalence estimate for combined NSP (Alexopolous 2003, Trinkoff 2002). Two studies reported on the combination of NSP alone (Bos et al. 2007, Smedley, 2003).

Forest plots depicting the range of 12 month prevalence estimates for neck pain and shoulder pain are given in figures 2.2 and 2.3 respectively.

Prevalence of Neck Pain

Study ID		ES (95% CI)	% Weight
Alexopolous 2003		47.01 (41.79, 52.23)	9.08
Josephson 1997		52.92 (48.80, 57.04)	9.16
Lagerstrom 1995		47.97 (44.23, 51.70)	9.18
Smith 2003a		27.82 (23.21, 32.43)	9.13
Smith 2003b		36.84 (30.83, 42.86)	9.02
Smith 2004a		45.04 (39.23, 50.84)	9.04
Smith 2004b		42.78 (35.55, 50.01)	8.91
Smith 2006		54.74 (51.38, 58.10)	9.20
Trinkoff 2002		45.83 (42.97, 48.69)	9.22
Yeung 2004		95.88 (91.92, 99.83)	9.17
Harcombe 2009		51.93 (44.66, 59.21)	8.90
Overall (I-squared = 98.4%, p = 0.000)		49.94 (39.24, 60.63)	100.00

NOTE: Weights are from random effects analysis

Figure 2.3 Forest plot depicting the meta-analysis of prevalence of neck pain in nurses (given as a percentage)
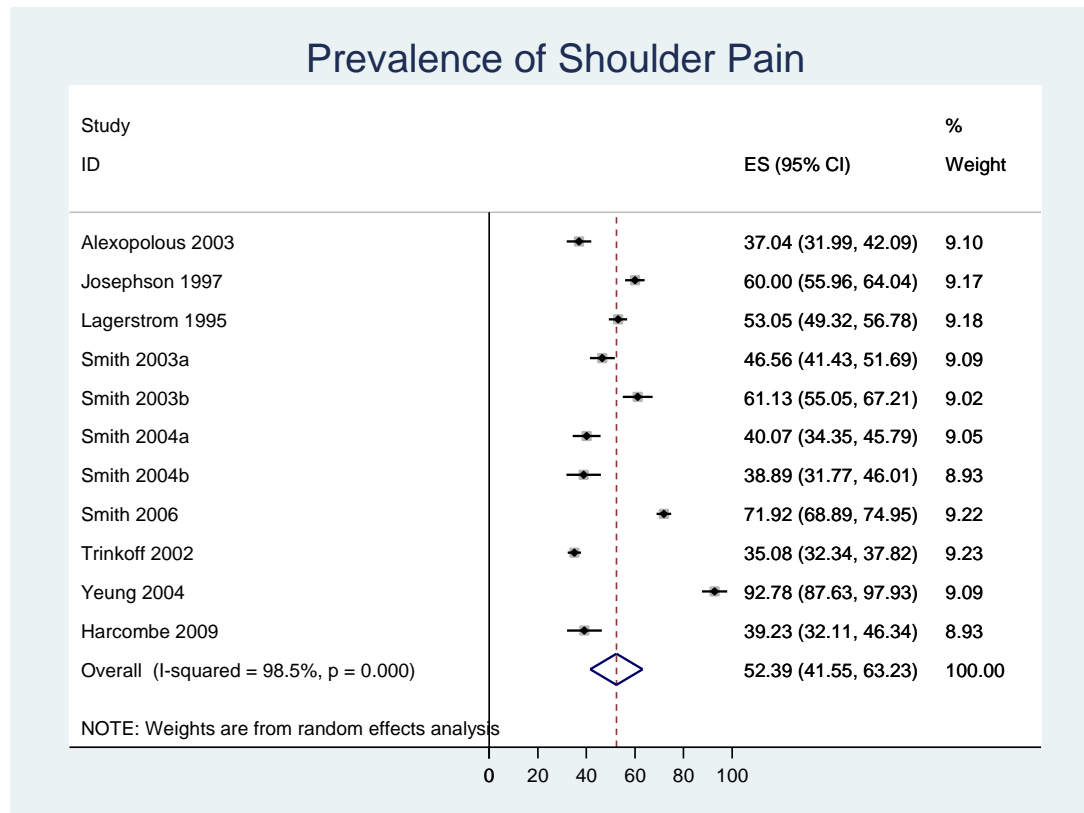
Figure 2.4 Forest plot depicting the meta-analysis of prevalence of shoulder pain in nurses (given as a percentage)

Random-effects meta-analysis (depicted by a diamond shape on the forest plot) yielded an overall 12 month prevalence of 50% for neck pain. Random-effects meta-analysis yielded an overall 12 month prevalence of 52% for shoulder pain. There was marked statistical heterogeneity in both neck pain and shoulder pain prevalences (I-square values of over 98% and $p<0.001$ in both cases).

Three studies reported on the combination of neck and /or shoulder pain with twelve month prevalence reports of 35% to 60% (mean = 50.86%) (Alexopolous et al. 2003, Smedley 2003, Bos et al. 2007) (refer to figure 2.5).
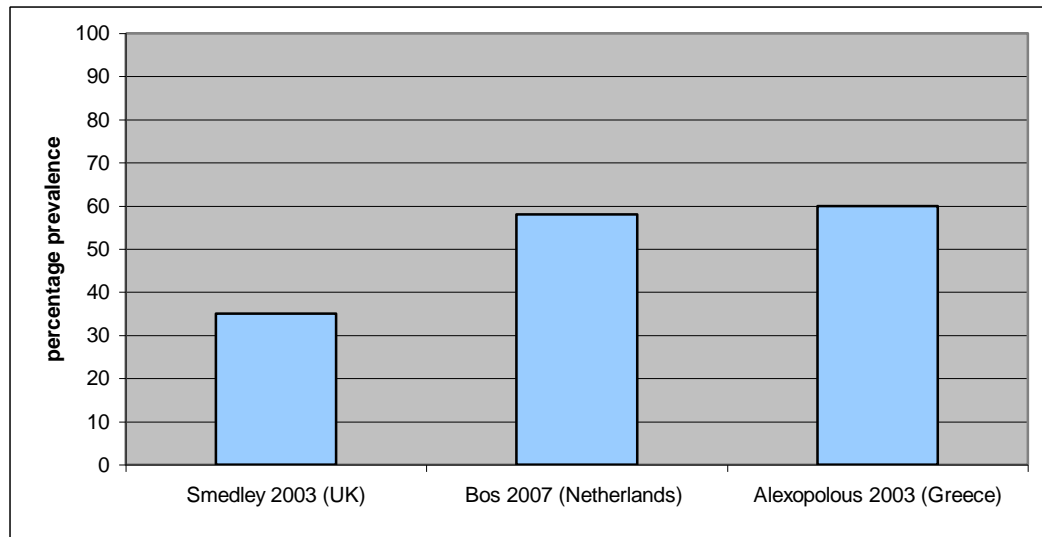
Figure 2.5 Twelve month prevalence of combined NSP

One study reported 12 month prevalence estimates for chronic neck pain and shoulder pain at 9% and 7% respectively (Alexopolous et al. 2003). In these cases, pain was present almost every day in the preceding 12 months with a minimal presence for at least 3 months. The same study reported a five percent prevalence of a complaint which led to a period of sickness absence in the previous 12 months. Three studies reported prevalence for severe symptoms, ranging from 16% to 20% for neck pain and 17% to 20% for shoulder pain (Lagerström et al. 1995, Josephson, Hagberg & Hjelm 1997, Yeung et al. 2005). Bos et al (2007) report a 8.9% prevalence for combined neck and shoulder pain which was severe, prolonged or occurring more then 10 times a year.

One good quality study reported a worklife prevalence for neck pain and shoulder pain at 12% and 17% respectively (Hou and Shiao 2006).

2.3.7   Sensitivity analyses

Six studies scored below 70% in the methodological appraisal (Hernandez et al. 1998, Botha and Bridger 1998, Ando et al. 2000, Daraiseh et al. 2003, Kee and Seo 2007, Warming et al. 2009). The twelve month prevalence of neck pain reported within these studies ranged from 17% to 55% (mean =37.87%), whilst shoulder pain prevalence ranged from 27% to 43% (mean = 29.4%). The combination NSP twelve month prevalence was reported in one excluded study as 41% (Botha and Bridger 1998). The all inclusive mean point for neck pain is 47.18% and for shoulder pain, 45.84%. The range of the prevalence estimates for the poor quality studies fell within the ranges reported by the methodologically sound studies. Although the mean point for shoulder pain in the poor quality studies was lower than the good quality studies' mean, the good quality studies' means are inflated by the addition of prevalence estimates from Yeung (2004). The exclusion of the poorer quality studies in analyses did not significantly alter the prevalence summary estimates.

2.3.8   Risk associations with NSP

Fifteen studies aimed to elucidate risk factors for NSP (refer to table 2.5 and 2.6). Ten studies found statistically significant associations with NSP. One study reported risk factors for incident neck and shoulder pain (Smedley et al. 2003). Although studies of incidence are more reliable in inferring causal relationships with pain, the Smedley et al. (2003) study's analysis of risk associations were excluded in the analysis of risk associations in this review. The risks for incidence of NSP may differ from those of prevalence (Smedley et al. 2003).   Hence, only prevalence statistics were extracted from the baseline statistics in the study performed by Smedley et al. (2003).

A cursory look at the range of risk associations reveals the wide range of associations with NSP in nurses including job factors, age, gender, ward

types and physical activities. Five studies (Ahlberg-Hulten et al. 1995, Lagerström et al. 1995, Lipscomb et al. 2004, Smith et al. 2004a, Smith et al. 2006) found statistically significant associations with psychosocial risk factors (refer to table 2.5) whilst eight studies (Lagerström et al. 1995, Josephson et al. 1997, Alexopolous et al. 2003, Eriksen 2003, Trinkoff et al. 2003a, Trinkoff et al. 2003b, Tezel 2005, Hou and Shiao 2006, Smith et al. 2006) found a variety of physical factors to be significantly associated with NSP in nurses (refer to table 2.6). Despite the use of elements from the 'Job Content Questionnaire' (Karasek et al.1998) in seven studies, there were no common job factors which achieved significance in more than one study. Furthermore the categorization and definitions of risks used in those studies which did not utilise the 'Job Content Questionnaire' (Karasek et al.1998) were vague rendering it difficult to compare risks across studies.

Age as a risk factor was associated with pain in three studies. Houand Shiao (2006) showed significant differences in shoulder and neck pain across four age groups ($p<0.001$). Lagerström et al. (1995) found that older age (>=45 years) was a risk associated with neck and shoulder pain (neck pain OR: 1.31(95%CI: 1.16-1.52); shoulder pain OR: 1.23(95%CI: 1.08-1.42). Eriksen (2003) found age over 59 years associated with shoulder pain ($p<0.05$) but not to neck pain.

A significant psychosocial risk factor common to both neck pain and shoulder pain was a "lack of support" (Ahlberg-Hulten et al. 1995, Lagerström et al. 1995, Smith et al. 2004a). Chinese hospital nurses complaining of a lack of support had a 2.52 times greater likelihood of experiencing neck pain during the previous 12 months (Smith et al. 2004a). Swedish nurses who complained of a lack of frequent help from their superiors had over double the likelihood of experiencing neck pain in the previous 12 months (Lagerström et al. 1995). Ahlberg-Hulton et al.

(1995) found that a lack of 'positive factors' which include supervisor support, was associated with shoulder pain (p=0.04) and neck pain (p=0.06) in Swedish nurses.

Study	neck	shoulder
Ahlberg-Hulten 1995	low positive factors nearly significantly related: OR 1.35 (95% CI: 1.06-1.5)	low 'positive factors'(calm atmosphere,fellowship, support from workmates etc) OR not reported
Alexopolous 2003	nil significant	nil significant
Bos et al 2007	nil significant	nil significant
Eriksen 2003	nil significant	nil significant
Hou 2006	nil significant	nil significant
Josephson 1997	nil significant	nil significant
Lagerstrom 1995	all at 95 % CI Low commitment to work tasks:OR 1.65(1.07-2.54), less frequent help from superiors(2.03(1.28-3.16)), severe symptoms: as above plus high work demands(1.82(1.14-2.92)	low work control: OR 1.73(1.13-2.67). severe symptoms: high work demands OR 1.65(1.05-2.59)
Lipscomb 2004	greater than 6 health care system changes OR: 4.45(1.97-10.08)	greater than 6 health care system changes 2.63(1.17-5.91)
Smedley et al. 2003	incidence related risk factors	incidence related risk factors
Smith 2003b	nil significant	nil significant
Smith 2003c	nil significant	nil significant
Smith 2004a	"not enough support" OR 2.52 (1.09 – 6.23); "high mental pressure" OR 1.79 (1.06 – 3.03)	nil significant
Smith 2004b	nil significant	nil significant
Smith 2006	High mental pressure 1.53 (1.02– 2.31)	high mental pressure 2.07 (1.35–3.17);
Tezel 2005	nil significant	nil significant
Trinkoff 2002	nil reported	nil reported
Trinkoff 2003a	nil significant	nil significant
Trinkoff 2003b	nil reported	nil reported
Yeung 2004	not the aim of study	not the aim of study

Table 2.5 Psychosocial risk associations with NSP in nurses

Study	neck	shoulder
Ahlberg-Hulten 1995	nil significant	nil significant
Alexopolous 2003	strenuous back postures OR 1.88(1.17-3.02); moderate perceived general health OR 2.76 (1.72-4.44);	age >40 years OR 3.58(1.86-6.89); Manual materials handling OR 1.95 (95%CI 1.06-3.60);strenous shoulder movements OR 1.87(1.06-3.30); moderate perceived general health OR 2.89(1.70-4.92)
Bos et al 2007	nil significant	nil significant
Eriksen 2003	female gender, single (any gender) , working >36 hours per week , working in old age homeP<0.05	female gender, age >59 (any gender), working in paediatric dept, community nursing or other areas P<0.05
Hou 2006	**neck/shoulder pain**: older age (p<0.01), increasing years worked , OR"s: bending at waist > 20x/day: 1.14 p = 0.03 (95% CI 0.92-1.40), twisting at waist 6-10 X/day: 1.26 p=0.025 (1.03-1.55)	
Josephson 1997	definitions of case included all body areas so cannot be used however, overall RR : physical exertion and job strain: 2.3(1.4-3.6, 95%CI)	
Lagerstrom 1995	age OR 1.31(1.16-1.52), perceived low physical fitness 1.42(1.00-2.02), severe symptoms: as above plus interaction with age and working in medical or geriatric ward 1.48(1.02-2.14).	age OR:1.23(1.08-1.42), low perceived physical fitness 1.75(1.25-2.49), . severe symptoms: age 1.22 (1.02-1.46). low perceived physical fitness 2.22(1.47-3.36)
Lipscomb 2004	not the aim of study	not the aim of study
Smedley et al. 2003	incidence related risk factors	incidence related risk factors
Smith 2003b	nil significant	nil significant
Smith 2003c	nil significant	nil significant
Smith 2004a	nil significant	nil significant
Smith 2004b	nil significant	nil significant
Smith 2006	Smokes tobacco 2.45 (1.43– 4.35); has children 2.53 (1.32– 4.91)	Manually handling patients 2.07 (1.08–4.32); Hard physical work 2.09 (1.11– 3.89)
Tezel 2005	**Chronic shoulder and neck pain** are associated with working in surgery and 'obstetrics and gynaecology' departments (p<0.05)	
Trinkoff 2002	nil reported	nil reported
Trinkoff 2003a	having mechanical lifting devices available was a protective OR : 0.45(0.22-0.89)	nil significant
Trinkoff 2003b	High Physical demands(10–12) 4.98 (2.68–9.26) p= 0.000* for staff nurses only : High physical demands(10–12): 9.05 (3.60–22.72)	High Physical demands(10–12) 6.13 (3.14–11.98) p= 0.000 for staff nurses only : High physical demands(10–12):11.99 (4.41–32.65)
Yeung 2004	not the aim of study	not the aim of study

Table 2.6 Physical risk associations with NSP in nurses

2.4 Discussion

This systematic review is the first known review of the prevalence and risk associations of neck and shoulder pain in nurses. Previous systematic reviews of pain in nurses have attended to lower back pain or general musculoskeletal pain (Govender 2004, Lorusso, Bruno & L'Abbate 2007, Daraiseh et al. 2010, Hamberg-van Reenen et al. 2007, Collins and Owen 1996). The aim of this review was to elucidate the worldwide prevalence of NSP in nurses and to highlight the main risk factors associated with NSP in nurses. This review has confirmed that NSP is a significant problem in nurses with mean point prevalence rates of 49.9%, 52.33% and 50.86% for neck pain, shoulder pain and the combination of neck and shoulder pain respectively. A wide variety of risk associations concerned with both physical and psychosocial factors are discussed in the literature but the results of this review do not add clarity as to the most salient associations with NSP in nurses.

2.4.1 Study Descriptions

The methodological appraisal of the included studies using the critical appraisal tool adapted from Walker et al. (2004) rendered high methodological scores. However, the Walker et al. (2004) tool failed to elicit several problems with respondent bias. Response rates were given at 100% in five of the studies where subjects had been invited to participate in the studies. However the tool did not penalize these studies for the use of volunteer nurses rather than randomly selected nurses as a sample group, which should be considered when reviewing the critical appraisal scores.

The large sample sizes of five studies (Trinkoff et al. 2002, Smedley et al. 2003, Eriksen 2003, Hou and Shiao 2006, Bos et al. 2007) as well as the common usage of the NMQ as measurement tool in all of these studies adds validity to the conclusions drawn from this review. However, multiple Asian studies used a translated version of the NMQ. As these populations are culturally quite diverse from the Scandinavian origins of the Nordic questionnaire, it would be important to ensure the validity of the translated measurement tool in the setting in which the study was performed before assuming the accuracy of study data (de Barros and Alexandre 2003). Content and face validity were attempted in the studies which used translated questionnaires but no pilot studies were presented to support the questionnaire's validity.

This review included studies predominantly from Scandinavia, Western Europe and Asia. There was an absence of studies of NSP among qualified nurses of South American, African and Australian populations. One study conducted among a South African nursing population scored poorly in methodological appraisal (Botha and Bridger 1998). The generalisation of the results to the South African nursing population is not advisable as South African nurses work under different conditions from those in Europe, Asia and North America.

The reviewed studies were predominantly published after the year 2000. This is an encouraging finding suggesting that the research on nurses is shifting to include a wider variety of musculoskeletal disorders than back pain alone. Only Smedley et al. (2003) studied NSP in isolation from other musculoskeletal disorders, whereas the remainder of the studies investigated multiple body sites.

2.4.2 The definitions of NSP used in the reviewed studies

The anatomical delineation of neck, shoulder or NSP was homogenous across the studies due to the widespread use of the body chart associated with the NMQ (Kuorinka et al. 1987). The original NMQ used only a posterior view of the body to guide the subject's classification of his/her pain area. The use of only a posterior view could result in an under-reporting of neck or shoulder pain as both can occur exclusively on the anterior surface of the body.

The NMQ originally used the terms, 'discomfort, stiffness, pain or tingling' to describe musculoskeletal complaints. Various studies adapted the NMQ definition. Kee and Seo (2007) include pain, ache, numbness, burning, swelling and discomfort of the neck or shoulder in their definition of NSP. Warming et al. (2009) asked subjects about discomfort, aches and pains while conducting work tasks. Terms describing pain may be difficult to define and translate accurately particularly when questionnaires are translated into other languages and used across cultures (de Barros and Alexandre 2003). Subjects are more likely to report pain when a broad definition of pain is used (Yeung and Levin 2004). All the above factors may have resulted in an inaccurate estimation of pain prevalence by the reviewed studies. Hence, the studies performed by Kee and Seo (2007) and Warming et al. (2009) were less likely to have found statistically significant risk associations.

Studies with specific severity or frequency ratings reported lower prevalences of NSP (Smedley et al. 2003: 35% and Trinkoff et al. 2002: 25%). It is questionable whether all symptoms of NSP should be considered a concern for prevention and rehabilitation (Trinkoff et al. 2002, Yeung et al. 2004). A clearer understanding of the prevalence of severe pain would assist in targeting specific management strategies. It is those nurses in severe pain who are at greater risk of leaving the

profession. The prevalence of low grades of pain is nonetheless important to capture in order to monitor and eventually prevent the transition of these nurses' dysfunction from a mild hindrance to a career threatening disability.

2.4.3 Prevalence of NSP in nurses

The widespread use of the NMQ facilitated comparisons across these 20 studies regarding general prevalence rates. The authors of the NMQ had the developed the NMQ tool in response to a need for a standardised measuring tool for pain prevalence. The NMQ authors compiled a fairly simple tool and avoided the complexities of an in-depth assessment of pain behaviour (Kuorinka et al 1987). Despite this, the authors of the reviewed studies chose to apply various operational definitions of 'being a case' with regards to frequency, duration or intensity, and character of the pain. This renders the prevalence rates of 'severe' pain reported in the reviewed studies less comparable with those who used the broader original definition from the NMQ. The data for the prevalence meta-analysis in this review was drawn from studies looking at 'symptoms' of NSP with vague case definitions. Studies of severe or chronic pain were excluded from the summary statistic. As pain prevalence is found to be significantly lower when greater definition of intensity and severity of pain is provided (Yeung and Levin 2004) or when the consequences of NSP are considered (Trinkoff et al. 2002, Trinkoff et al. 2006), the summary statistic must be interpreted cautiously when attempting to determine the true cost of NSP to the nursing community.

Meta-analysis of 12 month prevalence mean estimates of neck pain and shoulder pain was possible due to a degree of homogeneity of studies with regards to population and measurement tool. An insufficient number of studies assessed other recall periods in order to calculate a summary

statistic of one month, six month and lifetime prevalences. A problem with the use of an unweighted summary statistic is that small studies are given equal weighting in relation to larger studies which could skew the accuracy of the summary statistic ((Mann, Gilbody and Adamson 2010). This should be kept in mind when interpreting the mean prevalence estimates given for one month, six month and lifetime prevalence estimates.

The recall period influences the individual subjects' responses and hence substantially influences the report of prevalence. The longer the period of time the subject is asked to recall, the greater the probability of a subject reporting the experience of pain. The reviewed studies with longer recall periods reported higher prevalence, although the accuracy of reporting will be improved with shorter recall periods as the memory of pain is more recent. These issues must be considered when reviewing the range of prevalence statistics. Recall may also have been affected by the use of a dichotomous scale or a multiple factor scale regarding the occurrence of symptoms. The standardised NMQ (Kuorinka 1997) used a dichotomous scale (yes or no) which may not allow discretion for those subjects who had mild symptoms but felt they were not sufficiently severe to report.

The prevalence of NSP in nurses appears to be marginally lower than that of LBP among nurses. A weighted 12 month prevalence summary of LBP in nurses has been reported by Dareseih et al. (2003) as 50%. Since then efforts to curtail LBP through the use of assistive devices have been successful only when significant training was given (Garg and Owen 1994, Collins and Owen 1996, Owen 2000a, Owen 2000b). Prior to the year 2000, NSP received little attention in published research on nurses. Hence, it is less clear whether the prevalence of NSP has been reduced with the implementation of lifting policies and assistive devices (Owen 2000a). Furthermore, the use of hoists and sliding sheets may shift the kinetic forces of lifting from the lower back to the upper quadrant and

induce greater stresses on the neck and shoulder region (Owen 2000a). There is the possibility that NSP has indeed increased over the past 15 years due to the implementation of computerized workstations, requiring the use of static postures of the upper limbs and neck (Smedley et al. 2003).

2.4.4   Risk Factors

Due to the heterogeneity of the study aims of the reviewed papers, it was not possible to synthesize conclusions regarding the risk factors associated with NSP in nurses. Clear causal relationships between risk factors and pain cannot be inferred by cross sectional studies. A wide variety of risk factors have been explored in the reviewed literature including job, physical and psychosocial factors. The widespread use of the 'Job Control Questionnaire' compiled by Karasek et al. (1998) facilitated comparisons across the studies. However, a heterogenous mix of significant risk associations was found and therefore a meta-analysis was not possible. The variety of risks associated with NSP in nurses across the world may be due to the cultural differences in populations rather than the common factor of 'being a nurse'. Of the three Asian studies which used Karasek et al.'s analysis, only the Japanese study (Smith et al. 2006) found a significant risk association of shoulder pain with hard physical work. Physical factors were generally more significant in the European studies (Alexopolous et al. 2003, Lagerstrom et al. 1995). Although the prevalence rates in Asia were generally similar to those in other regions, risks associated with NSP in Asia may differ to the risks extracted by the 'Job Control Questionnaire' which was designed in Northern Europe. Chinese nurses are predominantly involved in the medical care of their patients while the patient's relatives play a much greater role in daily washing and feeding of the patient compared to nurses in northern Europe (Smith et al. 2004a). Hence Chinese nurses

may not be exposed to the same degree of physical strain as their European and North American colleagues where nurses of lower ranks take on the 'bodily' care of the patient. Korean nurses are involved with manual handling but are less likely to take time off work due to pain (Kee and Seo 2007) and may not be monitored and guided by health and safety legislation such as occurs in the USA and the United Kingdom (Smedley et al. 2003, Waters et al. 2006). Another reason for the variation of risk associations found could be cross cultural differences in interpretation of the risk definitions as used in the translated job content questionnaires (Smith et al. 2004a).

There was a weak association of increasing age with NSP found in three papers in this review (Lagerström et al. 1995, Eriksen 2003, Hou and Shiao 2006)(refer to table 2.5). The general population studies of neck pain alone show higher prevalence of neck pain with increasing age (Guez et al. 2002, Sim, Lacey & Lewis 2006, Grooten 2007). Shoulder pain is less related to age and in the general population shows greater association with repetitiveness of tasks (Waters et al. 2006, Luime et al. 2004a, Grooten et al. 2007). The lack of association with age in nurses to NSP may be due to the healthy worker effect whereby nurses who had NSP have left the profession or moved to different settings (Gilworth et al. 2007, Tinubu et al. 2010)

Individual studies found that the risk for the development of NSP was associated with the nurses' perception of general health and fitness which is conferred by studies of LBP in nurses (Lorusso, Bruno and L'Abbate 2007, Daraiseh et al. 2010). The onset of LBP in nursing students has been associated with reduced physical activity (Mitchell et al. 2010). In the general population, adults with reduced perceptions of their general health had higher risk for NSP (Croft et al. 2001). Young people (aged 22-25years) experienced more NSP if they had a poor perception of their

general health (Siivola et al. 2004). Yet Hamberg-van Reenan (2006) conducted a systematic review of the relationship of physical capacity (muscle strength, muscle endurance and spinal mobility) to NSP in adults and found no significant relationship.

Exposure to manual handling was cited as a risk association for shoulder pain by two reviewed studies (Alexopoulous et al. 2003 and Smith et al. 2006). Studies of the general population confer that prolonged bending at the neck, using the arms above shoulder height and repeated lifting of heavy objects are associated with NSP (Hager 2007). Grooten et al (2007) found that in a general population, working with one's hands above one's head, using vibrating tools and manual handling predicted the chronicity of NSP. The National Institute for Occupational Safety and Health in the U.S.A (NIOSH) conducted a review of occupational factors related to NSP (Waters et al. 2006). They reported that highly repetitive work was associated with shoulder pain while forceful exertion was related to neck pain. The NIOSH review concluded that strong evidence existed for the association of NSP with high levels of static contractions of upper limb musculature and extreme working postures (Waters et al. 2006). Nurses in modern hospitals are exposed to computerized work- stations, and in particular, managerial nurses will maintain static postures for longer periods of time than their subordinates. Extreme working postures may be encountered by nurses during manual handling activities particularly in wards caring for severely disabled or elderly patients. Smedley (2003) found that incident NSP was mildly related to manual handling tasks such as reaching, pushing and pulling with hazard ratios of up to 1.7. However manual loading may not necessarily increase risks when applied progressively. In a study of young adults aged 22-25 years, those who had dynamically loaded their upper bodies in the previous seven years reported a lower prevalence of NSP than those participating in sports loading the lower body or sedentary activities (Siivola et al 2004). The

increase in load and hence strength of the upper quarter musculature was a protective factor in the young adults studied by Siivola et al (2004). It appears that physical load alone cannot be considered a risk for NSP in nurses, but rather the imbalance of physical load versus physical capacity of the nurse which develops as an adaptation to the job (Josephson et al. 1997). The current review did not elucidate consistent findings that physical risks are primarily related to NSP in nurses.

Psychosocial risk factors were associated with neck pain in four of the studies whilst five studies reported significant psychosocial factors associated with shoulder pain. Although there were variations in exact definitions of the risks, three studies conferred that low levels of support were linked with NSP (Ahlberg-Hulton 1995, Lagerström 1995, Smith 2004a). Low job control (OR=1.6), and little supervisory support (OR=1.3) were associated with NSP in a study of the general population in the United Kingdom (Sim et al. 2006). The higher OR's for neck pain's association with 'little supervisory support' observed by Smith (2004) and Lagerstrom (1995), (2.52 and 2.03 respectively) suggest that this psychosocial factor has greater impact on nurses than the general population. Team work and effective leadership of the team are important elements of the nursing profession. Other occupations may not depend on supervisory support to the same extent as nurses which may partially explain why, for nurses, psychosocial work factors reached significance in association with NSP in five of the reviewed studies. This review's findings confer with a large and robust study conducted in seven European countries as part of the Nurses-early-exit-study (NEXT) (Simon et al. 2008). They demonstrated that a high effort/reward imbalance (ERI) was closely associated with neck and back pain disability in hospital nurses (OR: 6.2). In this context, reward not only included financial reward but job esteem and career opportunities. The ERI presented a far greater risk than physical factors. The NEXT study consistently found that only

extreme physical exposure, as experienced by 10% of their nursing populations, was related to spinal conditions (Simon et al. 2008). Although by definition, disability is not synonymous with pain, it is a consequence of pain (Trinkoff et al. 2002a, Rustøen, Salanterä 2010). The psychosocial risks faced by nurses require attention in order to prevent the progression of prolonged work- related pain into 'work instability' and finally work-related disability (Gilworth et al. 2007, Letvak and Ruhm 2010).

Conclusions regarding the weighting of psychosocial risks versus physical risks associated with NSP cannot be made on the basis of the variety of risks assessed and the inconsistencies in the associations found across studies. Ten studies which assessed psychosocial risks found no significant associations with NSP in nurses whereas six studies which assessed physical risks found no significant associations with NSP in nurses.

2.4.5 Limitations and recommendations

Most of the reviewed studies used a broad description of pain as discussed in section 2.4.2. Future studies should be concerned nurses experiencing severe pain and chronic disability as these nurses' workplaces need urgent intervention. However findings regarding less severe pain are also relevant and note-worthy as employers should ideally be seeking to prevent the transition of mild symptoms into more disabling dysfunction (Yeung and Levin 2004).

The generalization of this review's findings to Africa is not possible. Only one African study was found (Botha and Bridger 1998). Botha and Bridger (1998) studied a Western Cape nursing population but the study achieved a poor methodological rating. The results of the study by Botha and Bridger (1998) are outdated and are unable to predict the current NSP

prevalence in South African nurses as they deal with nurses from three private hospitals in the Western Cape. Risk factors for NSP in rural Africa are likely to be diverse from the findings of first-world settings. The risk factors for NSP in African nurses may more closely resemble those in rural Asian settings. In parts of rural Africa, nurses generally attend only to medical care of the patient (Kengne et al. 2008) and the relatives of the patient are responsible for everyday care of the patient. The differences in the nursing model used in rural Africa may reduce or enhance the nurses' exposures to various risks, affecting the prevalence and the significance of any likely risk associations.

The lack of reviewed studies emanating from Africa reveals the need for epidemiological research on occupational risks faced by African nurses. The lack of published papers found concerned with an African nursing population may reflect the fact that many African journals may not be indexed and are thus inaccessible via electronic databases (Adejumo, Lekalakala-Mokgele 2009). Hand-searching of African journals should be performed in future reviews of this nature.

This review was concerned with studies of the nursing population working in a clinic or hospital setting. Simon et al (2008) found that back pain and neck pain in nurses were associated the setting in which the nurses worked, for example, the prevalence rates were higher in nursing homes and home care settings than in hospital settings. The nursing setting determines the specific physical and psychosocial demands the nurse is placed under. The work setting is therefore an important etiological variable in the development of NSP. Hence, this review focused on hospital and clinic settings only. The populations studied by the reviewed papers included nurses of all ranks and qualifications. Nurse aides studied by Eriksen (2003) experienced very high rates of neck and shoulder pain for a short recall period of 14 days (53.5% and 47.1% respectively);

significantly higher than those of registered nurses studied by Lagerström et al. (1995) and Botha and Bridger (1998). This phenomena may be due to the greater exposure of less qualified nurses to physically demanding jobs. In other words, the higher the qualification of the nurse, the less likely she is to be involved with bodily care and manual handling of patients (Lund and Budlender 2009). Nonetheless, Trinkoff et al. (2003b) found that staff nurses were nearly twice as susceptible to both neck and shoulder pain if exposed to 'high physical demands' compared to the general nursing population exposed to equally high physical demands. Hence there may be added factors elevating the risk of NSP among the less qualified nursing ranks such as poor general and psychosocial health, and poor self management (Eriksen 2003, Lagerström et al. 1995). Future primary studies should sub-group nurses according to rank and setting in order to elucidate more specific risk factors. More specific risk associations may be found in secondary studies if specific ranks of the nursing workforce were independently reviewed (Simon et al. 2008).

NSP is a common occurrence in the general population (Makela et al. 1991, Bring et al. 1995, Croft et al. 2001, Palmer et al. 2001, Guez et al. 2002, Guez et al. 2003, Siivola et al. 2004, Sim, Lacey & Lewis 2006, Grooten et al. 2007, Natvig et al. 2010). The high prevalence of NSP in nurses, although higher than the general population, may not be entirely attributed to the workplace for two potential reasons. Firstly, the odds ratios found for physical risks in nurses are generally not significantly higher than odds ratios's found in the general population. Secondly, the temporal relationship of any risk factor to NSP is cannot be inferred from cross-sectional study. Smedley et al. (2003) found that the strongest predictor of incident NSP was a previous history of NSP. Incident NSP was closely linked with a previous history of LBP or NSP. Hence the initial causes of the nurses' NSP may be unrelated to the work place. In these cases, it may be more accurate to suggest that the workplace has

aggravated the pre-existing LBP or NSP. This factor reinforces the principle that prevention of pain needs to address both the risks to causation as well as aggravation of pain (Rustøen and Salanterä 2010, Rajbhandary and Basu 2010).

Future cross sectional studies need to compare the nursing with general working populations with the same demographic factors in order to compare prevalence rates and be able to better the control for confounding cultural and socioeconomic factors (Tinubu et al. 2010, Harcombe et al. 2009).

Cohort studies of incident NSP are needed to provide a more accurate understanding of the causation of NSP in the workplace in order to implement immediate curative and preventative strategies. Smedley (2003) found no association of incident NSP with psychosocial risk factors over a two year period in 190 nurses in the south of England but did find significant manual handling risk associations. This finding differs from many cross-sectional studies which highlighted psychosocial risk factors. This difference in finding between the Smedley et al. (2003) study and the reviewed cross-sectional studies highlights the fact that cross-sectional studies are less reliable in eliciting clear risk associations.

Intervention studies which address the most pertinent risks among those nurses already suffering from NSP are required. The effects of a stress management program and an individually tailored exercise program were compared with a control group among Swedish nurses with shoulder complaints (Horneij et al. 2001). The large loss to follow at 18 months did not allow the positive trends noted to reach significance. Similar studies need to be conducted across different cultural groups to ensure the effectiveness of long term interventions in different settings and to tailor interventions to address particular needs in various cultures. Furthermore

cohort studies exploring the implementation of preventative strategies would be required in order to confirm causation and motivate for long term changes in international nursing policy (Lipscomb et al. 2004, Owen 2000a). For example, long term cohort studies exploring strategies which reduce either physical or psychosocial risks in the nursing work environment, could offer some clarity on the relative contribution which each group of factors adds to the problem of NSP.

Finally, it is questionable whether pain prevalence is the most appropriate measure of a musculoskeletal disorder. Although pain prevalence holds great significance for the individual, the inconclusive findings regarding risk factors associated with pain alone renders it difficult for policy makers to discern which curative and preventative measure would be most effective in curbing NSP in nurses (Trinkoff et al. 2006). Sickness absence and work morbidity are two functional consequences which better measure the impact of NSP on the employer (Trinkoff et al. 2002a, Trinkoff et al. 2006). Wage costs, both in the public and private sector, demand significant chunks of the health care industry budget (SANC 2009; New England Public Policy Centre: conference report 2005). Nurses leaving the profession leave their colleagues at greater risk of 'job overload' (Gilworth et al. 2007) and burnout (Langballe et al. 2009) exposing their patients to greater risk of poorer health outcomes (Kane 2009). Analysis of the risk factors associated with these consequences of NSP may provide more accurate direction for future preventative action. Further studies are justified on the consequences of NSP in the interest of the employers of nurses and the nurses themselves (Trinkoff et al. 2002a).

2.5 Conclusion

The estimated prevalence of NSP in the worldwide nursing population is higher than among the general population. It appears that the etiology of

NSP in nurses is mutifactorial and is more complex than the summation of physical forces. Psychosocial risk associations have at least as much if not a greater association with NSP than physical factors. Measures aimed at preventing NSP in nurses need to address both the physical and the psychosocial elements of the nurses' workplace.

Chapter 3

An epidemiological study of neck and shoulder pain of nurses in Tygerberg hospital:

Methodology and results

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This study was conducted in two parts. The first part of this study was concerned with the prevalence of neck and shoulder pain (NSP) among nurses working in Tygerberg Hospital (TBH). This chapter outlines the methodology of the first part of the study and summarizes the results obtained during the cross-sectional study of NSP among nurses at TBH.

3.1 Methodology of the cross-sectional study

3.1.1 Research questions

Part one of the study sought answers to the following questions:

- What are the 12 month prevalences of neck pain, shoulder pain and combined NSP in the nursing population of TBH ?
- What are the risk factors in the nursing population at TBH for the development of neck pain, shoulder pain and NSP?
- What is the association of NSP with lower back pain (LBP) in the nursing population at TBH?

3.1.2 Aim of part one of the study

The primary aim of part one of the study was to determine the 12 month prevalence of neck pain, shoulder pain and combined NSP among TBH nurses.

3.1.3 Research objectives

The objectives of part one of the study were:

- To elicit the 12 month prevalence of NSP.
- To determine the association of neck pain with shoulder pain as well as the associations of LBP with neck pain and shoulder pain respectively, among TBH nurses.
- To determine the association of NSP with each of the following risk associations among nurses working in TBH hospital: age, ward module, time worked in ward, perception of general health and fitness and injuries.

3.1.4 Research team

- The main researcher conducted the pilot study, liaised with nursing and administrative managers of TBH, distributed and collected questionnaires, led the interviews and analysed the data obtained from the interviews.
- Professor Quinette Louw, offered advice and assistance regarding the appropriate analysis of quantitative data obtained from the questionnaire.
- Mrs Lynette Crous assisted with the conceptualization of the study and the selection of questionnaire items.
- Dr Justin Harvey performed the statistical analysis of the quantitative data.

3.1.5 Study setting

The questionnaire was administered at TBH, which is an academic tertiary institution providing a wide range of high level health care for the wider public sector, ranging from trauma services, out-patient clinics through to elective surgery. At least 3.6 million people receive medical care at TBH annually. The hospital was designed for 1899 beds, but presently has 1310 beds in use for patient care (Provincial Government of the Western Cape 2010).

3.1.6 Study design

A cross sectional questionnaire was used for this phase of the study to extract data from the nurses working at TBH. Ethical clearance for this study was received from the Stellenbosch University Ethics board for Human research in March 2009. Please refer to a copy of the letter of approval in appendix E.

3.1.7   Study population

The study population consisted of a cohort of approximately 1265 nurses working as permanent staff in the hospital (Provincial Government of the Western Cape 2010). This group consisted of both males and female and included auxiliary nurses, enrolled nurses and professional nurses. Up to a third of the cohort may be on annual leave at any given time. The nursing staff complement includes day and night staff.

3.1.8 Sample recruitment method and size

There are approximately fifty wards, 28 theatres and 30 out-patient departments within TBH. Wards with similar functions and patient profiles are grouped together to form a module. There are eight modules in total in TBH. The nurses perform similar job tasks in the wards which make up a module. For example, orthopaedic wards are grouped together with general surgical wards, plastic surgery and vascular surgery wards, forming a surgical module. Each module is managed by an area manager and is seen as a functional unit. On average, 16 to 20 nurses work in each ward, including both day and night staff. The nurses may be rotated between the wards within one module. The aim of this study was to randomly select one ward from each module to participate in the study.

The researcher met with Mrs G.C. Joseph, the acting head of nursing at TBH on the 16th of July, 2008 to introduce the study proposal to Mrs Joseph. Mrs Joseph consulted with Mrs R.M. Basson, the head of nursing at TBH, who gave final permission for the implementation of the study. The initial letter of consent sent by Mrs G.C. Joseph on the 17th of July 2008 can be found in Appendix C.

Permission was given to survey the wards on the condition that the ward managers gave their consent to have their staff surveyed. Initially six ward managers gave permission for their wards to be surveyed at a

management meeting with Mrs Joseph. The wards for which permission was given represent four modules: surgery, internal medicine, neurology and 'obstetrics and gynaecology'. This information was conveyed to the researcher telephonically in March 2009. The wards for which permission was granted were

- 1 neurological Intensive Care Unit and high care ward (Neuro ICU) (A4)
- 1 Orthopaedic surgery ward (A3west)
- 2 General surgical wards (D5 and J7)
- 1 Internal medicine ward (D10)
- 1 Obstetrics and gynaecology unit (A2)

Due to the slow return of questionnaires from the nurses in the abovementioned wards, the researcher decided to request permission to survey additional wards. During April 2009, the researcher asked Mrs G.C. Joseph whether consent could be obtained to survey the paediatric, renal and theatre complex nurses (refer to appendix D). Thereafter, Mr Visagie, the head of department of nursing of the theatre complex (R2) at TBH gave permission for the theatre nursing staff to be surveyed. A meeting was set up with Mr Visagie where the researcher explained the process of the research and he consented to distribute the questionnaires to his staff when they came on or off duty. Unfortunately, consent was not obtained to survey the paediatric or renal nurses. The aim was to survey approximately 15% of the total TBH nursing staff, hence 190 questionnaires were printed and distributed.

3.1.8.1 Sample inclusion criteria
The following inclusion criteria were applied to the sample population:
- Nurses who were on the payroll system of TBH, hence permanently employed staff.
- All ranks of nurses were included.

- Nurses who are able to write, speak and comprehend English.
- Nurses aged 18 years old or older at the time of the study, including auxillary nurses providing they were employed as permanent staff.

3.1.8.2 <u>Sample exclusion criteria</u>

The following exclusion criteria were applied to the sample population:

- Student nurses were excluded on the basis that their work tasks changed frequently due to the rotation across wards. Student nurses do not work full time throughout the year.
- Temporary staff were excluded on the basis that their work hours may not be sufficient to elicit work-related pain to the same extent as permanent staff.

3.1.9 Duration

The cross sectional questionnaire was administered over three months from March 2009 to May 2009.

3.1.10 Instrumentation

The 'Neck and Shoulder Pain Questionnaire for Nurses' (NSPn) was the name given to the questionnaire compiled by the researcher (refer to appendix F). The primary elements regarding prevalence and work-place factors as used in the NSPn were extracted from the Dutch Musculoskeletal Questionnaire (DMQ) (Hildebrandt et al. 2001) which in turn used elements of the Nordic Musculoskeletal Questionnaire (NMQ) (Kuorinka et al. 1987). The DMQ has been validated in the Dutch and Asian settings and has been widely used in industrial and occupational settings with multiple translations (Hildebrandt et al. 2001, Smith and Leggat 2004, Smith et al. 2004b, Smith et al. 2004a). The standard English translation of the DMQ consists of nine pages while the extended version consists of 14 pages (Hildebrandt et al. 2001). The DMQ includes extensive questions on general health, work tasks and specific questions regarding LBP and NSP. The DMQ in its entirety was considered too long and inappropriately detailed for this study. The aim of the use of a

questionnaire in this study was to extract the prevalence of NSP among TBH nurses. Risk associations with basic demographic factors rather than a complex assessment of job tasks were sought as a secondary aim. The DMQ would take approximately 15 minutes to complete. The resercaher anticipated that the nurses at TBH would be unwilling to spend their 30 minute lunch breaks completing a long questionnaire. Hence only a few key elements of the DMQ, involving demographic and job factors were included. These are discussed below.

The primary aim of the NSPn questionnaire was to determine the prevalence of NSP among nurses in the surveyed wards at TBH. Secondary aims included the extraction of information regarding age, module (ward type), general health and fitness and other areas of musculoskeletal pain. The question regarding module was worded to elicit the tenure of the months worked within a specific module as the nurses may move wards within a module but continue performing similar job tasks and hence their exposures to potential risks for NSP remained similar across wards within the module. The NSPn also served to identify nurses with NSP who would be suitable for selection for the qualitative part of this study.

English is the working language used at TBH and nurses working in the wards are expected to document their patient care in English. Hence the questionnaire was offered in English only as it is expected that the nurses are proficient in comprehending written English as far as occupational and daily living activities are concerned.

The NSPn is divided into three sections. Section one consisted of general questions regarding age, gender, English literacy and comprehension, module, tenure of work in module, hand dominance, whether the nurses

fulfilled a supervisory role and whether the nurses worked full or part –
time.

The second section asked the nurses to rate their perception of general
health and physical fitness on a four point Lickert type scale offering
options for 'good', 'reasonably good', 'not too bad' and 'poor'.

The third section was concerned with musculoskeletal symptoms. The
NMQ (Kuorinka et al. 1987) formed the basis for this section of the
questionnaire, in the same way as it was incorporated in the DMQ. The
subjects were requested to shade in any areas of discomfort, stiffness,
pain or tingling they have experienced over the past 12 months, on a body
chart (Kuorinka et al. 1987). If the NSPn asked the nurses to report only
neck, shoulder and low back pain, the nurses would have relied on their
subjective definitions of neck, shoulder and low back pain to determine
whether their pain should be reported. Hence, the nurses were asked to
report all areas of pain in order to obtain an accurate representation of
pain.

Contrary to the original NMQ, blank anterior and posterior views of the
body chart were used in the NSPn. The same adaptations were made by
the authors of the DMQ (Hildebrandt et al. 2001). The use of an anterior in
addition to posterior view of the body chart ensured that pain emanating
from the anterior surface of the neck and shoulder was reported. A blank
body chart was used in this study as there are indications that the blank
chart provides a more sensitive estimate of prevalence of pain of the neck
and shoulder than a chart with pre–existing anatomical boundaries
(Bertilson et al. 2007). During analysis by the researcher, a grid was
overlaid over the body charts in order to define the shaded areas of pain
per body site (Smith 2006, Grimmer-Somers, Nyland & Milanese 2006).
This grid is available in appendix I.

In addition to the question regarding the prevalence of musculoskeletal pain, the nurses were asked to report on any other areas of musculoskeletal injury by ticking the appropriate regions given in tick boxes. Finally, three questions related to previous pathologies of the neck and shoulders were asked. These pathologies were part of the exclusion criteria for the original study proposal.

No pilot study was performed as the original intent of the NSPn was to extract participants for a biomechanical study. It was deemed unnecessary to validate the NSPn as the DMQ has been widely used across various nursing settings worldwide (refer to chapter 2.2). The DMQ includes the NMQ which in turn has been widely used in English speaking settings (refer to chapter 2.2).

3.1.11 Study procedure

The researcher met with Mrs Joseph, the acting head of nursing at TBH in July 2008, and explained her intentions in conducting the research of NSP in nurses. Once ethical approval was obtained in March 2009, the researcher informed Mrs Joseph that she would begin data collection. The researcher visited the sister in charge of each selected ward and delivered the NSPn in sufficient quantities according to the numbers of staff on each ward in March 2009. The sister-in-charge (or ward manager) of each ward had been previously notified of the study by Mrs Joseph. The researcher introduced herself to the sister-in-charge and the ward secretary, informing them both of the aim of the study. The sister-in-charge was encouraged to inform all the nurses in their respective ward of the questionnaire as well as the sisters in charge of the other shifts working at that ward. The sisters-in-charge were not to force participation from any of the nursing staff. While visiting the wards to hand out the questionnaires, the researcher informed the available nurses about the study. It was not

possible to systematically meet with individual nurses as many nurses were involved with patient care at the time of the visits, or worked on other shifts.

The blank questionnaires were left in a designated place in the ward office. A cover letter was left with the questionnaires in each ward, outlining the voluntary nature of the study. Instructions regarding how to complete the form as well as the study details and ethics declaration were included on the front page of the NSPn. By completing the NSPn, nurses gave their consent to be included in the study. Once the nurse had voluntarily completed the questionnaire, she was instructed to return the completed forms by placing them in a box or green folder provided by the researcher.

Each NSPn form was given a unique identifying reference number on the front page. Once the nurse completed her NSPn, the questionnaire was stored in a box or folder in the sister's office. The nurses recorded the reference number of the NSPn and his/her relevant contact details on a separate form (refer to appendix G). This ensured that those involved in data capture and analysis were blinded to the identity of the nurses, and maintained the nurses' confidentiality. It was however necessary to keep a record of the nurses' names in order to contact those subjects selected for the second stage of this study.

Initially the return of the questionnaires was very slow. The researcher visited the wards on a weekly basis for three weeks to collect completed questionnaires. The initial collection of questionnaire took place in April 2009, three weeks after the questionnaires were delivered. Each ward was visited on three occasions by the researcher to remind the sister in charge and available nurses about the questionnaire. The researcher visited the wards at different times of the week in order to make contact

with nurses working on different shifts to the nurses who had previously been encouraged to complete the questionnaire. Nurses who may have been on annual leave when the questionnaire was first distributed should have had the opportunity to complete the questionnaire near the end of the data collection period. The theatre staff were surveyed in May 2009 after permission was gained from the theatre manager, Mr Visagie in late April (refer to appendix D). The response rate from the theatre staff was very good.

3.1.12 Data capture

A purposefully designed MS Excel (2005) spreadsheet (refer to appendix A) was used to transfer the written data into computer format. Dichotomous data was recorded as 0 or 1 depicting yes/no respectively. Likert type scales were given a rating of 1-4, with 1 depicting 'poor' and 4 depicting 'good'.

3.1.13 Data analysis

Subject characteristics were analysed and graphed using MS Excell (2005) and Statistica (9) software package. Correlations of neck, shoulder and lower back pain were sought with Chi-squared tests using the SAS version 9. A moderately high association was deemed to be a result of over five for the Chi-squared test, a high association was between 10 and 20, and very high association seen with a result over 20. Odds ratio's for the association of NSP with categorical variables' (age, perception of general health, perception of fitness) were calculated by means of 2x2 contingency tables using SAS version 9. Logistic regression analysis was used to assess months worked as a continuous variable using the SAS software package, version 9. The significance value was set as $p < 0.05$.

3.2 Results

3.2.1 Demographic data:

Of the 190 questionnaires distributed in the selected wards, 143 questionnaires were returned, yielding a response rate of 75.26%. Three subjects failed to report their respective ages. Four subjects did not report their tenure of work and one subject did not complete the general health and fitness questions. The respondents included 12 men and 131 women (91.6% of the final sample). The mean age of the respondents at the time of the survey was 38.9 years (SD: 8.52) years, with the mean age for women at 40.69 years (SD: 8.17) and for men, 32.83 years (SD: 8.84) (refer to figures 3.1 and 3.2 for the distribution of age groups). Six women and three men had worked in other modules besides their regular modules within the past 6 months. Fourteen nurses were left hand dominant. Supervisory functions were carried out by 90 nurses (62.93%) and 135 nurses (94.4 %) worked in a full- time capacity.
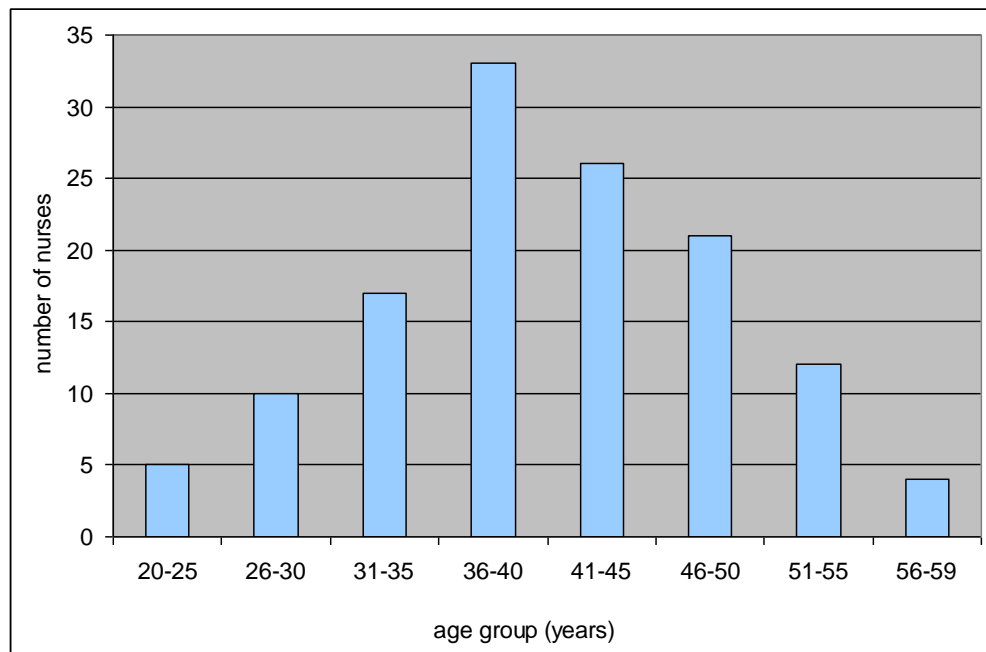
Figure 3.1 Distribution of ages (n=143)
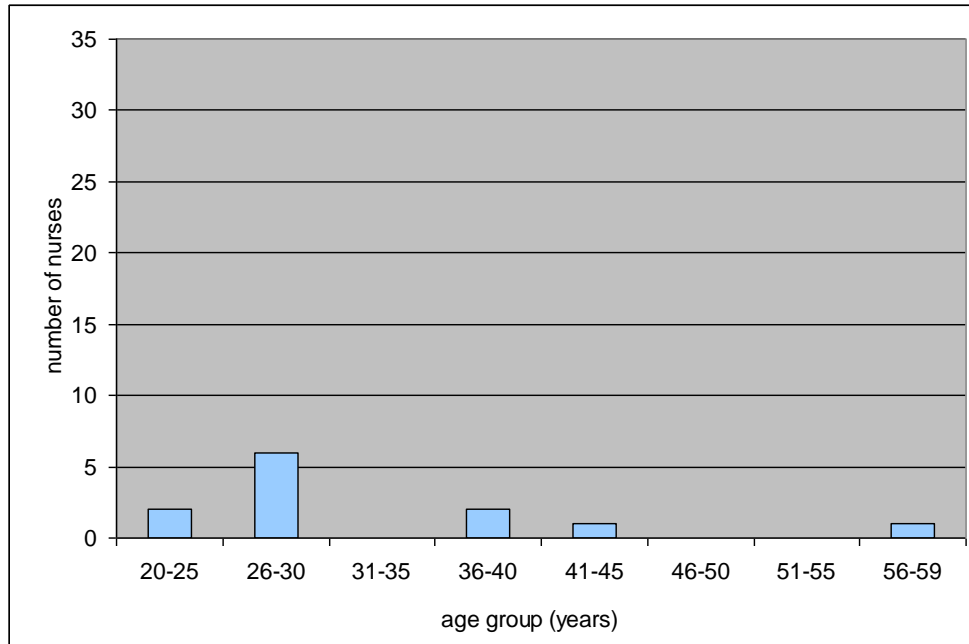
Figure 3.2 Distribution of ages of male nurses (n=12)

The response rate from each of the wards is represented in figure 3.3. One of the respondents moved from the Obstetrics and Gynaecology ward to an Out-patients ward during the data capture and hence Out-patients is reflected on this chart in order to represent this subject in the sample.

Ward	internal	obs and gynae	out patients	ortho	surgical	theatre	recovery	neuro ICU
no. of nurses	6	14	1	5	24	56	7	30
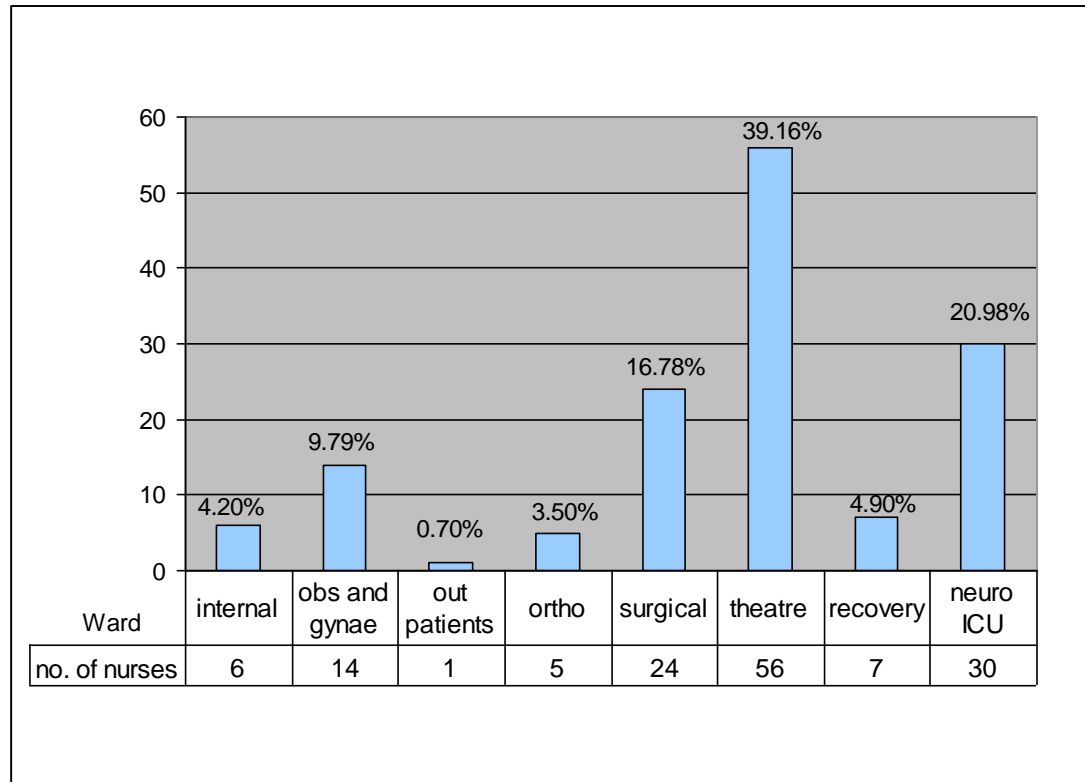
Figure 3.3 Distribution of sampled nurses in wards (n =143)

The mean tenure of work in the nurse's module was 120.25 (SD: 97.58) months or 10 years. The months worked were converted to years worked and then categorized into brackets of five years. The total years worked by subjects within a module is represented below in figure 3.4. Forty six nurses (33.81%) had worked in their respective module for five or less years.

years worked	0 to 5 yrs	> 5 to 10 yrs	>10 to 15 yrs	> 15 to 20 yrs	> 20 to 25 yrs	> 25 to 30 yrs	> 30 to 35 yrs
no. of nurses	47	27	23	23	12	2	4

Bar values: 33.81%, 19.42%, 16.55%, 16.55%, 8.63%, 1.44%, 2.88%
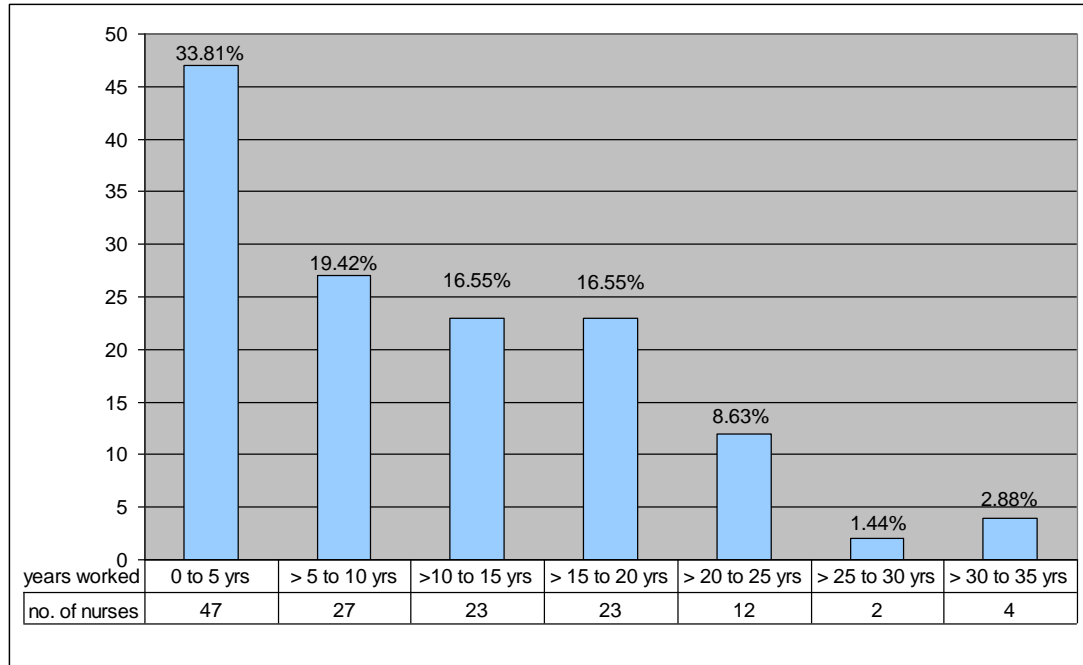
Figure 3.4 Tenure of years worked in module (n=139)

The perception of general health was good with the 59% of nurses scoring their general health as "good" and 31% scoring their general health as "reasonably good" (refer to figure 3.5). The physical fitness levels were perceived to be slightly lower with 29% scoring their physical fitness as "good" and 48% scoring their physical fitness as "reasonably good" (refer to figure 3.5).

perceived level	poor	not too bad	reasonably good	good
☐ general health	1	12	44	85
☐ fitness levels	2	30	69	41
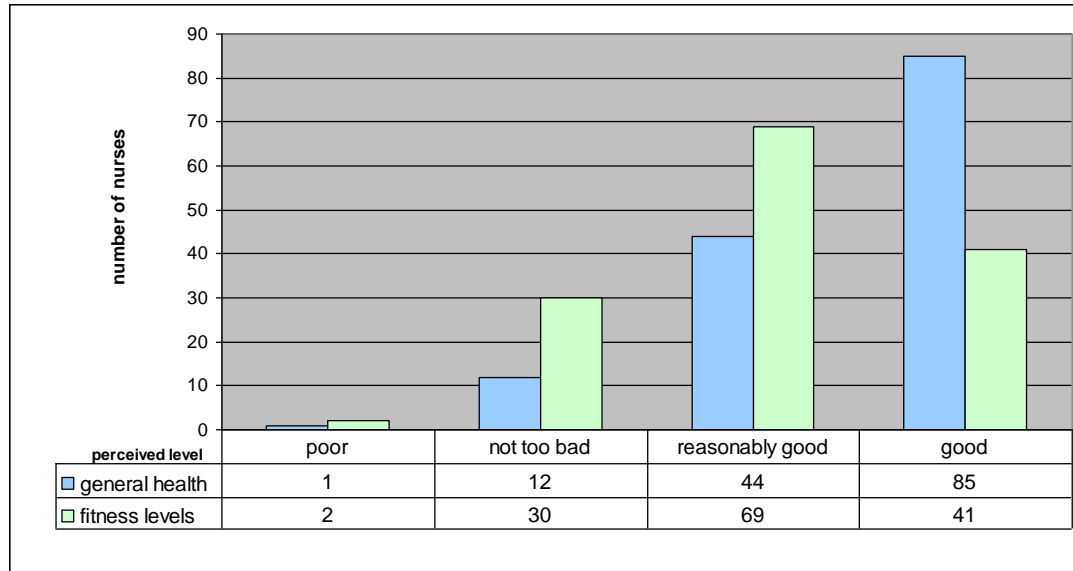
Figure 3.5 Perception of general health and fitness of nurses (n=142)

3.2.2 Areas of Musculoskeletal pain

Musculoskeletal symptoms for the previous 12 months were reported in a wide range of areas by the surveyed nursing staff. Figure 3.6 displays the range and frequencies of musculoskeletal symptoms experienced by the surveyed nurses. The lower back was the area of highest pain prevalence at 44.1%. The neck and shoulder prevalence rates were the next highest and will be discussed in section 3.2.3. The knees (left: 18%, right: 17.5%) wrists (left:14% and right: 12%) and ankles/feet (left: 6% and right: 14%) were other significant where symptoms had been experienced by the nurses in the previous 12 months.
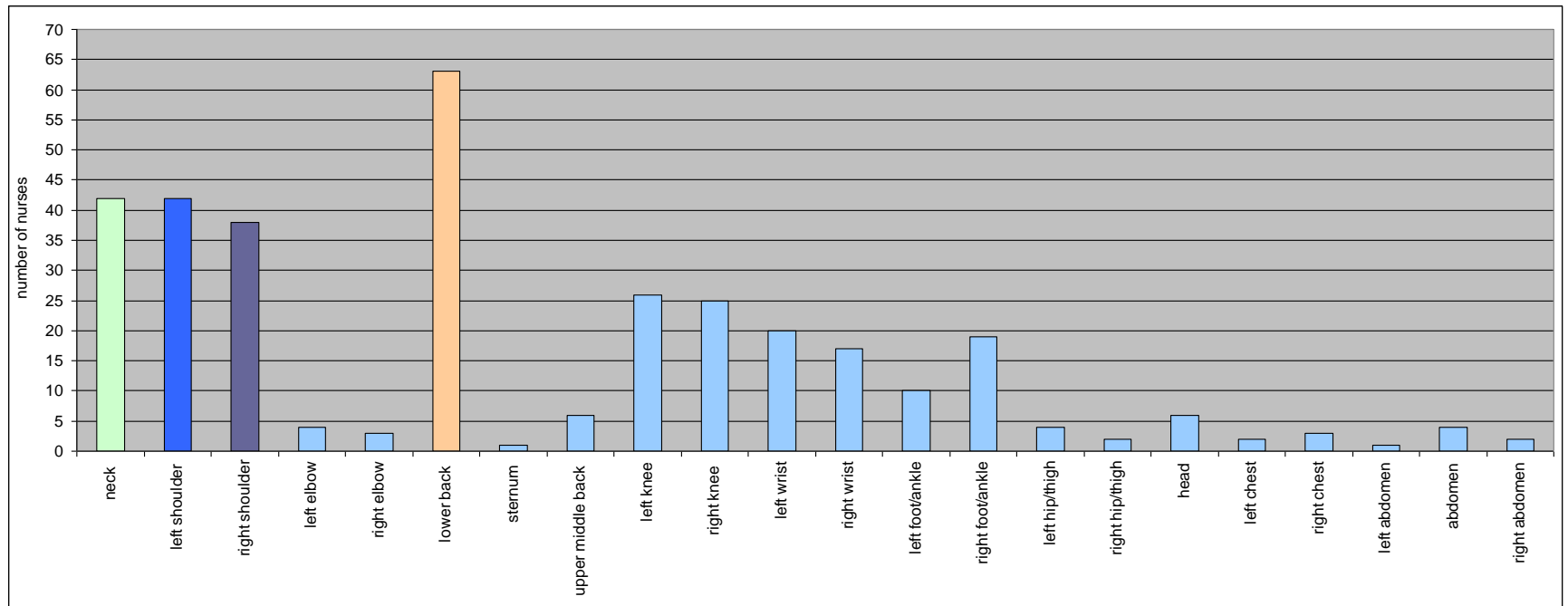
Figure 3.6 Prevalence of musculoskeletal pain: all body regions (n=143)

3.2.3 Prevalence of NSP

The 12 month prevalence of neck symptoms in nurses at TBH was 29%. The 12 month prevalence for left and right shoulder pain was 29% and 26% respectively. The 12 month prevalence of nurses experiencing any shoulder pain was 34% while the 12 month prevalence of nurses experiencing either neck and/or shoulder symptoms was 42.66% (refer to figure 3.7).

	Total nurses	with neck pain	with shoulder pain	with NSP
number of nurses	143	42	49	61
percentage	100%	29%	34%	43%
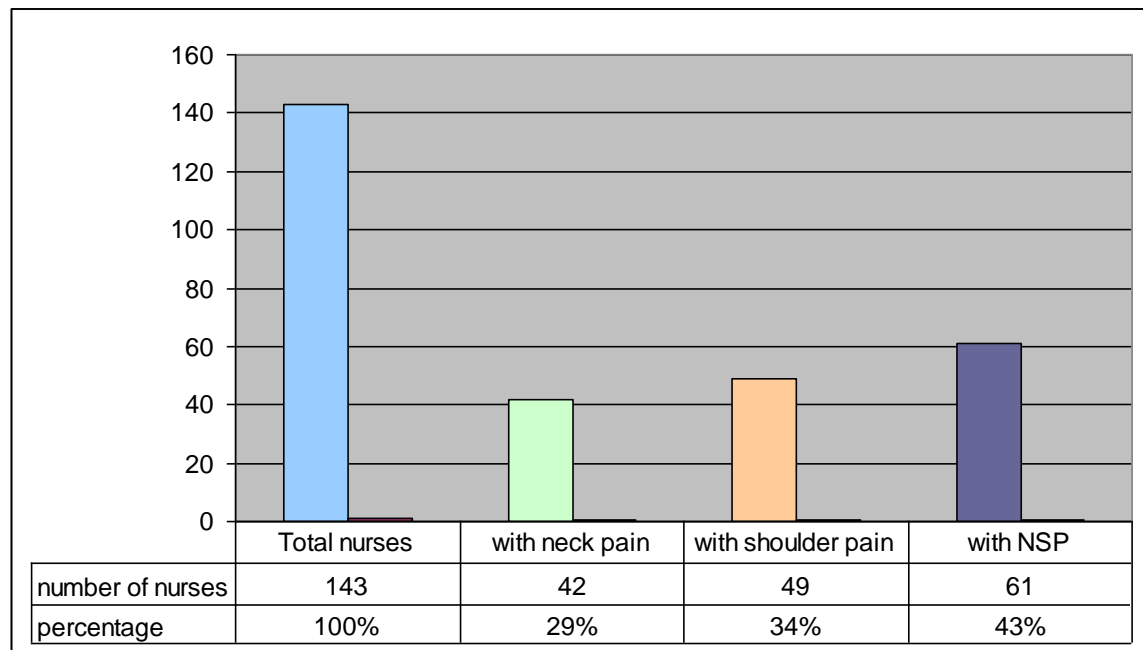
Figure 3.7 Twelve month prevalence of nurses with neck pain, shoulder pain and NSP (n=143)

3.2.3.1 Association of NSP with other areas of symptoms

Associations were sought between the presence of lower back pain, neck pain and shoulder pain using the Chi-squared test. A high association of neck pain with shoulder pain was found (x^2= 18.28, p<0.0001). A very high association was found between neck and lower back pain (x^2= 35.19, p<0.0001). The association of lower back pain and shoulder pain was moderately high (x^2= 4.02, p=0.044).

3.2.4 Risk factors associated with NSP in TBH nurses

3.2.4.1 <u>Association of NSP with age</u>

The association with age and the presence of pain in the surveyed nurses was explored. The nurses were divided into two age groups for statistical analysis with two categorical variables, the first being under and equal to 45 years and the second, over 45 years of age. This enabled analysis using 4x4 contingency tables for the odds of having shoulder or neck pain with age over 45 years. The 45 year age cut off was chosen due to significant findings of associated NSP in age groups greater than 45 in a previous study of pain among nurses (Hou and Shiao 2006). Shoulder pain failed to show any statistical association with age over 45 years (OR: 1.04(95% CI: 0.43-2.43)). Neck pain showed a small but insignificant association with age over 45 years (OR: 1.81(95% CI: 0.76-4.23)).

The odds ratio (OR) of a subject aged over 45 years having NSP is 1.43 (95% CI: 0.63-3.22). This association is statistically insignificant. Figure 3.8 depicts the lack of association with a Gaussian distribution of NSP across the age groups

age groups (years)	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-59
total nurses	7	16	17	35	27	21	12	5
nurses with NSP	2	5	6	15	10	11	6	1
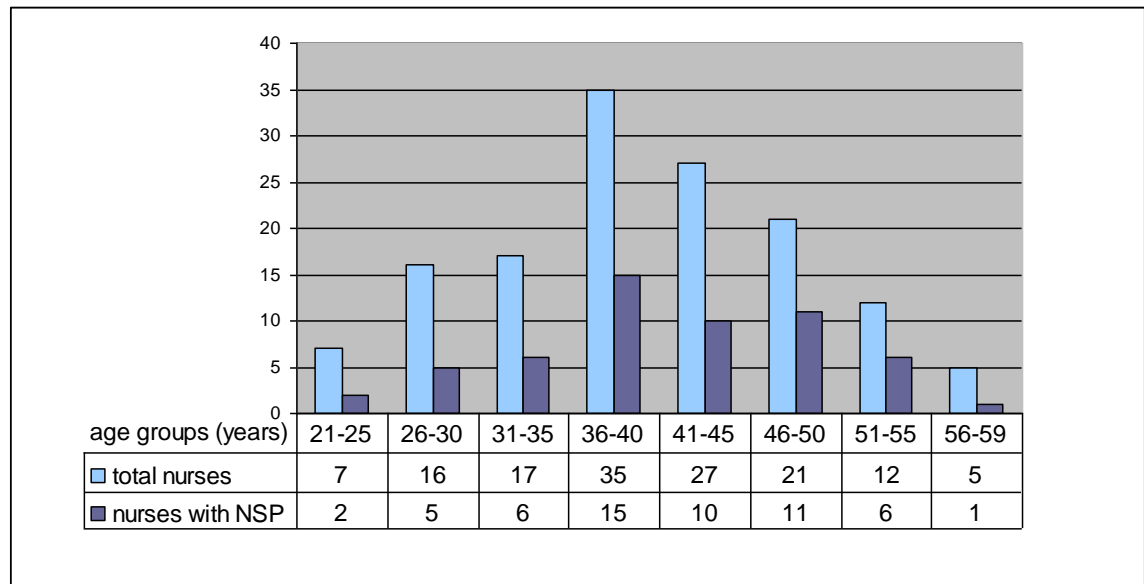
Figure 3.8 Distribution of ages of all nurses compared to distribution of nurses with NSP (n=140)

3.2.4.2 Association of NSP with module

Module and ward was explored as a possible risk association with NSP. Table 3.1 outlines the 12 month prevalence of shoulder pain, neck pain and combined NSP for each ward. Recovery is included in the table below as nurses working in the recovery section of the theatre complex named their module as 'recovery' in the NSPn.

	neuro ICU (n=30)	orthopaedic surgery (n=6)	general surgery (n=24)	recovery (n=6)	theatre (n=57)	obstetrics and gynae (n=14)	internal (n=6)	total sample (n=143)
Nurses with shoulder pain (left or right)	8	2	9	1	23	2	4	49
Nurses with neck pain	10	0	6	2	22	1	1	42
Nurses with NSP	13	2	10	3	32	2	4	66
Percentage with NSP	43.33%	33.33%	41.67%	50.00%	56.14%	14.29%	66.67%	46.15%

Table 3.1 Twelve month prevalence of pain by ward (N=143)

For the following analysis, wards were grouped together into their respective modules to increase the group sizes. Orthopaedic surgery wards were grouped with general surgical wards in the surgical module, whilst recovery ward nurses were grouped with theatre nurses in the theatre module. Neuro ICU nurses were kept as one module. The Obstetrics and Gynaecology ward and Internal wards could not be included in the above modules as the tasks specific to these wards are diverse from the tasks performed in the abovementioned modules. The response from the Obstetrics and Gynaecology ward (n=14) and Internal wards (n=6) were poor which precluded these wards from further analysis of associated risks as the sub-sample sizes were too small. One nurse moved to out patients during the data collection period and hence was not included in analysis.

The total responses from the modules selected for further analysis were as follows: neuro ICU (N=30), surgery (n=30) and theatre complex (n=63). The distribution of neck pain and of any shoulder pain (left or right) across the three modules is represented below in figures 3.9. and 3.10. The

theatre module reported the highest prevalence for both neck pain and shoulder pain. Neck pain prevalence was 38% in the theatre module, 33% in the neuro ICU and 20% in the surgical module. Shoulder pain was more evenly distributed across modules, with prevalence of shoulder pain at 38% for the theatre module 37% for the surgical module and 27% for neuro ICU. No statistically significant differences were found between the ward modules for neck pain and shoulder pain prevalence (p>0.05).
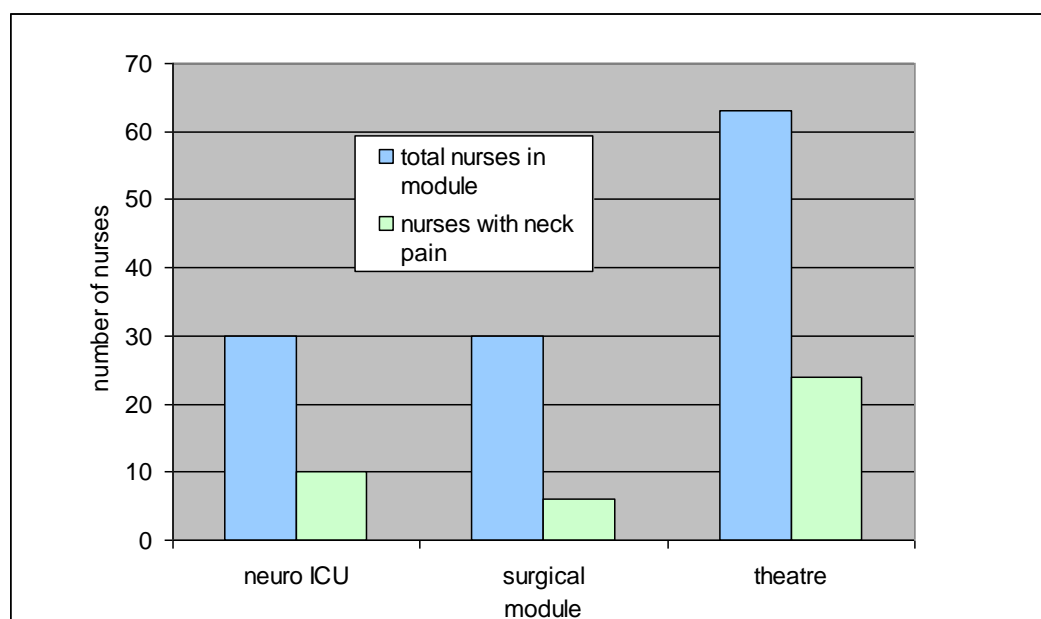
Figure 3.9 Nurses with neck pain in three modules
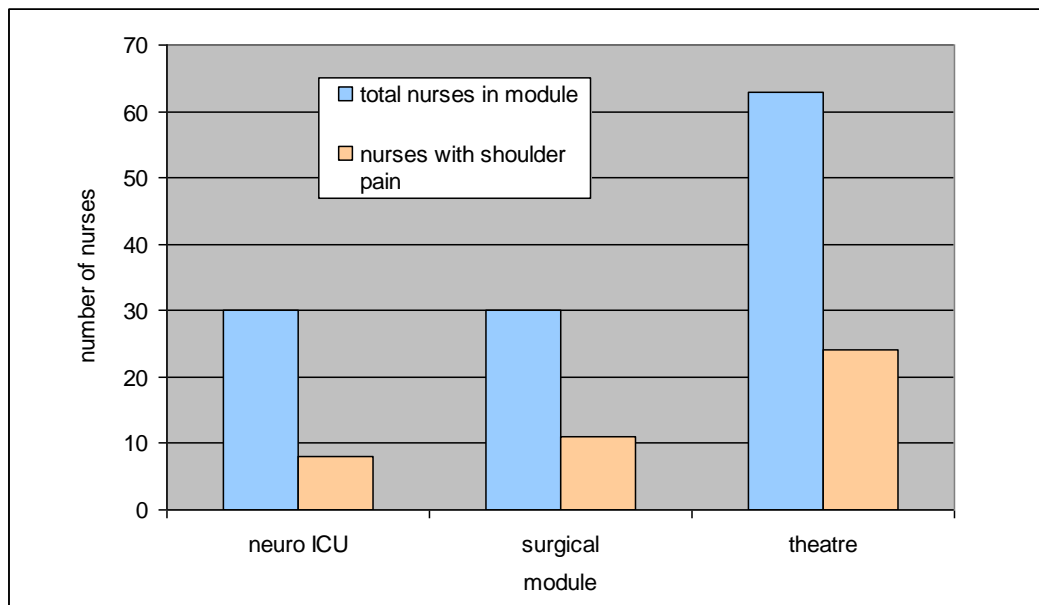
Figure 3.10 Nurses with any shoulder pain in three modules

Due to the high correlation of neck pain with shoulder pain (refer to 3.2.3a), those subjects with neck and/or shoulder pain (NSP) were regrouped for further analysis of the association of NSP with the nurse's specific module. No statistically significant association was found between module type and NSP (p=0.60).

The highest 12 month prevalence of NSP was found in theatre staff who reported a 51% prevalence. Neuro-ICU and surgical nurses reported a 43% and 40% prevalence for NSP respectively (figure 3.11).
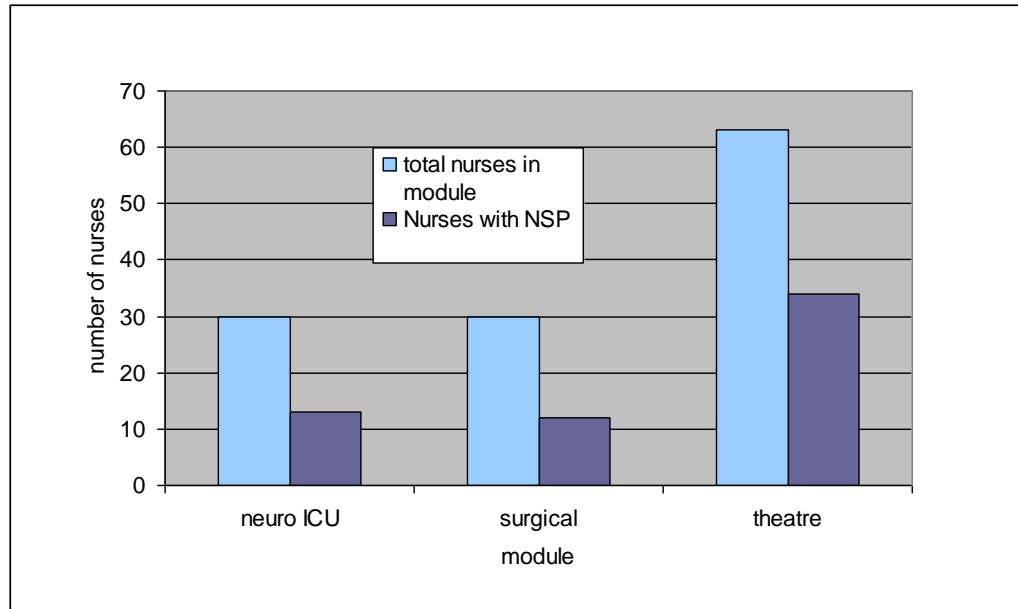
Figure 3.11 Nurses with NSP in three modules

3.2.4.3 <u>Association of NSP with months worked in a module</u>

An association of time worked in a module and NSP was sought using logistic regression analyses. No association was found between neck pain and the months worked by a nurse during her career. A weak association between any shoulder pain and months worked was found (p=0.0282). Likewise, a weak association between any neck and/or shoulder pain and months worked was found (p=0.0282).

3.2.4.4 <u>Association of NSP with perceived general health and level of fitness</u>

The association of the nurses' perception of their general health and fitness with the prevalence of neck, shoulder and NSP was explored using "4x4" tables.

A poorer perception of general health by the nurses demonstrated a weak association with pain. The OR for the prevalence of any shoulder pain in those with scores under four on the Lickert scale for general health (indicating a perception of general health as poorer than 'good') was 2.33 (95% CI: 1.14-4.73). The OR for neck pain in those with scores below four

for general health was 2.28 (95% CI: 1.03-5.08). The OR for NSP in those with scores below four was similar to the neck pain and shoulder pain ratios, at 2.26(95% CI: 1.08-4.46).

Likewise, the perception of physical fitness being less than "good" was mildly associated with pain. The OR for the prevalence of any shoulder pain in those with scores under 4 on the Lickert scale for fitness perception (indicating perception as poorer than 'good') was 2.59 (95% CI: 0.94-2.63). The OR for neck pain in those with fitness perception scores below four was 2.46 (95%CI: 1.03-7.15), whereas the OR for NSP in those with fitness perception below four was 3.16 (95% CI: 1.33-7.97), slightly more significant than shoulder pain alone.

Due to the small sample size, the confidence intervals for the OR's looking for associations with NSP with the perceptions of general health and fitness were large. Hence any potential associations failed to achieve statistical significance.

The univariate analysis of the explored risk associations with neck and/ or shoulder pain are presented in table 3.2.

Risk association	Odds Ratio (95% confidence interval given)		
	Shoulder	**Neck**	**NSP**
Age >45	1.04 (0.43-2.43)	1.81 (0.76-4.23)	1.43 (0.63-3.22)
GH < 4	2.33 (1.14-4.73)	2.28 (1.03-5.08)	2.26 (1.08-4.46)
Fitness <4	2.59 (0.94-2.63)	2.46 (1.03-7.15)	3.16 (1.33-7.97)
	Logistic regression		
Months worked	P=0.028	No association	P=0.028

Table 3.2 Summary of Risk associations

3.2.4.5 <u>Injury and morbidity rate</u>

The prevalence of injury of any area during the previous year was 15.39%. Areas most commonly injured were shoulder (n=5), neck (n=6), lower back (n=7) and upper back (n=4). The condition, 'frozen shoulder' had been experienced by 11 (7.69%) of the sample, whereas 3 (2.1%) subjects had previous upper limb surgery. A cervical disc lesion had previously been sustained by one nurse. The correlations between injury and NSP were not statistically analyzed due to the small number of injuries.

3.2.5 Summary of results of the cross-sectional study

This concludes the results obtained from the cross-sectional study. The overall 12 month prevalence of NSP was 42.66 % in nurses at TBH and the results show no statistically significant associations of shoulder, neck or the combination of neck and shoulder pain with the explored risk factors of age, tenure of work in module, perceptions of general health and fitness, and module type. Neck pain exhibited a strong correlation with shoulder pain as well as with lower back pain in the surveyed nurses from TBH.

A discussion on the findings of this study will be presented in Chapter 5.

Chapter 4

A qualitative study of nurses with NSP:

methodology and results

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The second phase of this study was conducted to qualitatively assess the perceptions of TBH nurses regarding the experience of NSP and risk associations with NSP. While the quantitative study aimed to report the extent of the NSP problem, this part of the study aimed to illuminate the pertinent issues related to NSP according to TBH nurses. This chapter outlines the methodology and the findings of the qualitative study.

4.1 Methodology of qualitative study

4.1.1 Research aim

The aim of this study was to gain an understanding of how the nurses with NSP at TBH experience their pain. The secondary aim was to determine and understand the nurses' perceptions of the risk factors associated with their NSP.

4.1.2 Research questions

The grounded theory approach (Chiovitti and Piran 2003), allows the responses of research participants to guide the research process. It does not intend to test a hypothesis (Glaser 1978). The initial analyses of data lead the researcher to ask the following questions:

- How do the TBH nurses who suffer from NSP experience working with their pain?
- How do the TBH nurses view their workplace and its contribution to their pain?

4.1.3 Objectives

The following objectives emerged during the initial data analysis of the first two interviews:

- To explore the experiences and beliefs regarding pain, wellness and illness among female nurses at TBH who have NSP.
- To explore female TBH nurses' opinions about the workplace's role in the development or aggravation of NSP.
- To elucidate the perceived risk associations with the onset of NSP in female nurses at TBH.

- To elucidate the perceived risk associations with the aggravation of NSP in female nurses at TBH.

4.1.4 Study setting

The study was undertaken entirely at TBH, a large tertiary academic hospital in the Western Cape province of South Africa.

Single interviews were conducted in staff rooms in various TBH wards, within which the respective interviewees worked. In order to maintain confidentiality, each subject was interviewed by the researcher in a staff room unoccupied by other nurses. If the staff room in the ward was unavailable, then the interviews were conducted in a private room in the physiotherapy department of TBH.

4.1.5 Study design

A qualitative design utilizing the grounded theory approach was used. This approach has been suggested for areas of social science where little or no research has yet been conducted (Glaser 1978, Glaser 1992, Chiovitti and Piran 2003).

Despite a moderate base of epidemiological research available on NSP in nurses worldwide, little is known about the personal experiences of nurses suffering from NSP. Furthermore, minimal epidemiological research of NSP in nurses in a South African context has been performed. No published qualitative studies of NSP in nurses emanating from a South African context were found in searches of indexed databases up till September 2009. Semi-structured interviews were led with individual nurses. In keeping with the grounded theory approach, the researcher developed the semi-structured interview on the basis of the most salient emerging themes (refer to appendix L) of the first two interviews. Hence the initial data analysis of the first two interviews led to the collection of

further data, which in turn served to enhance the understanding of the initial findings (Chiovitti and Piran 2003).

4.1.6 Research team

- The researcher invited the nurses to be interviewed, made appointments for the interviews, conducted the interviews, and undertook the analysis of the data

- Linzette Morris (LM), a researcher in the Division of Physiotherapy acted as the observer during the initial interviews in order to take notes of non verbal communication and to validate the transcriptions

- Jenny du Plooy (JdP) acted as an observer and transcribed the recorded interviews.

- Mrs Lynette Crous (LC) assisted with the data analysis.

- Suzelle Moolman (SM), an Occupational therapist checked the accuracy of translation of the quotations used in the presentation of findings.

4.1.7 Subject selection, recruitment and sample size

Purposive sampling was employed in the initial selection of participants for interviews. The selected nurses had experienced NSP over the previous 12 months as indicated by their responses in the cross-sectional study. A further selection criterion is outlined in section 4.1.8.

Twelve nurses were contacted telephonically and invited to participate in the study. Appointments were made for the interviews at a time suitable to the participant and researcher. Arrangements were made to meet the nurse in the ward staff room. If the staff room was occupied, then interviews were conducted in a private consulting room in the Physiotherapy Department at TBH.

The researcher anticipated that a total of seven to ten nurses should be interviewed, the purpose being to reach saturation point where no further themes would be introduced (Coyne 1997). According to the grounded theory approach, the number of participants interviewed is directed by the data analysis (Glaser 1978). In grounded theory, selection of participants continues after data analysis has begun and as new themes emerge during analysis.

During the initial data analysis of the first two interviews, it emerged that theatre nurses have different concerns to ward nurses. In order to ensure the diversity of findings in line with theoretical sampling (Glaser 1992), three additional theatre nurses were contacted. The theatre nurses gave telephonic consent to be interviewed but were repeatedly unable to keep their appointments due to their unpredictable work schedules. Ultimately, only one theatre nurse was interviewed.

Ultimately, a total of eight nurses were eventually interviewed.

4.1.8 Sampling criteria

4.1.8.1 Inclusion criteria

The nurses invited to attend the interviews were selected from the nurses who had completed the NSPn in the epidemiological study. The nurses who were invited to be interviewed fulfilled the following criteria:

- Nurses who had worked in the same module for the past 6 months
- Nurses who were able to speak and understand English
- Nurses who had worked full time for the previous 6 months in the ward in which they were currently working.
- Nurses that were 18-55 years old.
- Nurses of various ranks, including professional nurses, sisters-in-charge, nurse auxillaries and staff nurses.

- Female nurses who had experienced neck or shoulder pain or neck and shoulder pain in the previous 12 months. Only female nurses were selected in accordance with the study performed by Wiitavaara, Barnekow-Bergkvist and Brulin (2007) who selected only female nurses, in order to compare the female nurses experiences with a previous study on male ambulance workers. A homogenous group regarding gender allows for a detailed qualitative analysis from a female perspective, without confounding related to gender differences.

- Nurses who worked in the neuro ICU, theatre complex, internal or surgical wards at the time of the study

4.1.8.2 Exclusion criteria

The following nurses were excluded from the qualitative study:

- Nurses who had worked in a full time job other than nursing in the previous 6 months

- Night staff as it was not possible to interview night staff during work hours when both the observer and lead researcher were available.

- Nurses with a diagnosis of fibromyalgia or other chronic disease (Wiitivaara 2008).

4.1.9 Duration of stage two

Interviews took place during the months of September and October 2009.

4.1.10 Study instrumentation

Semi structured interviews were conducted. These included both narrative and reflective questioning. The first two interviews began with open ended questions, allowing the participant to dictate the course of the interview with minimal interference from the researcher. In this way, theoretical sensitivity was attempted, whereby the researcher begins the study with few pre-determined ideas (Wiitavaara, Barnekow-Bergkvist and Brulin

2007, Coyne 1997). The most salient 'phenomenological' themes raised in the first two interviews formed the basis for the development of the semi-structured interviews which took place in the next six interviews. Subjects were asked to relate their story regarding their NSP. They were asked how they felt about their present condition, what they feel caused or aggravated the problem, and whether their work environment affects them. Refer to appendix L for an outline of the interview structure. The translation of the questions into the Afrikaans language is included. A flow chart (Figure 4.1) is given to summarize the study instrumentation and data analysis.
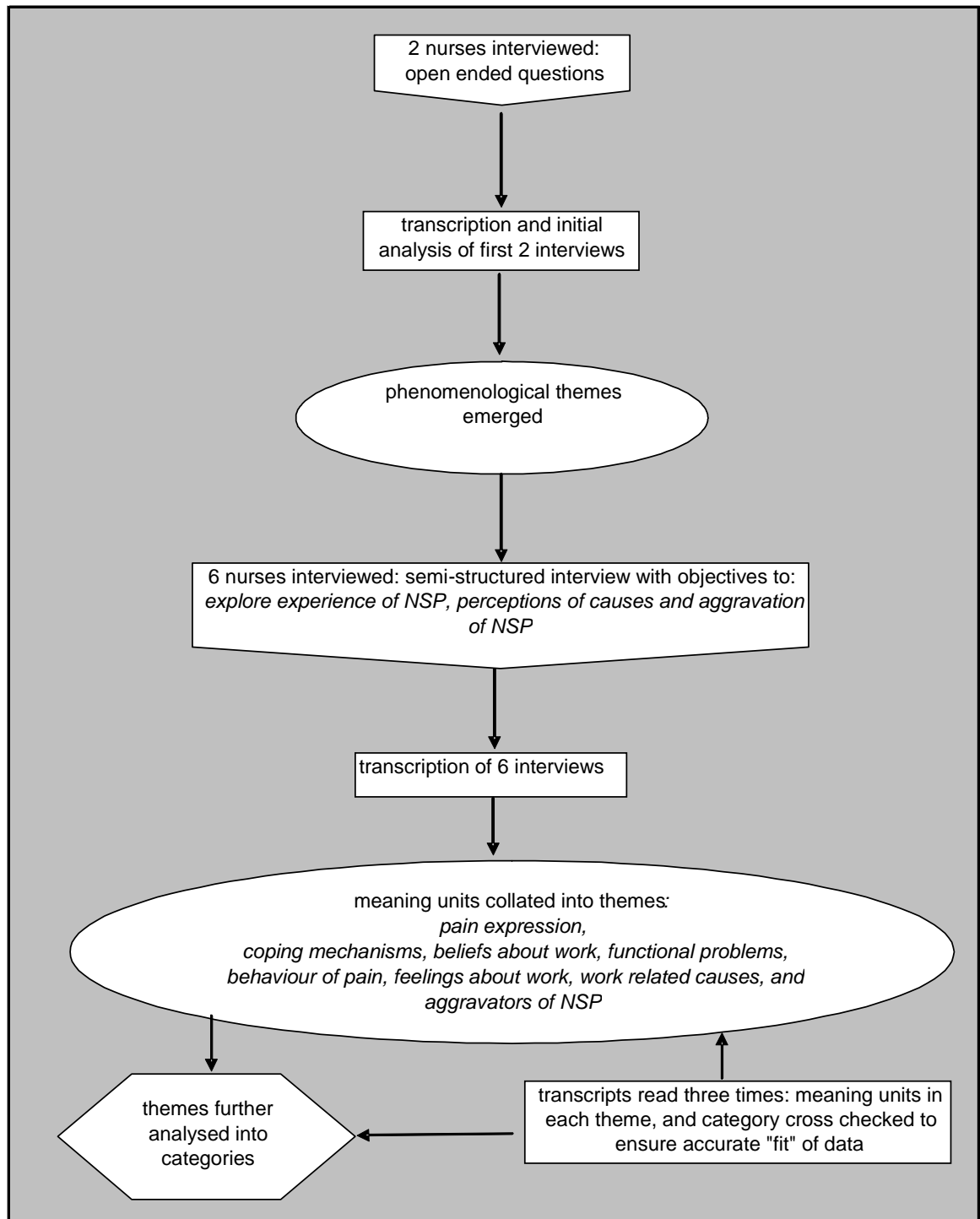
Figure 4.1 Flow chart of the qualitative study: data capture and analysis

4.1.11 Data Collection procedure

The interviews took place during tea or lunch breaks, at a time convenient for the participant and the ward in which she worked. The researcher gave an explanation to each participant as to the purpose of the research and the confidentiality of the interview. The researcher informed the participants that the interviews were to be recorded and stressed that their participation was voluntary, as was the choice of experiences to be communicated (Wiitivaara 2007). Each participant received a letter outlining the research aims and process and was asked to sign a consent form giving their written informed consent to be interviewed. Copies of the letter and informed consent form can be found in appendices J and K.

An observer (LM), fluent in both English and Afrikaans accompanied the researcher to three interviews. The researcher led the interview and the observer remained quiet while taking notes of the participant's answers and related non-verbal communication. The duration of each interview was approximately 30-40 minutes. The interviews were recorded with a small unobtrusive dictaphone fitted with a counter facility and operated by the observer. The observer (LM) gave the researcher feedback after the first two interviews regarding ambiguities in the researcher's questioning during the interviews. The observer (LM) was present in the third interview to monitor the first semi-structured interview. The feedback from the observer (LM) after the third interview guided the application of the questions for the subsequent semi-structured interviews.

The transcriber (JdP), who was fluent in both English and Afrikaans, acted as the observer for the remaining five interviews.

All the participants were encouraged to answer the questions in the language of their choice. Seven of the eight interviews were conducted in Afrikaans. All the participants, the researcher and both observers were

bilingual in the Afrikaans and English languages. Hence English was often interspersed in the discussion when the participant chose to add expression to their mother tongue comments as is the usual trend in South African speech. One interview was conducted predominantly in English.

4.1.12 Data capture

The voice recordings of each interview were transcribed verbatim by JdP within days following each interview. This ensured early analysis of the initial two interviews. The observer's notes were used to assist the transcriber when the voice recordings were unclear which ensured the accuracy of the transcription. The observer (LM) discussed her notes with the researcher after the initial two interviews to ensure the researcher understood the notes. The recording of interviews diverges from the purist approach to grounded theory which suggests that no notes or recordings are taken by the researcher during interviews (Glaser, 1978). However the recordings were justified as the researcher is a novice of the grounded theory approach. Recording the interviews enhanced the accuracy of data collection and allowed for early and repeat analysis of the emerging themes.

4.1.13 Data Analysis

The analysis was conducted in accordance with Glaser (1978) and Glaser (1992). The concepts of fit, emergence, work, relevance and modifiability which underpin the grounded theory approach were applied in the data analysis (Glaser 1978).

Three questions guided this process. These were, "What are the data a study of?"; "What category does this line or experience indicate?"; "What is actually happening in the data?" In other words, "What are the participants experiencing and how are they coping with it?" (Glaser 1978). In keeping with the guidelines given by Chiovitti and Piran (2003), the interviewed nurses dictated what was explored by the study.

The first two transcripts of the interviews were read several times by the researcher. Notes were made in the margins of each transcript in order to identify important emerging phenomenological themes. These notes were then gathered in a separate document and categorized into different types of information, for example, work stress, lifting tasks, the influence of home environment and the beliefs about pain. New questions which arose as a result of preliminary analysis of the initial two interview transcripts were used in subsequent interviews. The researcher continued the process of note taking and identification of 'meaning units' during subsequent interviews and the analysis thereof. The meaning units were then collated under themes. A supervisor (LC) discussed the findings with the researcher and assisted in defining the most salient meaning units and categorizing them into themes. The meaning units within themes were then compared with one another and grouped into emerging categories. Meaning units across themes were cross checked to ensure an accurate interpretation and categorization (the 'fit') of the data was achieved (Glaser, 1978) (refer to appendix .M).

To enhance the rigor of the data, phrases used by the participants were used to name certain categories (Chiovitti and Piran, 2003). The researcher translated the Afrikaans phrases into English before they were used to define categories. A first language Afrikaans speaker (SM), an occupational therapist, checked the translation and interpretation of the English translations. The use of participant's words in the analysis and modeling of a qualitative theory is recommended as a method to improve the rigor and of the study design and relevance of the findings (Chiovitti and Piran 2003). The frequency of nurses' comments pertaining to a category was recorded. This enhanced the generalization of the most salient themes and opinions.

Once each transcript's margin notes were categorized by the author, all the original transcripts were read a second and third time in order to ensure that other important information had not been excluded, and that no further themes or categories could be extracted from the data. The researcher felt that saturation was reached when no additional information regarding the main themes for module based (not theatre) nurses emerged (Wiitavaara, Barnekow-Bergkvist and Brulin 2007) (refer to figure 4.1 for a summary of the qualitative study process).

The relationships between the categories emerged when the data analysis was completed. This enabled the interpretation and collation of the data into a model of wellness and illness amongst nurses with NSP. Secondarily, the perceived risk associations with the onset and aggravation of NSP were elicited and interpreted.

4.2 Results of qualitative study

Semi-structured interviews were conducted with eight female nurses. The interviewed nurses' ages ranged from 32 to 54 years. Seven of the participants worked in the modules with the highest response rates to the questionnaire in the cross-sectional study (theatre, neurological ICU and surgical wards) (refer to table 4.1).

Subject ID	Age	Ward	Rank
1	38	ortho surgery	RN
2	54	ortho surgery	AN
3	52	theatre	RN
4	32	ortho surgery	RN
5	45	internal	RN
6	37	neuro ICU	AN
7	51	neuro ICU	RN
8	44	neuro ICU	RN
(key: RN: registered nurse; AN: Auxillary nurse)			

Table 4.1 Description of participants

The nurses did not perceive their neck pain and/or shoulder pain as a purely musculoskeletal complaint. The discussions developed into explorations of their sense of wellbeing or lack thereof as a result of pain. The nurses experienced an internal dissonance due to the conflict between their identity as a nurse and their identity as a person with NSP. The nurses experienced difficulty pinpointing the exact causes of pain, but could more readily elicit factors which caused them stress. They tended to use the term 'stress' synonymously with pain. The following qualitative findings describe these experiences of wellness and illness of nurses with NSP as narrated by the participants.

4.2.1 Experiences of nurses with NSP

The analysis revealed that the nurses are exposed to conflicting influences. They perceived pain but the processing of the pain was affected by their thoughts and beliefs as nurses. This conflict influenced the manifestations or consequences of their pain.

The conflict between the nurses' beliefs of what is expected of a nurse to feel and their personal subjective perception of pain emerged as an important recurring theme. This conflict led to numerous consequences for the nurse suffering from NSP. These consequences included the nurses' outward expression of pain, coping mechanisms, functional problems and the opinions about work.

The consequences of pain were the result of both cognitive processing and emotional engagement with the pain. Expressions of pain resulted from emotional engagement, whilst functional problems and related opinions stemmed from a cognitive engagement with their NSP. Coping mechanisms were utilized by the nurses as combination of emotional and cognitive engagements with pain. For example, taking medication was a cognitive coping mechanism operating at a conscious level. However, 'shifting the pain behind you' was an emotional engagement with pain often at a sub-conscious level. The emerging themes and categories are represented by the model depicted in figure 4.2 and will be discussed in further detail from page 104 onwards.

Beliefs as a nurse

	f
* can't stop your work	8
* patient comes first	8
* expected to be well	4
* identity as a nurse	3
* fear of not reaching 50	2
* thinking about pain will make it worse	1

Perception of pain

	f
* irregular pain	5
* constant pain	2
* variable distribution	2
* gradual onset	2

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Experiences of wellness and illness among nurses with NSP

Consequences

Coping mechanisms

	f
* medication	8
* dream of a better work environment	5
* work despite pain, feel it at home	5
* shift the pain behind you	5
* family support	5
* seeking help	4
* delay request for help till severe	3
* reduce activities outside work	3
* active self help	3
* spiritual help	2

Expressions of pain

	f
* internalise(frustration, anger, self-pity)	5
* don't show it on your face	4
* sense of hopelessness	4

Functional problems

	f
* washing clothes	1
* pulling out drips	1
* hanging washing	1
* carrying shopping bags	1
* reduced sleep	1

Opinions about work at TBH

	f
* factors 'from above' are out of our control	4
* too high patient to permanent staff ratio	4
* poor co-operation of the nursing team	2
* still happy to be a nurse in this ward	1

Figure 4.2 Consequences of pain in nurses with NSP

(f=frequency of comments)

4.2.1.1 Beliefs about work as a nurse conflict with the perception of NSP

Nurses were acutely aware of their responsibility and identity as care-givers and nurses:

> "I'm a nurse and that takes priority"

They strongly believed that a nurse could not stop her work, even when she experienced pain:

> "Bottom line is that you must work and you don't have a choice".

> "You must go on as if its normal, meanwhile you have pain".

The nurses' perception of the expectations of patients and colleagues strengthened this resolve:

> "You must try to keep the patient satisfied … so that they don't realise there is a problem with you".

> "I don't talk so easily, it's difficult. Look, you try to be this perfect person that people can see, "but she can deal with problems". So you try not to talk, because you are scared that if you do, people will think that you can't handle things and so you try to find a solution for yourself".

The belief that nurses could not stop work and should find their personal solution to the pain empowered the nurses to continue working while putting the pain aside. They acknowledged that pain makes it difficult to work but they chose to carry on:

> "It means that you feel sorry for yourself, because there is work to do and you can't do it. It's not comfortable for you to do it. Immediately that feeling leaves you because it's not appropriate, it isn't appropriate for a nurse…. you decide to focus"

The nurses were self sacrificial as demonstrated by their understanding of the balance between patient care and self care: there was a unanimous agreement that the patient takes priority. For one subject this was mentioned in the plural:

"We say that the patient comes first".

The third person pronoun was used by another subject:

"As they say, the patient always comes first".

In keeping with the belief that the patient comes first, any pain that may surface during their work is shifted to their subconscious.

"Patient care is important for me at that moment. My own needs are placed far behind me."

"At that stage when you are going around patients, then you get it right (to hide pain away). When your patients are done, then you remember, "I have actually got neck and shoulder pain". While you are busy, your deep problems, your neck and shoulder pain, are not on the foreground, it is not there, it is now the patient that is important. Patients don't expect nurses to have a problem. …"

The nurses' neck and shoulder pain or their "deep problems" as described by the participant in the previous quote, are a real and regular influence on their wellbeing. Most nurses described an insidious onset of irregular pain which varied in its distribution, but had progressively worsened over time.

"insiduous onset more on the right side of the neck, getting worse the past year"

"Begins with neck pain and one shoulder and then spreads to the other side with time"

One nurse perceived that her longstanding pain had developed into a constant pain.

"It is a constant pain as if it eats into my shoulder".

The data suggests that the 'pain of NSP' influences the nurses' wellbeing. Yet, their beliefs regarding their identity as nurses have a strong influence on their expression of the pain during the performance of patient care.

4.2.1.2 Coping mechanisms versus the expression of pain

Nurses expressed a wide range of coping mechanisms which allowed them to temporarily resolve the conflict between the subjective experience of pain and their beliefs. Coping mechanisms hence moderated the acuity of their expression of pain. This section presents the data exposing the various coping mechanisms expressed by the nurses.

As mentioned previously, the nurses' strong sense of identity and beliefs as nurses helped them to shift the pain behind them. A coping mechanism used by all eight of the nurses was to 'not think about pain', to 'push the pain to the subconscious mind'; to 'get on with the work' to be done and keep busy.

"I will handle it on my own step by step".

"But I go on in the end. If I go and sit as we sit here now, with pain, then I think of a stack of things and then it worsens in the end".

"The more I think, the worse the pain gets and then I try to say to myself, "Stay calm, breathe deeply," and so on. Look, we are in nursing and so we know what sort of load comes with pain…. But I try not to be alone, as I say, if I am alone then I think a lot of things and that makes the pain worse."

All the participants used self prescribed or prescribed pain medication to 'shift the pain' behind them.

> "You work with the pain, we all complain now of our pain. I take a pain pill now and again if the pain is really bad. But one doesn't feel you can drink pills all the time, and then when I get home tonight, I'll drink a pill again for the sleep, a Voltaren or a Brufen that I got at the doctor."

Shifting the pain behind them at work tended to magnify the pain at home. When at rest after a day's work, the nurses' pain made itself apparent. The nurses related the need to cut back on their social and home activities due to the pain:

> "You must rest a bit (at home) if you keep yourself busy at home with washing, then the pain will stay there. I sometimes leave the sweeping and vacuming for a while".

> "You feel that you kind of neglect yourself. How you can make up for it is when you are off duty. I can give myself a bit of attention by relaxing a little although relaxing may mean that I scale down a bit socially due to the neck and shoulder pain".

Dreams of a better working environment helped five nurses to cope with the threat of pain. However these dreams competed with a sense of hopelessness when the options for change appeared sparse.

> "You would never get a lighter job at TBH. If it was possible then I would work at the clinics ….where you don't do any lifting."

Despite the numerous coping mechanisms, the nurses expressed an underlying fear of severe injury or early retirement that they seemed unable to counteract.

> "We are so afraid that we won't make fifty."
> "As a nurse, my work must go on, but I am a bit afraid, nurses have previously come to lay in my own ward with back injuries. So one is just afraid".

The participants were reluctant to seek a doctor or physiotherapist's help with the initial onset of the pain. They would rather first consult their family support:

> "You don't show your emotions, or pain or tiredness to those around you at work, but you can at home"

They were able to ask help from their colleagues, but only after the pain had developed.

> "In the past if you wash the patient you have to turn the patient but now (that you have pain) you ask for help."

Only if the pain became severe or ongoing, would they consider consulting a medical practitioner or physiotherapist's help.

> "Its now three weeks that its like this, now with the busyness, its going to get worse, then I must go to my house doctor, she must then refer me to physio".

One nurse mentioned a spiritual source of strength, while others implied that they found help from 'above'.

> "I close my eyes and ask the Lord for strength, but then we must go on".

Their occupations as nurses influenced a few participants to search for medical causes of their pain, despite evidence for other more plausible causes of pain such as musculoskeletal overload or stress. They underwent medical tests to exclude Tuberculosis or a Cerebrovascular incident, before recognizing their pain as a physical symptom associated with psychosocial stress.

> "My house doctor showed me on a chart and told me "there's your pains" but I would not believe him until I had all the investigations and then when everyone said it was stress, then I had to accept that it was stress. It comes still when the pressure gets a bit too hectic, then I feel it here, down in my shoulder". (referring to left deltoid and upper arm area)

The nurses consistently mentioned frustration, anger or self-pity as emotional expressions of pain. However, they were unanimously clear that one shouldn't "show it (pain) on your face":

> "I feel frustrated… you still have to do what you need to do: that makes you feel frustrated sometimes and it makes you feel incompetent or like you can't do your best actually".

> "You actually feel sorry for yourself, frustrated, you wish you were in another position. Talking specifically of when there are pains in the neck and shoulder…"

> "When I don't feel good, I am not a person who complains or who shows it on my face, but at the end of the day, you

are tired and exhausted, understand me, this is what puts you off a bit".

Despite the severity of pain, many sought to internalize their emotions, and undermined the effects of NSP on their emotional state.

"The pain is not so very bad yet that it makes me emotional. You have terrible pain, you feel you must put your head down now, but it doesn't make me emotional or depressed because I don't want to be like that".

However hiding the pain had limits for one nurse when disuse took its place. Subconscious avoidance of pain altered the use of her right arm.

"Later, it (the pain) hindered my movement, but I just did everything with my left hand"

4.2.1.3 Functional Problems as a consequence of NSP

Interestingly, functional problems as sequelae of NSP received less attention during the discussions than emotional or stress related problems. Most of the functional problems were experienced during activities outside of work, for example, washing clothes or carrying shopping bags. One of the neuro I.C.U. nurses complained of discomfort when pulling out drips from the drip dispenser, which is above shoulder height. One nurse noted that her sleep was affected by her NSP.

4.2.1.4 Nurses' opinions about their work situation at TBH as a consequence of NSP

The experience of working with NSP influenced the nurses' opinions about their work situation at TBH. The nurses expressed strong opinions about the management at TBH and the lack of solutions offered for the shortage of staff and equipment. They frequently reported that factors "from above" were out of their control, but despite this the nurses had to continue to give their best to the patients.

> "…I regularly tell the nurses that we are angry over a lot of things. We are angry about the long hours, we are angry about the stack of pressure from above, but we can't take it out on our patients. We must go on giving our best and we must think about why we came (to work as nurses)".

> "Definitely not (enough staff) but this is something which we can do nothing about. It's in management's hands".

> "Today there are lots of moonlights, tomorrow there are few, then no-one pitches up. There is no change, we remain too few".

> "We have asked now for how many years for our wish-list…we need the bedslide which you put under patients which is really not expensive."

> "Now with the large patients you must go and ask two nurses to come help quickly, then there is just the old sheet which you can use , there is not a slide or a lift or anything (to help move the patient)."

The nurses had made requests for help in the form of better staff to patient ratios and the correct classification of their wards but they claimed their requests remained unheard.

> "At the moment, we are two sisters with two permanent people on one shift and the other are students, so if there aren't students around, then its just us that must carry on….but there is nothing we can do about that".(registered nurse from internal ward, which has 30 beds)

> "We have level three patients which are specialized so we expect to have a ratio of one nurse for three patients".(registered nurse from internal ward, which has 30 beds)

> "*if* its an ICU then it must be one sister to two patients, now we are actually one sister with three patients…..we have been fighting all the years to be classified as an ICU because we do have ventilators…..we can treat ICU patients but its not an ICU!" (a sister from neuro ICU, working in the high care section with 10 beds)

One nurse implied that there were no options for lighter work at TBH :

> "It will not happen at Tygerberg hospital that you get lighter work"

The lack of options led to a sense of hopelessness that nothing would change in their work environment.

4.2.2 Perceived causes of initial NSP

The influence of work on the NSP was cited by all but two nurses. Stress was the most prominently cited, whilst a variety of patient handling tasks or situations were given as causes of the nurses' NSP. External causes were mentioned by two nurses, one being a stressful time with a teenager and another, a motor-vehicle accident.

Stress was a subtle but important cause of NSP.

> "It was a long time ago, can I remember now, I think it was more stress relating, it's more on the right side. I can't remember a specific time it started."

> "It began to feel tender, and I took it as stress related".

The handling of patients was a prominent factor in the cause of NSP. Six nurses were unaware of an incident which caused their pain. These nurses became aware of the neck and shoulder pain either when it curtailed their home activities or at the end of a long day at work. Pain had crept up on them unobtrusively and they retrospectively assessed its cause as related to a manual handling incident or a stressful day (Table 4.2).

> "We work with very restless patients, big heavy patients which always need back and pressure care, then you must get the patient out sitting. I just felt when I got home that my neck felt so sore."

Repetitive work such as handling theatre packs by theatre nurses was a cause of NSP for one nurse.

There are few categories of causes of pain. The nurses found it difficult to recall specific incidents or a time of onset of pain. Table 4.2 summarises the perceived work-related causes of NSP experienced by the participating nurses.

categories	examples	f
Stress of work	" I went through a stress".(S5, S7, S8, S1)	4
	" the caring of patients puts a bit of stress on you" (S2)	1
Handling of patients	"while we were busy with the back and pressure care of patients".(S2,S6)	2
	"turning neck patients" (S4)	1
	"incorrect manual handling, trying to turn the patient on their own" (S5)	1
	"hastiness"(S5)	1
	" restless patients" (S6)	1
	"putting patient out in a chair" (S6)	1
	"pulling patients up in the bed" (S6)	1
Handling equipment	"moving the theatre packs"(S3)	1

Table 4.2 Work related causes of initial onset of NSP

4.2.3 Perceived risk associations for the aggravation of NSP

The analysis of narratives revealed the extensive but interlinked issues perceived by the nurses that aggravate their NSP. These aggravating issues were categorised into staffing issues, ward organization, the handling of equipment, the handling of patients, the personality of the nurse and stress (refer to table 4.3).

Factors pertaining to staff (number of staff on a shift, absenteeism, permanent versus temporary staff and to staff: patient ratio etc.) rather than manual handling issues appear to be prominent aggravators of NSP (refer to table 4.3). When manual handling issues were raised, these were usually present due to the underlying issue of staff shortages. A lack of staff available to do the job in an ergonomically correct way rendered it impossible for nurses to complete their tasks without putting themselves or their patients at risk.

> "Look, there is a six bed trachea room. I work lots on that side, that's where I hurt myself more because we are also few on that side."

> "Often you say to one, "Wait till there are enough hands, but then she is in a hurry and tomorrow she complains of back pain and so on."

> "Look, you must turn the patients every four hours, then sometimes the patient is so obese and there are just three of us, then obviously we won't be able to handle him. Now we must phone for extra help and they have an excuse. In the end, the patient suffers through this because the patient

> must lie and wait for an extra hour until someone is available."

> "The workload is very heavy you know its not always the case but certain days its worse then other days …but now its pouring with patients, because the ward is full, full, full."

A concern for three subjects was the handling of the hospital beds. They claimed that the moving of beds aggravated their pain. The beds' wheels needed oil, making the beds difficult to move. The foot end of a bed needs to be elevated for patients with certain orthopaedic conditions. The nurses in the surveyed orthopaedic wards had to elevate a bed by lifting the foot end and placing it onto two wooden blocks. This activity aggravated NSP for one participant. Despite the difficulties using the beds, the nurses with NSP did not stop performing these tasks as there was no other support staff available to help them.

The aggravation of NSP associated with handling patients was influenced by the lack of team involvement in patient handling. Three participants mentioned that turning patients aggravated their NSP. In the past, turning teams were in operation in TBH, whereas presently the nurses turn their own patients since the dedicated 'turning teams' were disbanded. None of the participants used hoists as they did not have hoists available in their wards. One nurse had never been exposed to the concept of a hoist. On questioning the nurses regarding other assistive devices, two claimed that a 'sliding board' was only available in recovery and radiology. In the absence of assistive devices, the nurses were aware that they should work together as a team to move patients. However, other members of the team were not always available to help. Hence, the aggravation of NSP due to patient handling was closely associated with the increased workload that ensued as a result of staff shortages.

"Where you may be only one sister, having to turn all six neck patients alone, at the end of the day when you go home, then you feel you have pain in your feet and your shoulders pain."

"…especially in the turning of patients. In the past, they had turning teams which came to turn the patients every 4 hours or so. I think that's where the problem came in, when they cancelled that."

Apart from the abovementioned factors, the nurses were often unaware of the aggravating factors for their NSP.

"I am not sure (what aggravates the pain). I don't take much notice to say, this is what I did, and that is what caused the pain".

Stress was cited by all interviewees as related to NSP. The subjects were unsure whether stress caused or aggravated the pain. The nurses were often unaware of the pain during the stressful work day but became conscious of NSP at the end of the day. For many participants, the underlying stress of being a nurse became the focus of the discussion rather than the pain itself. The experience of being 'in pain' and hence 'not being completely healthy' was used synonymously or interspersed with the concept of 'being stressed'.

"Yes I think it makes a difference (busyness of the ward and its impact on pain). The less busy you are, the less stress you are under and the less an impact it has on you."

"When I stress then I sometimes feel that my chest is sore from the stress."

"If you are not a 100% healthy, then it is going to have an influence on your patient. When you are stressed, you are going to shout at your patient. If you are short tempered, this will influence your patient. Then in the end, the patient gets stressed over this rude nurse."

The results pertaining to the aggravation of pain is summarized in table 4.3.

Category	examples	f
staffing	increased work load, (S1,S2, S3, S7, S8)	5
	staff absence (S1, S4)	2
	reduced permanent staff (S1,S5)	2
	insufficient staff allocated to shift (S2, S6)	2
	busy days or periods of the week (S1, S4)	2
	staff are leaving but not sufficiently replaced (S1)	1
	"not enough men to help us moving the beds"(S1)	1
	patient staff ratio inappropriate for the level of care in ICU (S6)	1
ward organisation	"set up of the ICU cramped, have to stretch to reach something" (S8)	1
	classification of the ward incorrect (S8)	1
	very sick patients not appropriate for the ward type. (S8)	1
	"lots of time in the office (doing admin work)" (S8)	1
handling equipment	needing to elevate the heavy beds manually (S2)	1
	lifting heavy things (S3)	1
	insufficient equipment (S6)	1
	pushing things (S7)	1
	"stiff (awkward) beds (S7)	1
	"we only have linen draw sheets" (S6, S4)	2
	the beds' wheels are stuck, needing oil. (S1)	1
handling patients	"turning of patients, without a turning team (6 people used to do what 2 do now)" (S4)	1
	"moving patients from one bed to another" (S4)	1
	"not influenced by turning patients" (S5)	1
	"wash, turning, back and pressure parts, pulling patient up in bed, putting them out in chair, putting patient back in bed (the worst of all the tasks)" (S6)	1
	"turning a spastic patient" (S6)	1
	heavy patients (S7)	1
	handling restless and aggressive patients (S8)	1
personality	"I think I want to do everything perfect." (S8, S5)	2
stress	stress (S1, S5, S7,S8)	4
	responsibility is great (S1)	1
	"more responsibility puts more pressure on you"(S5)	1

Table 4.3 Perceived risk associations with the aggravation of NSP

4.2.4 Summary of qualitative results

The nurses experienced a conflict between their beliefs that a nurse should be caring for others and the real experiences of her own pain. In accordance with their beliefs and identity as a nurse, the participating nurses placed the patient first, above their own needs. They coped with NSP by putting the pain behind them and continuing with their work, although as a result, they experienced greater pain at home and during social activities. The participating nurses felt that their concerns were unheard by the management of TBH, which left them feeling hopeless and angry at times. The perception of the causes and aggravators of NSP were poorly differentiated from one another. However workplace stress related to high patient loads and low staffing levels featured most prominently in the discussions on associated risks for NSP.

Chapter 5

Discussion

The results of the quantitative and qualitative studies will be interpreted and
discussed in this chapter.

5.1 Introduction

The aim of the study was to report on the prevalence of NSP, the risk associations thereof and the experiences of nurses with NSP working at TBH. The prevalence of NSP in nurses at TBH has not previously been assessed. A cross-sectional study was performed to determine the prevalence of NSP among nurses working in selected wards of TBH. As far as the researcher is aware there are no other published cross-sectional studies which focus on nurses with NSP in South Africa. This study examined the associations of NSP with other musculoskeletal problems whilst various risk associations with NSP were explored. Data from a final sample of 143 nurses from a population of approximately 1300 nurses was analysed.

After the cross-sectional study was completed, a qualitative study was performed during which eight nurses' perceptions and opinions regarding their experience of NSP, their work place and the risk associations for NSP were elucidated using a grounded theory approach. This approach allowed an exploration into a new area of research in a context where little qualitative research on musculoskeletal disorders has been conducted. The qualitative study gave the participating nurses a unique opportunity to express their frustrations and concerns regarding working at TBH while suffering from NSP.

The cross-sectional study did not elicit any clear risk associations with NSP explored in the cross sectional study. However, the qualitative study served to highlight potential risk associations as perceived by the participating nurses. The pertinent results of each study are discussed in further detail below.

5.2 Prevalence of NSP in TBH nurses

The 12 month prevalence of combined NSP in nurses at TBH (42.66%) fell within the reported range of NSP prevalence of 35.1% to 59.83% in Greek, British and Dutch nursing populations (Alexopolous, 2003; Bos et al, 2007; Smedley et al, 2003)(chapter 2.3.6.4). The current study used the pain definition from the Nordic Musculoskeletal Questionnaire (NMQ) (Kuorinka 1987), which was also used in the above-cited studies. The mean age of the current study's subjects (39 years) fell within the range of mean ages reported in the above mentioned studies (37-39years). The above studies were all conducted in university or acute hospitals. TBH is a tertiary hospital affiliated to two universities. Hence, the current study is homogenous with international studies with regards to age, NSP definition and setting. Moderately reliable comparison can be drawn between the current study and international studies' NSP prevalence.

The reported 12 month prevalence of neck pain at 29% and shoulder pain at 34% in the surveyed TBH nurses falls within the lower range of worldwide prevalence reports. The current study's neck pain and shoulder pain prevalence estimates are lower than the summary statistics given for both neck pain and shoulder pain prevalence in the meta-analysis of eleven previous studies (50% and 52% respectively; see chapter 2.3.6.4). The NMQ was used in all the reviewed studies used for the meta-analysis (refer to chapter 2.3.4). The mean ages of subjects in the meta-analysis ranged from 25 to 45 years, a range which includes the current study's mean age. Both rural and urban settings were explored in the reviewed studies (refer to chapter 2.3.6). Therefore a reliable comparison can be drawn between the current study's prevalence for neck pain and shoulder

pain in TBH nurses with the meta-analysis statistics of the systematic review of worldwide nurses.

If the prevalence of neck pain and shoulder pain in TBH nurses is indeed lower than worldwide prevalence rates of nurses in similar settings, this may be due to the higher levels of perceived general health and fitness of TBH nurses than reported in international studies. The relationship of general health and fitness with NSP is discussed further in section 5.2.3.

A lack of assistive devices at TBH may demand of the TBH nurses to develop greater upper body strength. Normal levels of physical stress result in adaptation of the neuro-musculoskeletal system. However excessive stress to the neuro-musculoskeletal system leads to stress overload and finally injury and/or pain (Madeleine, Madsen 2009). Although the lack of assistive devices is intuitively seen as a negative situation at TBH, the lack of assistive devices may actually encourage greater upper body strength capacity in nurses. In normal staffing conditions with sufficient staff to patient ratios, the increased strength may be a protective factor against NSP (Hamberg-van Reenen et al. 2006).

The definition of the area of pain defined as NSP may have influenced the reporting of pain and hence the prevalence estimates given in the cross-sectional study. The area of pain was recorded using a blank body chart without pre-defined outlines of the areas defined as 'neck' and 'shoulder' which was a departure from the original NMQ body chart (Kuorinka et al. 1987). The use of the blank body chart has been suggested to provide a more conservative estimate of prevalence related to disability (Bertilson et al. 2007). In the current study, it was hoped that the use of a blank body chart would provide more accurate reporting of the areas of pain and hence more accurate measures of prevalence of NSP and co-morbid pain areas. This may account for the lower prevalence of neck pain and

shoulder pain reported in the current study compared to other studies which used the original NMQ body chart.

Aside from the possible reasons for a lower prevalence of NSP in TBH nurses, methodological limitations regarding the reporting of NSP and sampling may account for the observed difference in NSP prevalence with international studies. These short-comings are discussed further in chapter 6.

5.2.1 NSP prevalence in TBH nurses compared to the general population in South Africa

Schierhout (1995) reported an NSP prevalence of 21% in clothing, fruitpacking and motor vehicle assembly workers in South Africa. The nursing sector was excluded from this study. No studies restricted to the study of NSP alone in South African nurses were found in indexed literature. However, one cross sectional study reporting pain prevalence of multiple body sites in 100 nurses working at various hospitals in the Western Cape region (not including TBH) reported a 12 month prevalence of NSP at 41% (Botha, 1998). The current study findings of a 42.66% prevalence of NSP in TBH nurses concur with Botha (1998). This suggests that nursing staff have a higher prevalence of NSP than other manual workers in South Africa. Further studies of current NSP prevalence in other industries are needed to confirm this suggestion. Yet if true, this finding implies that workplace factors and the related job tasks for nurses at TBH may hold inherent risks for the development of NSP, apart from the risks associated with manual work in other industries.

5.2.2 Co-morbidity of Neck pain, shoulder pain and other areas

Neck and shoulder pain were highly correlated with one another. This finding is in agreement with Smedley (2003) who reported co-morbidity of neck and shoulder pain at 52% in nurses working in the South of England.

Neck pain was highly correlated with LBP and shoulder pain was moderately correlated with LBP in the surveyed nurses. This result concurs with numerous studies worldwide (Yeung 2004, Daraseih 2003, Trinkoff 2002). The above correlations suggest that pain from one area may predispose another area to pain through biomechanical or neurophysiological means (Madelein, 2010) or that nurses who report one area of pain are more likely to report other areas of pain than those who chose not to report pain (Bru, Mykeltun and Svebak, 1994). Central sensitization of the central nervous system due to complex biopsychosocial mechanisms may account for co-morbidity of multiple areas of pain (Butler 2000). This is particularly true for nurses suffering from chronic pain (Butler 2000). Similar physical and psychosocial risks influence neck pain, shoulder pain and LBP independently, albeit to different extents.

5.2.3 Risk associations with NSP in TBH nurses

The cross-sectional study failed to elicit highly significant risk associations with age, ward type, months worked and perceptions of general health and fitness. This may be due to the small sample size of the total sample and individual wards. The lower prevalence rates within the small sample groups rendered it less likely to find statistically significant odds ratios when assessing the associations with NSP.

There was no association between the presence of NSP or shoulder pain and age greater then 45 years in TBH nurses; and only a mild association was found between neck pain and nurses over 45 years old. NSP has

previously been shown to be associated with increasing age (Lagerström et al. 1995, Hou and Shiao 2006) whilst shoulder pain has been significantly related to age over 40 years (Alexopolous et al. 2003) and age over 59 years (Eriksen 2003) in studies of nurses. NSP in nurses may not appear to be related to age due to the healthy worker effect (Tinubu et al. 2010). As nurses mature and gain experience, their manual handling skills during very day nursing tasks may improve. The nurses' experience may offset the risk that ageing poses to the musculoskeletal system (Hamberg-van Reenen et al. 2009).

Working in a particular module did not appear to increase the risk of having experienced NSP in the previous 12 months in the surveyed sample of TBH nurses. This finding is in conflict with the findings of numerous larger studies (refer to table 2.7). Tezel (2005) found that nurses working in theatre and gynaecology wards were more likely to report chronic musculoskeletal complaints of any body area. Smith (2003) found that working in theatre increased the risk for musculoskeletal disorders of any area although NSP alone was not significantly related to theatre work. Bos et al (2007) found that theatre nurses perceived significantly more neck and shoulder complaints than non-specialised nurses from a sample whose mean duration of employment was ten years. Working in theatre may hold greater risk for musculoskeletal disorders due to the long periods of time spent standing interspersed with bursts of manual handling activity (Smith et al. 2003a). Incident shoulder pain specifically has been attributed to nursing activities which involve pushing and pulling (Smedley et al. 2003), and repetitive work above shoulder height in the general population (Sim, Lacey and Lewis 2006). This may explain why previous studies have demonstrated a greater risk for developing NSP in theatre nurses. In contrast, nurse aides working in settings where lower manual handling loads were present such as

paediatric and psychiatric wards exhibited the lowest rates of musculoskeletal pain in a large Norwegian study (Eriksen 2003).

Over a third of the current study's nurses had worked in their respective modules for five or less than five years. Hence, the accrued stresses and strains pertaining to the specific work tasks performed on a particular module (ward type) may not have reached the threshold for overload of the neck and shoulder region, altered motor patterns and the development of pain (Madelein 2010). Despite the possible demographic and methodological reasons for a lack of significant findings, the lack of association of NSP with module is supported by two studies (Smedley et al. 2003, Lagerström et al. 1995). Lagerström et al. (1995) demonstrated no association with ward alone and NSP. They did however find that age as a risk factor interacted with ward type, whereby an increased association of severe neck symptoms was found in older nurses working in geriatric or medical wards. Ward module is only one of multiple underlying causes of work related NSP which may simultaneously impact on a nurse (Lagerström et al. 1995).

The current study sample had a mean tenure of ten years of work in their current module. The tenure of work in a specific module only demonstrated a trend with NSP and shoulder pain in the TBH nurses. The lack of significance found in the current study is likely due to the distribution of tenure worked favoring the five years-or-fewer category (refer to chapter 3.2.4), rendering the sample sizes of longer tenure categories small and less likely to reach significant associations with NSP. However, the lack of association of NSP with tenure may be credible. As TBH nurses gain experience over their working years, they may become more skilled at coping with the physical and psychosocial aspects of nursing, and hence have less risk of developing NSP. Tinubu (2010) found that a high percentage of their cohort of Nigerian nurses experienced their

first episode of work-related musculoskeletal disorder during their first five years of work. An association of increasing years worked with NSP was found in a large cross sectional analysis of Taiwanese nurses (Hou, 2006). Hou (2006) suggested that Taiwanese nurses performed more caring duties than others in Asia and spent more time on their feet, which increased the stresses accrued over the years worked as a nurse. The same argument would hold for TBH nurses who carry out all caring duties (instead of family members, as in some parts of Africa and Asia) (Kengne et al. 2008). If this reasoning holds truth, then the apparent lack of significant association of tenure with NSP in the current study may be related to methodological error.

The cross-sectional study findings suggest that the surveyed TBH nurses considered themselves reasonably healthy and fit (refer to figure 3.5 and 3.6).TBH nurses may walk greater distances to and from public transport than in urban Asia/Europe, as many nurses working at TBH may be unable to afford private motor vehicles due to their poor remuneration (SANC 2008). Walking may assist in maintaining the nurses' general health, physical strength and fitness (Vieira 2008).

TBH nurses with a poorer than 'good' perception of their general health had a small and insignificant increased risk for neck pain, shoulder pain or combined NSP. Alexopoulous et al. (2003) demonstrated a similar but more significant association of shoulder and neck pain with a perception of general health less than 'moderate' in their sample of 351 nurses. The weak association of NSP with general health perception leads to an assumption that musculoskeletal pain from the neck and shoulder region has more specific causative factors remote from general health concerns. This assumption is supported by Bru, Mykeltun and Svebak (1994) who found a poor correlation between the presence of pain as measured by

the NMQ and a subjective general health inventory in Norwegian hospital staff.

The perception of fitness had a greater influence on the reporting of neck pain, shoulder pain or NSP in TBH nurses. The current study's findings concur with Lagerström et al (1995) who demonstrated weak relationships of fitness perception with neck pain and fitness perception with shoulder pain. High physical demands have been shown to present a significantly greater risk to nurses for neck pain (Trinkoff 2003b) and shoulder pain (Trinkoff et al., 2003b; Smith 2006). It is plausible that TBH nurses' 'reasonably good' fitness levels could offset the risk of the NSP attributed to high physical demands. This possibility rests on the assumption that TBH nurses view increased physical strength as contributory to their good fitness level.

It is questionable whether the nurses' perceptions of their general health and fitness were accurate. In the absence of objective measures of health and fitness to substantiate the nurses' perceptions in the current study, any observed association of general health and fitness with NSP should be interpreted with caution.

5.3 Qualitative experiences of TBH nurses with NSP

The grounded theory approach was used in this part of the study with the aim to explore the experiences of TBH nurses who suffer from NSP. This is the first known qualitative assessment of NSP in nurses in South Africa.

Pain is a warning mechanism usually motivating the individual to stop the inciting activity (Bardin et al. 2009), yet in this study, nurses in pain tended to continue working. The model of pain perception, processing and output

which emerged from the study is supported by the theory of Butler (2000) (refer to figure 4.2). The pain perceived by the nurses was influenced by emotional (eg. fear of not reaching 50 years old) and cognitive (eg. thoughts and beliefs about their identity as nurses) dimensions, resulting in various consequences or output mechanisms. The output mechanisms were not predominantly a change in motor function as would be normally expected in an acute pain episode. The consequences led to altered coping mechanisms as a result of the chronic stress related to NSP. This demonstrates the influence of the neuro-endocrine system which responds to thoughts and feelings by enabling the individual to escape a perceived threat, albeit by the use of higher cognitive functions such as 'dreaming of a better work environment', rather than physically stopping the work task (Jones and Rivett 2004).

The data suggest a conflict between self care and patient care in the nurses experiencing NSP. There are multiple possible reasons why the nurses felt they were unable to stop working when their NSP was present. The over-riding beliefs that 'a nurse cannot stop her work' and that the 'patient comes first' resulted in nurses continuing to work despite their NSP. The nurses may continue to work to ensure sufficient staff numbers and hence patient outcomes are maintained (Kane 2009). Nurses may derive a sense of identity through their work and perceive the 'giving in to pain' as unbecoming of a 'nurse'. Finally, there is the financial cost of having to cut down on work or having to resign before the age of fifty, which motivates nurses to continue working despite pain. The above reasons why the nurses with NSP continue to work will be discussed in greater detail below.

The nurses implied that putting the patient first meant that they would have to ignore their own NSP and continue with the care of the patient. Wiitivaara et al. (2007) comment that the body 'becomes aware of itself' in

the initial stages of neck and shoulder disorder. The interviewed TBH nurses were made aware of the neck and shoulder symptoms only after the work day or after potentially aggravating activities were completed. Similarly, the nurses studied by Wiittivaara et al. (2007) used the term, "hearing the pain" when they became aware of pain usually after the inciting incident had occurred.

The frequent use of the plural in the phrase, 'we believe the patient comes first' suggests that this expectation may be imposed on some nurses by the professional code of conduct or public opinion and not necessarily be due to personal conviction. Myers et al. (2007) confer that the culture of caring which exists in the nursing profession increases the likelihood of injury to the individual nurse. The emergence of 'patient-centred care' within a broad bio-psychosocial framework has called for greater empathy in holistic nursing practice (Stewart 2002). Although it is plausible that nurses chose their profession due to their caring orientation, this may not be so for all female nurses, who historically have had fewer career opportunities than men (NEPPC 2004), particularly in South Africa (Lund and Budlender 2009). Drach-Zahavy (2009) reported on the environmental mismatch experienced by nurses whose natural orientation was more task oriented but who were expected to perform 'patient-centred care'. These task oriented but low caring oriented nurses experienced high levels of stress. Hence, those nurses who had a low caring orientation but who performed 'patient centred care' were at greater risk for poor mental health compared with those of high caring orientation. Drach-Zahavy (2009) also found that physical health was not significantly associated with those whose orientation mismatched the type of care provided. However poorer physical health was associated with providing 'patient centred care' in both high and low caring oriented groups. These findings of Drach-Zahavy (2009) could explain the phenomena seen among the interviewed nurses who expressed high levels of work stress while continuing to deliver

'patient centred care', with subsequent development of NSP. The term 'emotional labour' (Hochschild 1983) aptly describes the interviewed nurses' perspectives of their work. The participants were expected to deliver 'patient-centred care' in an inadequately resourced environment and despite this; they also expected of themselves to express positive emotions.

Nurses are primarily interested in the outcomes of patient under their care (Kane 2007). An increase in the ratio of numbers of registered nurses to auxillary nurses has been shown to reduce patient morbidity and mortality (Kane 2007). The interviewed TBH nurses are inherently aware of the problems of staff shortages. In the event that they develop musculoskeletal pain, they are unlikely to take time off work for their NSP as they are aware of the consequences of fewer staff for their patients and their colleagues. Temporary staff do not adequately fill the gaps as they do not know the team and ward protocols. This finding is not isolated to TBH. Kee and Seo (2007) suggests that due to nursing staff shortages in Korea, nurses report less pain and take less time off work for musculoskeletal symptoms than the nurses in the U.S.A. Nurses in Massachusetts reported that due to staff shortages, they go home distressed as they have been unable to perform their work as thoroughly they would have liked to; and that this contributed to the further loss of nurses from the profession (Tannenwald 2005).

The TBH nurses had a desire to be identified as 'the nurse' rather than the person experiencing pain. The nurses' identity supported their belief that 'a nurse is expected to be well' (refer to chapter 4.2.1.1) (Wittivaara et al. 2007). A previous qualitative review of musculoskeletal disorders in Swedish nurses reveals similar conflicts where the nurses strived for the balance between 'illness' and 'wellness' in order to keep working (Wittivaara et al. 2007).

The interviewed nurses believed that they were unable to cut back on overtime work or resign from their jobs in order to reduce the stresses on their neck and shoulders. The main concern was financial; particularly the older women felt they had no alternative earning options if they were to resign. This belief may have arisen due to the older nurses' lack of exposure to career opportunities for women in their early careers (Collet, 2007). The nursing sector has been historically underpaid compared to others with equal responsibility and training (Tannenwald 2005; SANC 2008). It is unlikely that the nurses had the resources available to make a change in their careers at this point in life. The younger nurses with NSP may consider moving to work in other countries where the working conditions and salaries are better than in South Africa (Gilworth 2007). It would be of interest to compare the reasons for leaving the nursing profession in South Africa compared to those in the United Kingdom and the U.S.A.; and to what extent musculoskeletal problems account for the loss of nursing staff in South Africa. The imbalance of effort and reward was implied by the interviewed nurses as a cause of stress, although they did not openly discuss the lack of financial reward (Simon et al 2008) (refer to chapter 2.4.4 and 4.2.1). Further discussion on the financial concerns for nurses with NSP is warranted but is beyond the scope of this thesis.

5.3.1   Coping strategies

The most prevalent coping mechanism in dealing with NSP as expressed by the nurses, was to put the pain behind them and continue working (the reasons thereof have been discussed earlier in 5.5.1). The nurses were able to deny the presence of pain for a period of time (Busch 2005). They used various methods to 'put pain behind them' including, "not thinking about pain", use of medication and only later, accessing support from

others. There was an absence of strategies whereby the nurse decided to stop or reduce her work which stands in contrast to the findings of Tinubu (2010) who found that 37% of a Nigerian sample of nurses would stop their treatment task to avoid causing or aggravating an injury.

Busch (2005) discusses the course of LBP illness from initial awareness to a second phase of denial of the symptoms. During the work day, the participants appeared to be in this second phase of coping with NSP. The shifting of pain to the nurses' subconscious minds temporarily maintained the nurses' status to the on-looker as 'apparently pain free'. In the meantime this coping mechanism appeared to be effective, enabling the nurses to continue their work. Suppressing pain has however short and long term consequences. Not only is pain likely to emerge later in the day impacting on social or family time (Josephson et al. 2005, Trinkoff et al. 2002) but the ongoing abuse of the musculoskeletal structures can result in early degenerative changes, rendering these nurses more at risk of work instability and finally chronic disability (Gilworth et al. 2007). The disability associated with NSP may not only necessitate early retirement from a nursing career but also precipitates serious personal consequences for the individual nurse (Gilworth et al. 2007). This concern is reflected in previous studies suggesting that nurses exhibit one of the highest occupational burnout prevalence rates (Hilton and Whiteford 2010)

Medication use was a frequently mentioned method of suppressing NSP in order for the interviewed nurses to continue working. Trinkoff et al. (2002) reported that the most frequent functional consequence of Neck, shoulder and lower back symptoms in their cohort of North American nurses was the taking of medication. Of a large sample, 90.9% of nurses suffering from neck pain and 90.6% of nurses suffering from shoulder symptoms took non-steroidal anti-inflammatory drugs to ease their

symptoms. In contrast, only 2.8 % missed work for neck pain while 34.8 % missed work for shoulder pain (Trinkoff et al. 2002).

5.3.2 Functional problems

The apparent absence of functional problems at work as a result of NSP may have been due to the nurses' ability to push the pain behind them at work rendering them less aware of the functional problems. Whereas outside of work, their roles and beliefs surrounding their roles as nurses were no longer as powerful in suppressing the pain as they were no longer functioning as a nurse. The data obtained from interviews is entirely subjective. Research needs to distinguish between what nurses think and say they do at work and what they actually do in practice (Drach-Zahavy 2009). For example, they may have said that they continue to turn patients every four hours as they knew this is best practice, but in reality, due to their pain, they may not have turned the patients as regularly. The interviewed nurses may not have wanted to appear negligent or lazy in front of the researcher and her assistant, and hence declined to forward information on their functional work problems.

5.3.3 Opinions about work as a nurse at TBH

The nurses expressed a sense of hopelessness regarding their interactions with their superiors. This may reflect poor relationship between the nurses at ward level and those in management. The finding that the nurses had not accessed help for their NSP through the occupational health department of the hospital, but had chosen to seek help from private doctors, supports this notion. On questioning regarding the correct procedure to take following a work injury, one nurse did not know of the occupational health department.(should I send to results)

The participating nurses felt that their concerns regarding staffing levels and lack of equipment were unheard by the management of TBH. This may have contributed to the disabling sense of hopelessness which in turn contributed to their experience of NSP. According to the interviewed nurses, the removal of the lifting teams is one change which has adversely affected the TBH nurses and increased the risk for NSP.

The neurological ICU nurses were concerned about the low ratio of one registered nurse to three patients in their ward. At TBH, the registered nurse to ventilated patient ratio is reported to be 1:2 according to a South African parliamentary report (2009). The ten bed neurological ICU had at the time of publication, twelve registered nurses available over a 24 hour period where they essentially should have 16 registered nurses. The report claims that there are insufficient qualified staff available to appoint and too few staff to allow untrained staff the study leave to develop their skills. TBH nurses are not alone in their concerns about staffing levels and the impact these job issues may have on their personal NSP (Tannenwald. 2005). Multiple studies have suggested that nurses feel frustrated and hopeless regarding the injustices they experience in the workplace (Daraiseh et al. 2003, Lipscomb et al. 2004, Geiger-Brown et al. 2004, Trinkoff et al. 2006, Kane 2009, Geiger-Brown, Letvak and Ruhm 2010). The researcher questions whether TBH nurses face even greater challenges than those from better resourced hospitals in South Africa and abroad. If so, the question remains whether the extent of the challenges facing the TBH nurses correlates with their degree of stress and resultant NSP.

5.3.4 Perceived risk associations with NSP

A dearth of research exists into relative impact of the physical versus the psychosocial risks associated with musculoskeletal pain among South

African nurses. The qualitative study adds new insights into the experiences of TBH nurses with NSP, suggesting that psychosocial factors closely interact with physical factors.

Repetitive overhead work has been cited as a risk factor for NSP in the general population (Waters et al. 2006). Of all participants, only the theatre nurse cited repetitive lifting of theatre packs as a cause for injury. The theatre packs which can be of awkward size and significant weight, are not lifted overhead but are usually moved at shoulder height (Smith et al. 2006). The weight of the theatre packs at TBH have been reduced in recent years according to one of the interviewed theatre nurses. However the angle of shoulder flexion which the theatre nurses sustain is the greater cause for concern.

The majority of nurses retrospectively linked a manual handling incident/series of incidents as a cause for the onset of NSP. These incidents were most commonly related to lifting or moving of patients when insufficient staff were available to assist the nurse. Although the nurses expressed knowledge of the correct lifting techniques, they were often unable to implement them due to insufficient staff. Lagerström et al. (1995) presented similar findings. Education regarding manual handling made no effect on the prevalence of manual handling injuries over a four year study period. Upper back and hip injuries actually increased due to staff shortages, because the nurses chose to transfer patients alone, despite their knowledge that two nurses transferring the patient would be considered best practice (Lagerström et al. 1995).

From a local context, a study conducted in the Western Cape region looked at the anthropometric fit of nurses to their jobs and the relationship between this 'fit' and musculoskeletal disorders (Botha and Bridger 1998). NSP was reported by 41% of the nurses, of whom 75% felt that the pain

was due to lifting and moving patients and/or equipment. Shoulder and arm pain was reported by 24% of the subjects, of whom 38% felt that their pain was induced by pushing and pulling beds. Thirty three percent of nurses felt that pulling up the barriers or 'cot sides' of beds induced their pain. Eighty two percent of the Botha and Bridger (1998) sample suggested that their NSP was attributed to sustained fixed postures while caring for patients. It was suggested that a correlation existed between those who had variations of the normal in terms of anthropometry and those who were more likely to develop musculoskeletal pain. Since the publication of the Botha and Bridger (1998) study, worldwide advancements in ergonomic and manual handling equipment should have improved the anthropomentric 'fit' of nurses to their equipment (Owen, Keene and Olson 2002). However, due to major budgetary cuts in the South African public health care sector over the past 15 years, TBH nurses have not been exposed to the benefit of many adjustable devices such as hoists, walking belts, toileting devices and sliding boards which are now in regular use in developed nations (SANC, 2008; refer to chapter 4.1.15). Not only are the TBH nurses not availed of assistive devices, but the existing hospital beds are considered a hazard as they are poorly maintained. This adds to the nurses' difficulty in moving patients in the bed, lifting cot-sides or lowering the beds for ergonomic best practice and patient safety.

The interviewed nurses who were aware of assistive devices being used in other wards, expressed a desire to have them available in their wards. Trinkoff (2003) reported that the use of assistive devices such as hoists and sliding sheets reduced both NSP and LBP in a cross sectional study, A longitudinal study performed by (Owen, Keene and Olson 2002) demonstrated a reduction in shoulder pain and LBP incidence in a five year follow up study of the implementation of assistive devices and an ergonomic approach to patient care. However, the success of the

implementation of ergonomic equipment depends on the efficacy of training and adequacy of staffing levels (Owen, Keene and Olson 2002). Incident NSP has been associated with extensive pushing and pulling activities such as required when using the sliding sheet (Smedley et al. 2003), suggesting that the acquisition of assistive devices would not automatically reduce NSP in TBH nurses. Effective training programs are required to ensure that ergonomic principles are effectively applied when using the assistive devices in order to prevent the shifting of pain from the lower back to the neck and shoulder region.

Stress was cited as a cause of pain by five of the participating nurses, although they were often unable to differentiate stress as a cause or an aggravator of pain. It appears that stress is consistently associated with NSP as reported in observational studies of nurses and the general population (Daraiseh et al. 2003, Kane 2009, Hilton and Whiteford 2010, McGibbon, Peter & Gallop 2010). Stress was reported as a cause of any area of pain by 47% of a sample of Western Cape nurses (Botha and Bridger 1998). Neurophysiological studies support relationships between pain and stress. Bardin et al. (2009) suggest that chronic stress could lead to the development of pain pathology in humans, supporting their hypothesis with the results of their laboratory study which demonstrated that chronic stress reduced the pain thresholds of rats.

The aggravating factors cited by the nurses in the qualitative study are similar to the causes of pain as it was difficult for the nurses to differentiate the cause of pain with the aggravators of pain when the onset of pain was insidious. The most pertinent aggravating factor cited by all interviewed nurses was a shortage of staff along with high patient loads. One nurse very aptly described the ward as "pouring with patients" which suggested that the high patient turnover was an ongoing issue which the TBH nurses faced on a daily basis. The consequence of the staff shortages (e.g. a lack

of assistance for turning patients) led to increased stress which in turn was associated with more pain (Trinkoff et al. 2003, Bardin et al. 2009).

Lipscomb (2004) conducted an important study on the effects of health care changes on the prevalence of musculoskeletal disorders in two states of the U.S.A. A significant relationship with musculoskeletal disorders was found where more than six healthcare changes had taken place whereby nursing personnel numbers are cut, patient's hospital stays are shortened and patient acuity (severity of illness) is increased. Similar health care changes have been instituted in South African due to the shift of health budget provision from tertiary public hospitals to primary health care (South African Government 1997). If the impact of these changes on TBH nurses has been similar to those in the Lipscomb et al. (2004) study, the prevalence figures observed in the quantitative survey may be a conservative estimate of the true prevalence of NSP at TBH. On the contrary, TBH nurses may have adapted better to health care changes than their North American counterparts. The changes may not have been as severe as the baseline of staffing levels prior to healthcare cuts may have been lower than in other parts of the first world. The qualitative results indicate that there is cause for concern over a potential rise in the prevalence of NSP if TBH nurses' concerns are not adequately addressed.

It appeared that the participating nurses found it difficult to differentiate stress from pain at a phenomenological level. The underlying stress of the job became the focus of the discussion rather than the neck or shoulder pain. Nurses are continually in the public eye which is in itself a considerable stress (Hilton and Whiteford 2010). Nurses experiencing pain are under additional stress as they do not want the public to perceive them as in need of help. Ongoing pain, which the nurse perpetually pushes back to her subconscious mind in order to continue working, adds to the

stress of the nurse's work (Wittivaara et al. 2007). Stress is added to by the dissonance that results from nurses trying to offer patient-centred care in an under-resourced environment (Drach-Zahavy 2009). Hence stress is plentiful in the nurses' day but the question remains, "How does 'stress' translate to 'pain'? The nurses possibly name 'pain' as 'stress' as a euphemism enabling them to address their personal NSP problem amongst peers and the public. However, the "International Association for the Study of Pain' defines pain as an "unpleasant sensory and emotional experience related to a real or potential tissue lesion or described in terms of such a lesion" suggesting that pain does not have to have a discernable physical cause (Merskey 1994). In the context of this definition, the nurses' use of the emotive term 'stress' to denote pain in the neck and shoulder region, is justified and understandable.

The lack of identification of the NSP problem as a musculoskeletal pain and of the 'stress' as a causative or aggravating factor, may interfere with the future prevention and management of NSP in this population (Kane 2009, Svensson et al. 2008).

5.4 Conclusion

The study concludes that the presence of NSP is a significant problem in the nurses at TBH. Although the prevalence of NSP is within the lower range of prevalence reported in worldwide nursing populations, the reported 12 month prevalence of NSP across the surveyed wards of TBH of 42.66% suggests that NSP plays a significant role in the daily lives of TBH nurses. Risk associations with NSP were not clearly defined by the epidemiological study. Further epidemiological study is warranted on the physical and psychosocial risk associations with NSP in TBH nurses.

The qualitative study gave a unique insight into personal experiences of nurses with NSP. Psychosocial factors feature dominantly in the nurses' experiences of NSP. The nurses' desire to maintain their identity as nurses and to hide pain while continuing their work may perpetuate the problem of NSP. Stress as a result of inadequate staffing levels plays a significant role in the etiology of NSP in TBH nurses. The interaction between staffing levels, stress and poor coping methods suggests that the prevalence of NSP will rise in the near future if TBH nurses' concerns remain unheeded.

Chapter 6

Limitations, Recommendations and Clinical application

The limitations of the current study, recommendations for further study and the clinical application of the conclusions of this study will be discussed in this chapter 6.

6.1 Limitations:

There are several methodological concerns that should be considered when interpreting the findings of both parts of this study.

6.1.1 Reporting of pain

The use of a subjective questionnaire in this population may have resulted in under-reporting of the true prevalence of NSP in the cross sectional study (Wiitavaara et al. 2009). The qualitative results indicate that the TBH nurses who experience NSP are proficient in 'hiding the pain' and getting on with the job (see chapter 4.1.13). Despite their knowledge that the questionnaires would be kept anonymous, the nurses may have been reluctant to render information about their NSP. They may have felt that reporting pain would be letting their guard down which could subconsciously aggravate their NSP (Wiitavaara et al. 2007). The fact that several nurses reported being injured in the neck and shoulder region but did not report pain in these areas during the previous 12 months supports this speculation (chapter 3.2.4.5).

The TBH nurses may have a different interpretation of the pain definition given in the NMQ than the European populations for which the NMQ was first designed (de Barros and Alexandre 2003). The NMQ pain definition includes discomfort, stiffness, pain or tingling. TBH nurses may not consider tingling or stiffness as sufficient in intensity to report as a pain problem, and despite the given definition, may have chosen not to shade in those areas of symptoms. A pilot study of the questionnaire and a focus group to determine TBH nurses' interpretation of the pain definition would have assisted in improving the content validity of the NSPn.

6.1.2 Sampling restrictions causing misrepresentation of prevalence

A few methodological concerns may have led to a misrepresentation of the NSP prevalence in the current study. Firstly, permission was gained from the head of the nursing department to survey only seven TBH wards. The ward managers (or sisters-in-charge) of other wards in TBH did not give consent for their respective wards to be surveyed. Reasons were not given as to why consent was not gained from these ward managers. As a result, randomisation of wards was not employed. The prevalence reported should not be generalized to other wards or to TBH in general. The prevalence of NSP may have been considerably higher in the un-surveyed wards. The ward managers of particularly busy wards such as the paediatric ward, may have felt that their staff were too busy to complete a questionnaire. If so, the researcher speculates that NSP prevalence may be higher in the un-surveyed wards as busyness has been linked to stress which has in turn been associated with NSP (Chapter 4.1.13) (Kane 2009, McGibbon, Peter and Gallop 2010, Bardin et al. 2009).

6.1.3 Response bias

Response bias is a concern in studies of self reported measures of prevalence. An analysis of the non-responders was not possible due to the unavailability of further data and the voluntary nature of the study. Hence it is unknown whether the proportion of symptomatic nurses in the final sample was representative of the population of symptomatic nurses in the study population.

The lack of randomization of nurses also lead to within- ward respondent bias, whereby the less busy or more research conscious nurses working in a particular ward opted to complete the questionnaire. The researcher speculates that the respondents may have had better job-control and

stress management practices and hence report less NSP (Lagerstrom, 1995). This may explain why the prevalence rates for neck pain and shoulder pain reported in this study were lower than the average of those reported internationally.

The study obtained poor response rates from the obstetrics and gynaecology and internal medicine wards. Repeat visits were made to these wards to encourage the ward managers to remind the staff to complete the questionnaires. The ward managers of neuro ICU and theatre wards, where the best responses were found, took ownership of their role in research and reminded the staff of the questionnaires at handover meetings.

6.1.4 The design of the NSPn questionnaire

Reporting errors may have existed in the quantitative study as the NSPn was not piloted in the TBH population. The NSPn was not piloted as it was initially intended to be a tool for recruiting nurses *without* NSP into a laboratory study using LODOX Low dosed Xrays (LODOX) scanning. The original study proposal included a biomechanical study of scapula position at various points of elevation of the shoulders. The LODOX study was unfortunately not implemented due to the emigration of the radiographer trained to operate the LODOX scanner at the University of Cape Town medical school. A suitable replacement radiographer was not found before data collection was to begin. Hence the study changed course to a qualitative study. The NSPn questionnaires had already been distributed and collected prior to the study change. The use of the NSPn was to identify the prevalence of NSP in nurses and would secondarily have been used to identify asymptomatic nurses appropriate for the biomechanical study. The NSPn included questions on previous pathology which would have excluded nurses from the LODOX study if answered in the positive.

Hence the NSPn was not intended to explore a wide range of risk associations with NSP in nurses. The data obtained from the NSPn was used to report only prevalence and a few demographic risk factors. The use of a more comprehensive version of the DMQ including physical and psychosocial work factors would have allowed for exploration of the complexities and interactions of associations with NSP.

The NSPn asked nurses to rate their level of general health and fitness but did not ask the nurses to report on smoking status, which is known to exhibit a relationship with general health (Vieira, Kumar and Narayan 2008, Retief et al. 2003). A cross-sectional survey conducted in Canada found that 47% of their cohort of nurses performed no physical exercise aside from their work, 28% smoked and 47 % were classified as overweight (Vieira, Kumar and Narayan 2008). One hundred percent of the nurses with LBP smoked and did not exercise (Vieira, Kumar & Narayan 2008). A previous study of TBH nurses reported that 31 % of the surveyed nurses were daily smokers (Retief et al. 2003). If the prevalence of smoking in TBH nurses has not significantly declined since 2003, then the nurses' standard of general health may not be as good as the results of the cross-sectional study results suggest.

6.1.5 Qualitative methodology

Grounded theory purports that theoretical sampling, whereby the researcher selects participants on the grounds of ongoing analysis of data and not from pre-determined ideas, should be used in the development of a study (Wiitivaara et al. 2007, Glaser 1978). Yet, the researcher employed a degree of purposive sampling as prior to the onset of the qualitative study, an epidemiological study was conducted, from which participants of the qualitative study were chosen. Still, the epidemiological study did not set out to determine psychosocial or job specific risk

associations and the risks explored did not show significant associations with NSP. Hence the researcher only had information about prevalence of NSP at her disposal prior to the initial interviews, which should not have significantly biased her thoughts regarding the qualitative study objectives and analysis.

Recall bias is a concern in the qualitative study. Symptomatic nurses may be able to recall risk factors more readily than asymptomatic nurses. However the qualitative study did not include asymptomatic nurses. The nurses who consented to be interviewed may have been particularly keen to voice their opinions regarding their NSP and workplace stress in the hope that changes could be made. Their eagerness to express their concerns may bias the results of the qualitative study (Wiitavaara et al. 2007).

The qualitative results are not intended to be a generalization of the experiences of all nurses. They are at most representative of the small group of interviewed nurses and the nurses working in their respective wards. A larger sample of theatre nurses in the qualitative study could have allowed for comparison to be drawn between the experiences of theatre nurses' and those of ward based nurses. Minor themes which did not reach saturation point, such as sleep deprivation and financial concerns, may have been expounded upon with a larger sample of interviewees. However the most salient categories emerging from the data were relevant and 'fitted' with the most prominent themes pertaining to the nurses' work-time experiences (Glaser 1978). A previous qualitative study which explored the experiences of nurses with musculoskeletal pain claimed to reach saturation with a sample of eight nurses from a variety of settings (Wiitavaara et al. 2007).

The sample of participants in the qualitative study was 'survivors' of NSP in the workplace and do not represent those who have dropped out of work due to NSP. This is known as the 'healthy worker effect' (Tinubu et al. 2010). This study's qualitative findings are representative, albeit to a small degree, only of the TBH nurses who have continued in their employ as nurses despite the development of NSP.

The qualitative study data was analysed by the researcher with assistance from a supervisor (LC). However, the rigor of the qualitative summary could be improved by inviting a panel of reviewers from varying fields to analyse the data and reach consensus on the categorization and 'fit' of the data (Pope and Mays 2009).

6.2 Recommendations

A large scale study of NSP and associated risks should be implemented across all wards and nursing staff at TBH. A more comprehensive version of the DMQ could be utilized, although it is advisable to keep the questionnaire short to ensure a good response rate is achieved. If questionnaires are distributed in the hospital, then the researcher should preferably obtain consent from each nurse in person prior to distributing the questionnaire. Different ranks of nurses should be analysed as sub-groups in order to elucidate the specific risk factors associated with varying levels of job control and autonomy. With a sufficiently large sample, different age groups should be sub-grouped to explore the effect of ageing and long tenures of work more accurately than the current study achieved. Future studies exploring the association of health and fitness with NSP in TBH nurses could include objective measures such as the 'Body Mass Index' and pedometer diaries (Schmidt et al. 2008).

A postal survey may capture a better response rate from the TBH nursing population and can be used to include nurses who have left TBH due to retirement or a job change (Gilworth et al. 2007). This method of data collection should reduce the healthy worker effect (Eriksen 2003).

Thereafter nationwide studies targeting rural and urban areas should be performed. Nurse to population ratios are more favourable in the Western Cape (193:1) compared to the overall South African ratio (222 :1) (SANC 2009). If staffing ratios are as significant a factor in the development of NSP as the qualitative study suggests, then the extent of NSP may be greater in other areas of South Africa than at present in TBH. Comparative studies could compare risk associations such as staffing levels, stress, and the use of assistive devices as well as the prevalence of NSP across multiple sites (Trinkoff et al. 2006).

Studies of incidence are needed to more accurately assess the etiology of NSP in TBH and among all South African nurses. These studies involve long follow up times with large sample sizes at baseline, the implementation of which would require extensive collaboration with nursing management staff (Smedley et al. 2003, Trinkoff et al. 2006, Li et al. 2010). Longitudinal studies are required to assess changes in incidence and prevalence following the implementation of preventative strategies (Owen, Keene and Olson 2002).

Although functional problems during work time were not highlighted by the interviewed nurses, an observational analysis should be conducted in order to substantiate this finding. Logbook analysis has been used effectively in the registration of specific patient handling tasks in order to better understand the interaction of musculoskeletal disorders with work tasks in nurses (Warming et al. 2009). Functional consequences outside of the workplace such as loss of sleep, pain medication use, financial

concerns and absenteeism should be addressed in future longitudinal studies of TBH nurses as these give a clearer indication of the extent of disability that results from NSP (Trinkoff et al. 2006, Trinkoff, Storr and Lipscomb 2001).

Future qualitative studies should include nurses who have left the nursing profession in order to assess whether this population's experiences of NSP and coping mechanism's differ from the working population (Gilworth et al. 2007). Focus groups including working nurses, retired nurses, nurses with and without NSP as well as management nurses would encourage collaboration between the various ranks of nurses. Qualitative study allows for insightful observations to be made of the nurses' personal experiences which an epidemiological study would fail to accomplish.

6.3 Clinical application

Consultation with nurses working in the wards of TBH is of paramount importance if the management staff of TBH desires to reduce the prevalence of NSP in TBH nurses. Nurses know they need to ask for help when handling patients but they need the skills to know how to address their colleagues assertively in order to receive sufficient help and co-operation from their teams. The nurses need to be empowered with the confidence to decline to transfer heavy patients in the absence of sufficient staff. Staff could be taught appropriate stress management strategies which involve timeously accessing available care when stress or NSP initially develops and be encouraged to take the appropriate rest or time off work (Horneij et al. 2001). Ward based strategies to cope with staff shortages due to sickness absences need to be implemented to avoid the additional extra stress which rests on remaining staff when nurses in their team are absent (Rajbhandary and Basu 2010).

The use of a 'lifting team' which can be called upon to transfer heavy patients should be revisited in TBH (Kutash et al. 2009). Another alternative to the 'lifting team' is to train nurses to view manual handling as a team exercise (Lagerström, Hansson and Hagberg 1998). The acquisition of new equipment will not necessarily alleviate the physical stresses placed on nurses' neck and shoulder regions (Owen 2000b, Owen, Keene and Olson 2002). The nurses will require thorough and regular training to lessen the risks of manual handling injuries when transferring patients using assistive devices (Owen 2000b). For example, to avoid injuring their neck and shoulders while operating a hoist to transfer a patient out of the bed into a chair, the nurse will need to choose the correct sling in consideration of the patient's size and she will need to avoid over-reaching with her arms in elevation while attaching the sling to the hoist (Edlich et al. 2004, Owen et al. 2002). Another example is the use of the sliding sheet, the effective use of which requires of the nurse to initiate effective trunk and scapular stabilization in order to pull a patient up the bed without injuring her neck and shoulder area.

The current equipment in use at TBH, in particular, the hospital beds, need to be better maintained in order to lessen the risks associated with moving the beds or lifting cot-sides. An alternative should be sought to elevating the hospital beds with wooden blocks. If no alternative method can be used with the currently available equipment, the elevation of the beds should be performed in a controlled manner with the appropriate assistance from male nursing or porter staff.

Furthermore, the nurses who suffer from NSP require education regarding the available resources available to them through the 'occupational health department' of TBH. Barriers which may exist preventing the nurses from reporting injuries and accessing help need to be explored.

6.4 Concluding remarks

The South African Nursing Council stipulates that one of the rights of nurses is to have "a safe working environment which is compatible with efficient patient care and which is equipped with at least the minimum physical, material and personnel requirements." (South African Nursing Council 2009b). The results of the qualitative study suggest that this right is potentially threatened by the lack of resources available to TBH nurses in order to effectively care for patients without compromising their personal wellness (Drach-Zahavy 2009). A larger study of the prevalence and associated risk factors for NSP among all the TBH nursing staff is required. Preventative efforts should follow extensive research which defines the minimum requirements of personnel and equipment in TBH and nursing environments in South Africa. TBH ward managers should be held accountable to these requirements through the regular audit of resources and the monitoring of NSP among other musculoskeletal disorders. The current NSP preventative measures should be assessed and reviewed at TBH, followed by implementation of new preventative measures (Finch 2006) in accordance with the findings of future prevalence studies.

Reference list

Adejumo, O. & Lekalakala-Mokgele, E. 2009, "A 2-Decade Appraisal of African Nursing Scholarship: 1986?2006", *Journal of Nursing Scholarship,* vol. 41, no. 1, pp. 64-69.

Ahlberg-Hulten, G.K., Theorell, T. & Sigala, F. 1995, "Social support, job strain and musculoskeletal pain among female health care personnel", *Scandinavian Journal of Work, Environment and Health,* vol. 21, no. 6, pp. 435-439.

Alexopoulos, E.C., Burdorf, A. & Kalokerinou, A. 2003, "Risk factors for musculoskeletal disorders among nursing personnel in Greek hospitals", *International archives of occupational and environmental health,* vol. 76, no. 4, pp. 289-294.

Ando, S., Ono, Y., Shimaoka, M., Hiruta, S., Hattori, Y., Hori, F. & Takeuchi, Y. 2000, "Associations of self estimated workloads with musculoskeletal symptoms among hospital nurses", *Occupational and environmental medicine,* vol. 57, no. 3, pp. 211-216.

Bardin, L., Malfetes, N., Newman-Tancredi, A. & Depoortere, R. 2009, "Chronic restraint stress induces mechanical and cold allodynia, and enhances inflammatory pain in rat: Relevance to human stress-associated painful pathologies", *Behavioural brain research,* vol. 205, no. 2, pp. 360-366.

Bertilson, B., Grunnesjö, M., Johansson, S. & Strender, L. 2007, "Pain Drawing in the Assessment of Neurogenic Pain and Dysfunction in the Neck/Shoulder Region: Inter-Examiner Reliability and Concordance with Clinical Examination", *PAIN MEDICINE,* vol. 8, no. 2, pp. 134-146.

Bos, E., Krol, B., van der Star, L. & Groothoff, J. 2007, "Risk factors and musculoskeletal complaints in non-specialized nurses, IC nurses, operation room nurses, and X-ray technologists", *International archives of occupational and environmental health,* vol. 80, no. 3, pp. 198-206.

Botha, W.E. & Bridger, R.S. 1998a, "Anthropometric variability, equipment usability and musculoskeletal pain in a group of nurses in the Western Cape", *Applied Ergonomics,* vol. 29, no. 6, pp. 481-490.

Botha, W.E. & Bridger, R.S. 1998b, "Anthropometric variability, equipment usability and musculoskeletal pain in a group of nurses in the Western Cape", *Applied Ergonomics,* vol. 29, no. 6, pp. 481-490.

Bring, G., Bring, J., Bovim, G., Schrader, H., Sand, T. & Croft, A.C. 1995, "Neck pain in the general population", *Spine,* vol. 20, no. 5, pp. 624-629.

Buchan, J. 2007, "International recruitment of nurses: Policy and practice in the United Kingdom", *Health services research,* vol. 42, no. 3 II, pp. 1321-1335.

Busch, H. 2005, "Appraisal and coping processes among chronic low back pain patients", Scandinavian Journal of Caring sciences, vol. 19, pp. 396-402.

Butler, D. 2000, "The sensitive nervous system", Australia, NOI group publications

Chiovitti, R.F. & Piran, N. 2003, "Rigour and grounded theory research", *Journal of advanced nursing,* vol. 44, no. 4, pp. 427-435.

Collins, J.W. & Owen, B.D. 1996, "NIOSH research initiatives to prevent back injuries to nursing assistants, aides, and orderlies in nursing homes", *American Journal of Industrial Medicine,* vol. 29, no. 4, pp. 421-424.

Cools, A.M., Declercq, G.A., Cambier, D.C., Mahieu, N.N. & Witvrouw, E.E. 2007, "Trapezius activity and intramuscular balance during isokinetic exercise in overhead athletes with impingement symptoms", *Scandinavian Journal Medicine and Science in Sports,* vol. 17, pp. 25-33.

Coyne, I.T. 1997, "Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries?", *Journal of advanced nursing,* vol. 26, no. 3, pp. 623-630.

Croft, P.R., Lewis, M., Papageorgiou, A.C., Thomas, E., Jayson, M.I.V., Macfarlane, G.J. & Silman, A.J. 2001, "Risk factors for neck pain: A longitudinal study in the general population", *Pain,* vol. 93, no. 3, pp. 317-325.

Daraiseh, N., Genaidy, A.M., Karwowski, W., Davis, L.S., Stambough, J. & Huston, R.L. 2003, "Musculoskeletal outcomes in multiple body regions and work effects among nurses: The effects of stressful and stimulating working conditions", *Ergonomics,* vol. 46, no. 12, pp. 1178-1199.

Daraiseh, N.M., Cronin, S.N., Davis, L.S., Shell, R.L. & Karwowski, W. 2010, "Low back symptoms among hospital nurses, associations to individual factors and pain in multiple body regions", *International Journal of Industrial Ergonomics,* vol. 40, no. 1, pp. 19-24.

de Barros, E.N.C. & Alexandre, N.M.C. 2003, "Cross-cultural adaptation of the Nordic musculoskeletal questionnaire", *International nursing review,* vol. 50, pp. 101-108.

Drach-Zahavy, A. 2009, "Patient-centred care and nurses' health: The role of nurses' caring orientation", *Journal of advanced nursing,* vol. 65, no. 7, pp. 1463-1474.

Edlich, R.F., Winters, K.L., Hudson, M.A., Britt, L.D. & Long, W.B. 2004, "Prevention of disabling back injuries in nurses by the use of mechanical patient lift systems", *Journal of long-term effects of medical implants,* vol. 14, no. 6, pp. 521-533.

Engels, J.v.d.G., J.Senden, T. & van't Hof, B. 1996, "Work related risk factors for musculoskeletal complaints in the nursing profession: results of a questionnaire survey", *Environmental and Occupational medicine,* vol. 53, pp. 636-641.

Eriksen, W. 2003, "The prevalence of musculoskeletal pain in Norwegian nurses' aides", *International archives of occupational and environmental health,* vol. 76, no. 8, pp. 625-630.

Faria, C., Teixeira-Salmela, L.F., Goulart, F. & Moraes, G. 2008, "Scapular Muscular Activity With Shoulder Impingement Syndrome During Lowering of the Arms", *Clinical Journal of Sports Medicine,* vol. 18, no. 130-136.

Finch, C. 2006, "A new framework for research leading to sports injury prevention", *Journal of Science and Medicine in Sport,* vol. 9, no. 1-2, pp. 3-9.

Garg, A. & Owen, B. 1994, "Prevention of back injuries in healthcare workers", *International Journal of Industrial Ergonomics,* vol. 14, no. 4, pp. 315-331.

Geiger-Brown, J. & Trinkoff, A.M. 2010, "Is it time to pull the plug on 12-hour shifts?: Part 1. The evidence", *The Journal of nursing administration,* vol. 40, no. 3, pp. 100-102.

Geiger-Brown, J., Trinkoff, A.M., Nielsen, K., Lirtmunlikaporn, S., Brady, B. & Vasquez, E.I. 2004, "Nurses' perception of their work environment, health, and well-being: a qualitative perspective.", *AAOHN journal : official journal of the American Association of Occupational Health Nurses,* vol. 52, no. 1, pp. 16-22.

Gilworth, G., Bhakta, B., Eyres, S., Carey, A., Chamberlain, M.A. & Tennant, A. 2007, "Keeping nurses working: Development and psychometric testing of

the Nurse-Work Instability Scale (Nurse-WIS)", *Journal of advanced nursing,* vol. 57, no. 5, pp. 543-551.

Glaser, B.G., 1978. "Theoretical Sensitivity: Advances in theMethodology of Grounded Theory.", Sociology Press, MillValley, CA, USA.

Glaser, B.G., 1992." Basics of Grounded Theory Analysis.Emergence versus Forcing." Sociology Press, Mill Valley,CA, USA.

Govender, S. 2004, "Low back pain in the nursing profession-a pilot study", *South African Orthopaedic Journal,* vol. 3, pp. 7-13.

Grimmer-Somers, K., Nyland, L. & Milanese, S. 2006, "Repeated measures of recent headache, neck and upper back pain in Australian adolescents", *Cephalalgia,* vol. 26, no. 7, pp. 843-851.

Grooten, W.J.A. 2007, "Predictors for persistent neck/shoulder pain, medical care-seeking due to neck/shoulder pain and sickness absence", *Clinical rehabilitation,* vol. 21, no. 7, pp. 648-659.

Grooten, W.J.A., Mulder, M., Josephson, M., Alfredsson, L. & Wiktorin, C. 2007, "The influence of work-related exposures on the prognosis of neck/shoulder pain", *European Spine Journal,* vol. 16, no. 12, pp. 2083-2091.

Guez, M., Hildingsson, C., Nilsson, M. & Toolanen, G. 2002, "The prevalence of neck pain: A population-based study from northern Sweden", *Acta Orthopaedica Scandinavica,* vol. 73, no. 4, pp. 455-459.

Guez, M., Hildingsson, C., Stegmayr, B. & Toolanen, G. 2003, "Chronic neck pain of traumatic and non-traumatic origin: A population-based study", *Acta Orthopaedica Scandinavica,* vol. 74, no. 5, pp. 576-579.

Hager, K. 2007, "Fatigue during prolonged intermittent overhead work: reliability of measures and effects of working height", *Ergonomics,* vol. 50, no. 4, pp. 497-513.

Hamberg-van Reenen, H.H., Ariens, G.A., Blatter, B.M., van der Beek, A.J., Twisk, J.W., van Mechelen, W. & Bongers, P.M. 2006, "Is an imbalance between physical capacity and exposure to work-related physical factors associated with low-back, neck or shoulder pain?", *Scandinavian journal of work, environment & health,* vol. 32, no. 3, pp. 190-197.

Hamberg-van Reenen, H.H., Ariens, G.A., Blatter, B.M., van Mechelen, W. & Bongers, P.M. 2007, "A systematic review of the relation between physical capacity and future low back and neck/shoulder pain", *Pain,* vol. 130, no. 1-2, pp. 93-107.

Hamberg-van Reenen, H.H., van der Beek, A.J., Blatter, B.M., van Mechelen, W. & Bongers, P.M. 2009, "Age-related differences in muscular capacity among workers", *International archives of occupational and environmental health,* .

Harcombe, H., McBride, D., Derrett, S. & Gray, A. 2009, "Prevalence and impact of musculoskeletal disorders in New Zealand nurses, postal workers and office workers", *Australian and New Zealand Journal of Public Health,* vol. 33, no. 5, pp. 437-441.

Hernandez, L., Genaidy, A., Davis, S., Guo, L. & Alhemoud, A. 1998, "A study of musculoskeletal strain experienced by nurses", *Occupational Ergonomics,* vol. 1, no. 2, pp. 123-133.

Hildebrandt, V.H. 2005, "The Dutch Musculoskeletal Questionnaire (DMQ)" in *Handbook of Human factors and Ergonomics factors* CRC Press CLC, , pp. 1-7.

Hildebrandt, V.H., Bongers, P.M., van Dijk, F.J.H., Kempers, H.C.G. & Dul, J. 2001, "Dutch Musculoskeletal Questionnaire", *Ergonomics,* vol. 44, no. 12, pp. 1038-1055.

Hilton, M.F. & Whiteford, H.A. 2010, "Interacting with the public as a risk factor for employee psychological distress", *BMC Public Health,* vol. 10.

Horneij, E.H., B., Jensen, I. & Ekdahl, C. 2001, "No significant differences between intervention programmes on neck, shoulder and low back pain: A prospective randomized study among home-care personnel", *Journal of Rehabilitation Medicine,* vol. 33, pp. 170-176.

Hou, J.Y. & Shiao, J.S. 2006, "Risk factors for musculoskeletal discomfort in nurses.", *The journal of nursing research : JNR.,* vol. 14, no. 3, pp. 228-236.

Igumbor, E.U., Useh, U. & Madzivire, D.M. 2003, "An epidemiological study of work-related low back pain among physiotherapists in Zimbabawe", *South African Journal of Physiotherapy,* vol. 59, no. 3, pp. 7-14.

Jester, A.H., A. & Germann, G. 2005, "Measuring Levels of Upper-Extremity Disability in Employed Adults Using the DASH Questionnaire", *Journal of Hand Surgery,* vol. 30A, pp. 1074.e1–1074.e10.

Jones, M.A., Rivett, D.A. 2004, "Introduction to clinical reasoning*",* in "*Clinical Reasoning for manual therapists*", London, Butterworth Heinemann

Josephson, M., Lagerström, M., Hagberg, M. & Hjelm, E.W. 1997, "Musculoskeletal symptoms and job strain among nursing personnel: A study over a three year period", *Occupational and environmental medicine,* vol. 54, no. 9, pp. 681-685.

Josephson, M., Pernold, G., Ahlberg-Hulten, G., Harenstam, A., Theorell, T., Vingard, E., Waldenstrom, M. & Hjelm, E.W. 1999, "Differences in the association between psychosocial work conditions and physical work load in female- and male-dominated occupations. MUSIC-Norrtalje Study Group", *American Industrial Hygiene Association Journal,* vol. 60, no. 5, pp. 673-678.

Kane, P.P. 2009, "Stress causing psychosomatic illness among nurses", *Indian Journal of Occupational and Environmental Medicine,* vol. 13, no. 1, pp. 28-32.

Karasek, R., Brisson, C., Kawakami, N., Houtman, I., Bongers, P. & Amick, B. 1998, "The Job Content Questionnaire(JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics", *J Occup Health Psychol.,* vol. 3, pp. 322-355.

Kebaetse, M., McClure, P. & Pratt, N. 1999, "Thoracic Position Effect on Shoulder Range of Motion, Strength, and Three-Dimensional Scapular Kinematics", *Archives of Physical Medicine and Rehabilitation,* vol. 80, pp. 954-950.

Kee, D. & Seo, S.R. 2007, "Musculoskeletal disorders among nursing personnel in Korea", *International Journal of Industrial Ergonomics,* vol. 37, no. 3, pp. 207-212.

Kengne, A.P., Sobngwi, E., Fezeu, L.L., Awah, P.K., Dongmo, S. & Mbanya, J.C. 2008, "Nurse-led care for asthma at primary level in rural sub-Saharan Africa: The experience of Bafut in Cameroon", *Journal of Asthma,* vol. 45, no. 6, pp. 437-443.

Kuorinka, L., Johnson, B., Kilbom, A., Vinterberg, H., Biering Sorensen, F., Andersson, G. & Jorgensen, K. 1987, "Standardised Nordic Questionnaires for the analysis of musculoskeletal symptoms", *Applied Ergonomics,* vol. 18, pp. 233-237.

Kutash, M., Short, M., Shea, J. & Martinez, M. 2009, "The lift team's importance to a successful safe patient handling program", *The Journal of nursing administration,* vol. 39, no. 4, pp. 170-175.

Lagerström, M., Hansson, T. & Hagberg, M. 1998, "Work-related low-back problems in nursing", *Scandinavian Journal of Work, Environment and Health,* vol. 24, no. 6, pp. 449-464.

Lagerström, M., Wenemark, M., Hagberg, R. & Hjelm, E.W. 1995, "Occupational and individual factors related to musculoskeletal symptoms in five body regions among Swedish nursing personnel", *International archives of occupational and environmental health,* vol. 68, no. 1, pp. 27-35.

Langballe, E.M., Innstrand, S.T., Hagtvet, K.A., Falkum, E. & Aasland, O.G. 2009, "The relationship between burnout and musculoskeletal pain in seven Norwegian occupational groups", *Work,* vol. 32, no. 2, pp. 179-188.

Letvak, S. & Ruhm, C.J. 2010, "The impact of worker health on long term care: Implications for nursing managers", *Geriatric nursing,* vol. 31, no. 3, pp. 165-169.

Li, J., Galatsch, M., Siegrist, J., Muller, B.H., Hasselhorn, H.M. & European NEXT Study group 2010, "Reward frustration at work and intention to leave the nursing profession-Prospective results from the European longitudinal NEXT study", *International journal of nursing studies,* .

Lipscomb, J., Trinkoff, A., Brady, B. & Geiger-Brown, J. 2004, "Health care system changes and reported musculoskeletal disorders among registered nurses", *American Journal of Public Health,* vol. 94, no. 8, pp. 1431-1435.

Lorusso, A., Bruno, S. & L'Abbate, N. 2007, "A review of low back pain and musculoskeletal disorders among Italian nursing personnel", *Industrial health,* vol. 45, no. 5, pp. 637-644.

Louw, Q.A., Morris, L.D. & Grimmer-Somers, K. 2007, "The Prevalence of low back pain in Africa: A systematic review", *BMC Musculoskeletal Disorders,* vol. 8.

Luime, J.K.B.M., H., Verhaar, J. & Burdorf, A. 2005, "High incidence and recurrence of shoulder and neck pain in nursing home employees was demonstrated during a 2-year follow-up", *Journal of Clinical Epidemiology 58 (2005) 407–413,* vol. 58, pp. 407-413.

Luime, J.J., Koes, B.W., Hendriksen, I.J.M., Burdorf, A., Verhagen, A.P., Miedema, H.S. & Verhaar, J.A.N. 2004a, "Prevalence and incidence of shoulder pain in the general population; a systematic review", *Scandinavian journal of rheumatology,* vol. 33, no. 2, pp. 73-81.

Luime, J.J., Kuiper, J.I., Koes, B.W., Verhaar, J.A.N., Miedema, H.S. & Burdorf, A. 2004b, "Work-related risk factors for the incidence and recurrence of

shoulder and neck complaints among nursing-home and elderly-care workers", *Scandinavian Journal of Work, Environment and Health,* vol. 30, no. 4, pp. 279-286.

Lund, F. & Budlender, D. 2009, [online] *Paid Care Providers in South Africa: Nurses, Domestic Workers, and Home-Based Care Workers.* Available at http://www.unrisd.org/unrisd/website/document.nsf/8b18431d756b7085802 56b6400399775/57355f8bebd70f8ac12575b0003c6274/$FILE/SouthAfrica RR4.pdf [downloaded on 20 October 2010]

Madeleine, P. & Madsen, T.M. 2009, "Changes in the amount and structure of motor variability during a deboning process are associated with work experience and neck-shoulder discomfort", *Applied Ergonomics,* vol. 40, no. 5, pp. 887-894.

Makela, M., Heliovaara, M., Sievers, K., Impivaara, O., Knekt, P. & Aromaa, A. 1991, "Prevalence, determinants, and consequences of chronic neck pain in Finland", *American Journal of Epidemiology,* vol. 134, no. 11, pp. 1356-1367.

Mann, R., Gilbody, S. & Adamson, J. 2010, "Prevalence and incidence of postnatal depression: What can systematic reviews tell us?", *Archives of Women's Mental Health,* vol. 13, no. 4, pp. 295-305.

McClure, P., Michener, L.A. & Karduna, A.R. 2006, "Shoulder Function and 3-Dimensional Scapular Kinematics in People With and Without Shoulder Impingement Syndrome", *Physical Therapy,* vol. 86, no. 8, pp. 1075–1090.

McGibbon, E., Peter, E. & Gallop, R. 2010, "An institutional ethnography of nurses' stress", *Qualitative health research,* vol. 20, no. 10, pp. 1353-1378.

Merskey, H. 1994, "Logic, truth and language in concepts of pain", *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation,* vol. 3 Suppl 1, pp. S69-76.

Mitchell, T., O'Sullivan, P.B., Burnett, A., Straker, L., Smith, A., Thornton, J. & Rudd, C.J. 2010, "Identification of modifiable personal factors that predict new-onset low back pain: A prospective study of female nursing students", *Clinical Journal of Pain,* vol. 26, no. 4, pp. 275-283.

Myers, D., Silverstein, B. & Nelson, N.A. 2002, "Predictors of shoulder and back injuries in nursing home workers: A prospective study", *American Journal of Industrial Medicine,* vol. 41, no. 6, pp. 466-476.

Myers, D.J., Kriebel, D., Karasek, R., Punnett, L. & Wegman, D.H. 2007, "The social distribution of risk at work: acute injuries and physical assaults among healthcare workers working in a long-term care facility", *Social science & medicine (1982),* vol. 64, no. 4, pp. 794-806.

Myers, D.J. & Pscomb, H.J.L. 2010, "Informal social status among coworkers and risk of work-related injury among nurse aides in long-term care", *American Journal of Industrial Medicine,* vol. 53, no. 5, pp. 514-523.

Natvig, B., Ihlebæk, C., Grotle, M., Brage, S. & Bruusgaard, D. 2010, "Neck pain is often a part of widespread pain and is associated with reduced functioning", *Spine,* vol. 35, no. 23, pp. E1285-E1289.

Nolan, P. & Smojkis, M. 2003, "The mental health of nurses in the UK", *Advances in Psychiatric Treatment,* vol. 9, no. 5, pp. 374-379.

Owen, B.D. 2000a, "Preventing injuries using an ergonomic approach.", *AORN Journal,* vol. 72, no. 6, pp. 1031-1036.

Owen, B.D. 2000b, "Teaching students safer methods of patient transfer.", *Nurse educator,* vol. 25, no. 6, pp. 288-293.

Owen, B.D., Keene, K. & Olson, S. 2002, "An ergonomic approach to reducing back/shoulder stress in hospital nursing personnel: a five year follow up", *International journal of nursing studies,* vol. 39, no. 3, pp. 295-302.

Palmer, K.T., Walker-Bone, K., Griffin, M.J., Syddall, H., Pannett, B., Coggon, D. & Cooper, C. 2001, "Prevalence and occupational associations of neck pain in the British population", *Scandinavian Journal of Work, Environment and Health,* vol. 27, no. 1, pp. 49-56.

Parliamentary Monitoring Group. 2009 [online] available at http://www.pmg.org.za/node/19587 [accessed on 29 November 2010]

Pelfrene, E., Vlerick, P., Mak, R.P., De Smet, P., Kornitzer, M. & De Backer, G. 2001, "Scale reliability and validity of the Karasek 'Job Demand-Control-Support model in the belstress study", *Work and Stress,* vol. 15, no. 4, pp. 297-313.

Pope, C. & Mays, N. 2009, "Critical reflections on the rise of qualitative research", *BMJ,* vol. 339, no. 7723, pp. 737-739.

Provincial Government of the Western Cape. South Africa, 2010 [online] Available at http://www.capegateway.gov.za/eng/your_gov/5987/, Updated on 10 November 2010 [accessed on 30 November 2010]

Rajbhandary, S. & Basu, K. 2010, "Working conditions of nurses and absenteeism: Is there a relationship? An empirical analysis using National Survey of the Work and Health of Nurses", *Health Policy,* vol. 97, no. 2-3, pp. 152-159.

Reesink, D.D., Jorritsma, W. & Reneman, M.F. 2007, "Basis for a functional capacity evaluation methodology for patients with work-related neck disorders", *Journal of Occupational Rehabilitation,* vol. 17, no. 3, pp. 436-449.

Retief, F.W., Prinsloo, E., Calitz, J. & Barnes, J.M. 2003, "Smoking among nursing staff at Tygerberg Hospital, Cape Town", *South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde,* vol. 93, no. 9, pp. 661-663.

Rustøen, T. & Salanterä, S. 2010, "Swedish nurses are prone to chronic shoulder and back pain because of miserable working conditions and poor leadership?", *Scandinavian Journal of Pain,* vol. 1, no. 3, pp. 158-159.

Sackett D., Richardson, Rosenberg, W., Haynes, R. 2000, *Evidence Based Medicine,* Oxford Churchhill Livingstone, Unites Kingdom.

Schierhout, G.H., Meyers, J.E. & Bridger, R.S. 1995, "Work related musculoskeletal disorders and ergonomic stressors in the South African workforce", *Occupational and environmental medicine,* vol. 52, no. 1, pp. 46-50.

Schierhout, G.H., Myers, J.E. & Bridger, R.S. 1993, "Musculoskeletal pain and workplace ergonomic stressors in manufacturing industry in South Africa", *International Journal of Industrial Ergonomics,* vol. 12, no. 1-2, pp. 3-11.

Schmidt, M.D., Cleland, V.J., Thomson, R.J., Dwyer, T. & Venn, A.J. 2008, "A comparison of subjective and objective measures of physical activity and fitness in identifying associations with cardiometabolic risk factors", *Annals of Epidemiology,* vol. 18, no. 5, pp. 378-386.

Siivola, S.M., Levoska, S., Latvala, K., Hoskio, E., Vanharanta, H. & Keinänen-Kiukaanniemi, S. 2004, "Predictive factors for neck and shoulder pain: A longitudinal study in young adults", *Spine,* vol. 29, no. 15, pp. 1662-1669.

Sim, J., Lacey, R.J. & Lewis, M. 2006, "The impact of workplace risk factors on the occurrence of neck and upper limb pain: A general population study", *BMC Public Health,* vol. 6.

Simon, M., Tackenberg, P., Nienhaus, A., Estryn-Behar, M., Maurice Conway, P. & Hasselhorn, H.-. 2008, "Back or neck-pain-related disability of nursing

staff in hospitals, nursing homes and home care in seven countries-results from the European NEXT-Study", *International journal of nursing studies,* vol. 45, no. 1, pp. 24-34.

Smedley, J., Inskip, H., Trevelyan, F., Buckle, P., Cooper, C. & Coggon, D. 2003, "Risk factors for incident neck and shoulder pain in hospital nurses", *Occupational and environmental medicine,* vol. 60, no. 11, pp. 864-869.

Smith, D.R., Kondo, N., Tanaka, E., Tanaka, H., Hirasawa, K. & Yamagata, Z. 2003, "Musculoskeletal disorders among hospital nurses in rural Japan", *Rural and remote health,* vol. 241.

Smith, D., Mihashi, M., Adachi, Y., Koga, H. & Ishitake, T. 2006, "A detailed analysis of musculoskeletal disorder risk factors among Japanese nurses", *Journal of Safety Research,* vol. 37, pp. 195 – 200.

Smith, D., Wei, N., Kang, L. & Wang, R. 2004, "Musculoskeletal Disorders Among Professional Nurses in Mainland China", *Journal of Professional Nursing,* vol. 20, no. 6, pp. 390-395.

Smith, D.R., Choe, M.A., Jeon, M.Y., Chae, Y.R., An, G.J. & Jeong, J.S. 2005, "Epidemiology of musculoskeletal symptoms among Korean hospital nurses.", *International journal of occupational safety and ergonomics : JOSE.,* vol. 11, no. 4, pp. 431-440.

Smith, D.R. & Leggat, P.A. 2004, "Musculoskeletal disorders among rural Australian nursing students", *Australian Journal of Rural Health,* vol. 12, no. 6, pp. 241-245.

Smith, D.R., Mihashi, M., Adachi, Y., Koga, H. & Ishitake, T. 2006, "A detailed analysis of musculoskeletal disorder risk factors among Japanese nurses", *Journal of Safety Research,* vol. 37, no. 2, pp. 195-200.

Smith, D.R., Ohmura, K., Yamagata, Z. & Minai, J. 2003, "Musculoskeletal disorders among female nurses in a rural Japanese hospital", *Nursing and Health Sciences,* vol. 5, no. 3, pp. 185-188.

Smith, D.R., Wei, N., Kang, L. & Wang, R.-. 2004a, "Musculoskeletal disorders among professional nurses in mainland China", *Journal of Professional Nursing,* vol. 20, no. 6, pp. 390-395.

Smith, D.R., Wei, N., Zhao, L. & Wang, R.-. 2004b, "Musculoskeletal complaints and psychosocial risk factors among Chinese hospital nurses", *Occupational Medicine,* vol. 54, no. 8, pp. 579-582.

Smith, L. 2006, *Investigating the correlation between musculoskeletal dysfunction and computer usage among high school learners*, University of StellenboschEditor.

South African government information, 1997, [online] available at http://www.info.gov.za/whitepapers/1997/health.htm [accessed on 30 November 2010]

South African Nursing Council, 2008, [online] Available at http://www.sanc.co.za/pdf/nursing-strategy.pdf [accessed on 12 November 2010]

South African Nursing Council, 2009, [online] Available at http://www.sanc.co.za/stats/stat2009/Distribution%202009xls.htm [accessed on 12 November 2010]

South African Nursing Council, 2009, [online] Available at http://www.sanc.co.za/policyrights.htm [accessed on 15 November 2010]

Stewart, S. 2002, "Caring for older patients with chronic cardiac disease: an increasing challenge for cardiac nurses in the 21st century", *European journal of cardiovascular nursing : journal of the Working Group on Cardiovascular Nursing of the European Society of Cardiology,* vol. 1, no. 1, pp. 11-13.

Svensson, A.L., Strøyer, J., Ebbehøj, N.E. & Mortensen, O.S. 2008, "Factors predicting dropout in student nursing assistants", *Occupational Medicine,* vol. 58, no. 8, pp. 527-533.

Tannenwald, R. July 2005, New England Public Policy Center and the Massachusetts Health Policy Forum Research and Reality, NEPPC Conference Report Series No. 05-1,Federal reserve bank of Boston, Boston.

Tezel, A. 2005, "Musculoskeletal complaints among a group of Turkish nurses", *International Journal of Neuroscience,* vol. 115, no. 6, pp. 871-880.

Tinubu, B.M., Mbada, C.E., Oyeyemi, A.L. & Fabunmi, A.A. 2010, "Work-related musculoskeletal disorders among nurses in Ibadan, South-west Nigeria: a cross-sectional survey", *BMC musculoskeletal disorders,* vol. 11, pp. 12.

Trinkoff, A.M., Brady, B. & Nielsen, K. 2003, "Workplace prevention and musculoskeletal injuries in nurses", *Journal of Nursing Administration,* vol. 33, no. 3, pp. 153-158.

Trinkoff, A.M., Le, R., Geiger-Brown, J., Lipscomb, J. & Lang, G. 2006, "Longitudinal relationship of work hours, mandatory overtime, and on-call to

musculoskeletal problems in nurses", *American Journal of Industrial Medicine,* vol. 49, no. 11, pp. 964-971.

Trinkoff, A.M., Lipscomb, J.A., Geiger-Brown, J. & Brady, B. 2002a, "Musculoskeletal problems of the neck, shoulder, and back and functional consequences in nurses", *American Journal of Industrial Medicine,* vol. 41, no. 3, pp. 170-178.

Trinkoff, A.M., Lipscomb, J.A., Geiger-Brown, J. & Brady, B. 2002b, "Musculoskeletal problems of the neck, shoulder, and back and functional consequences in nurses", *American Journal of Industrial Medicine,* vol. 41, no. 3, pp. 170-178.

Trinkoff, A.M., Lipscomb, J.A., Geiger-Brown, J., Storr, C.L. & Brady, B.A. 2003, "Perceived physical demands and reported musculoskeletal problems in registered nurses", *American Journal of Preventive Medicine,* vol. 24, no. 3, pp. 270-275.

Trinkoff, A.M., Storr, C.L. & Lipscomb, J.A. 2001, "Physically demanding work and inadequate sleep, pain medication use, and absenteeism in registered nurses", *Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine,* vol. 43, no. 4, pp. 355-363.

Vieira, E.R., Kumar, S. & Narayan, Y. 2008, "Smoking, no-exercise, overweight and low back disorder in welders and nurses", *International Journal of Industrial Ergonomics,* , no. 38, pp. 143-149.

Walker, B.F., Muller, R. & Grant, W.D. 2004, "Low back pain in australian adults. Prevalence and associated disability", *Journal of manipulative and physiological therapeutics,* vol. 27, no. 4, pp. 238-244.

Walls, C. 2001, "Do electric patient beds reduce the risk of lower back disorders in nurses?", *Occupational Medicine,* vol. 51, no. 6, pp. 380-384.

Warming, S., Precht, D.H., Suadicani, P. & Ebbehøj, N.E. 2009, "Musculoskeletal complaints among nurses related to patient handling tasks and psychosocial factors - Based on logbook registrations", *Applied Ergonomics,* vol. 40, no. 4, pp. 569-576.

Waters, T., Collins, J., Galinsky, T. & Caruso, C. 2006, "NIOSH Research Efforts to Prevent Musculoskeletal Disorders in the Healthcare Industry", *Orthopaedic Nursing,* vol. 25, no. 6, pp. 380-389.

Weon, J.-., Oh, J.-., Cynn, H.-., Kim, Y.-., Kwon, O.-. & Yi, C.-. 2010, "Influence of forward head posture on scapular upward rotators during isometric shoulder flexion", *Journal of Bodywork and Movement Therapies,* vol. 14, no. 4, pp. 367-374.

World Health Organization, 1946, preamble to the constitution of the World Health Organisation as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

Wiitavaara, B., Barnekow-Bergkvist, M. & Brulin, C. 2007, "Striving for balance: A grounded theory study of health experiences of nurses with musculoskeletal problems", *International journal of nursing studies,* vol. 44, no. 8, pp. 1379-1390.

Wiitavaara, B., Björklund, M., Brulin, C. & Djupsjöbacka, M. 2009, "How well do questionnaires on symptoms in neck-shoulder disorders capture the experiences of those who suffer from neck-shoulder disorders? A content analysis of questionnaires and interviews", *BMC Musculoskeletal Disorders,* vol. 10.

Wiitavaara, B., Brulin, C. & Barnekow-Bergkvist, M. 2008, "When the body makes itself heard - The experience of bodily illness among people with neck-shoulder problems", *Advances in Physiotherapy,* vol. 10, no. 2, pp. 85-94.

Yeung, S.G., A. & Levin, L. 2004, "Prevalence of musculoskeletal symptoms among Hong Kong nurses", *Occupational Ergonomics,* vol. 4, pp. 199-208.

Yeung, S.S., Genaidy, A., Deddens, J. & Sauter, S. 2005, "The relationship between protective and risk characteristics of acting and experienced workload, and musculoskeletal disorder cases among nurses", *Journal of Safety Research,* vol. 36, no. 1, pp. 85-95.

Yeung, S.S., Genaidy, A. & Levin, L. 2004, "Prevalence of musculoskeletal symptoms among Hong Kong nurses", *Occupational Ergonomics,* vol. 4, no. 3, pp. 199-208.

Appendices

Appendix A.

Table of search strategies and hits for systematic review

Databases	#	keywords/MeSH terms	hits	limits	excluded by title	excluded by duplicates in this data base	remaining	duplicates in other databases	excluded by abstract	excluded by article	total each database
PubMed	1	shoulder pain AND nurses	60	human	40	0	20			1 excluded as duplicate data set	
	2	neck pain AND nurses	80	english	54	17	9		1 in Italian	1 Excluded as in nursing homes	
	3	prevalence AND #1	30		18	12	0			1 excluded as reports on collective health worker	
	4	prevalence AND #2	41		15	25	1			1 excluded as neck and sh data not given specifically	
	5	nurses(MeSH) AND shoulder pain (MeSH)	1		1		0			2 excluded as dealt with students only	
	6	nurses(MeSH) AND neck pain (MeSH)	1		1		0			1 excluded as dealt with peri-operative nurses	
	7	#1 AND risk factors (MeSH)	14		5	9	0				
	8	#2 AND risk factors (MeSH)	23		10	13	0				
	9	Risk factors AND shoulder pain AND nurses	21		6	14	1			1 excluded as a longitudinal study reporting only	
	10	Risk factors AND neck pain AND nurses	30		12	18	0				
total			**301**				**31**			**8**	**22**
Science direct	1	"shoulder pain" AND "nurse" AND "occupational health"	220		216	0	4	3		1 excluded as main aim factor analysis	0
	2	"neck pain" AND "nurse" and "epidemiology"	258		255	2	1	1			0
	3	"neck pain" AND "nurse" AND "occupational health"	103		102	0	1	1			0
	4	"shoulder pain" AND "nurse" AND "epidemiology"	195		192	2	1		1		0
	5	"shoulder pain" AND "nurse" AND "prevalence"	315		311	3	1	1			0
	6	"neck pain" AND "nurse" AND "prevalence"	397		390	3	4	3		1 excluded as peri-operative nurses	1
total			**1488**				**12**	**9**		**2**	**0**
CINAHL											
	1	MW shoulder pain AND MW Nurse	1		1		0				0
	2	MW neck pain AND MW Nurse	1		1		0				0
	3	TX shoulder pain AND TX nurse	33		33		0				0
	4	TX neck pain AND TX nurse	38		36		2	1			1
	5	TX musculoskeletal pain AND TX nurse	37		37		0				0
	6	TX pain AND TX nurse AND TX prevalence	202		200		2	2			0
total			**312**				**4**	**2**			**1**

Databases		keywords/MeSH terms	hits	limits	excluded by title	excluded by duplicates in this data	remaining	duplicates in other databases	excluded by abstract	excluded by article	total each database
Proquest	1	"shoulder pain" AND nurse	9		6	0	6	6			0
	2	" neck pain" AND nurse	6		3	3	0				0
	3	(LSU({SHOULDER}) AND LSU({INJURIES})) AND nurse	3		3		0				0
	4	(LSU({INJURIES}) AND LSU({NECK})) AND nurse	2		2		0				0
	5	((LSU({NURSES}) AND LSU({Epidemiology})))	7		6	0	1	0		1 not conforming with study aims	0
	6	(nurse) AND (musculoskeletal pain)	10		9	1	0				0
total			**37**				**7**	**6**		**1**	**1**
Sport discus	1	" epidemiology" AND nurse(SU)	18		18	0	0				0
	2	" shoulder" AND nurse(SU)	4		3	0	1	1			0
	3	"neck"AND nurse(SU)	3		2	1	0				0
total			**25**				**1**	**1**			0
Cochrane	1	MeSH(shoulder pain) explode 2nd tree	18		18		0				0
	2	MeSH(neck pain) explode all trees	13		13		0				0
total			**31**				**0**				0
total hits			**2194**				**55**	**18**			**24**

Appendix B.   **Summary of reviewed articles:**

a) Settings, samples and measurement tools

study	% quality	country	tool to measure MSD	tool to measure risk factors	urban or rural	setting	final sample size	population	mean age (yrs)	gender	response rate	data collection period
Ahlberg-Hulten 1995	60%	Sweden	self developed questionnaire	Karasek's demand decision latitude questionnaire for job strain	urban	various wards in variety of hospitals	90	registered nurses and nurse aides	34	F	79%	autumn 1989-spring 1992
Alexopolous 2003	90%	Greek	NMQ	Karasek and Theorell's model, 1998, self validated	urban	6 general hospitals	351	nursing staff	37	M and F	84%	Nov 2000-March 2001
Bos et al 2007	90%	Netherlands	NMQ	Dutch questionnaire on work and health, The Leiden Quality of work questionnaire	urban	8 university hospitals	3169	non specialised nurses, ICU nurses, op room nurses and X-ray technologists(for review only extract nurses and ICU (n=2502) as op room/xray tech in Netherlands are not RN's)	37	M and F	for non-spec and ICU nurses: 63.88%	Jan 2001 to Dec 2003
Eriksen 2003	90%	Norway	NMQ	demographics from NMQ	variable	nurses belonging to a nurses union	6485	random sample vocationally active nurse aides belonging to nurses union	not given, (can try work it out from groups?	M and F	62,3% responded but 54% used in final sample	not given
Hou 2006	90%	Taiwan	Modified Chinese version of NMQ, test retest reliability given at 0.902	Modified Chinese version of NMQ wih added questions regarding work	variable	nurses from 16 randomly selected hospitals evenly distributed regards size	3950	nurses employed at the hospitals	ranged 25-34	F	69.7% overall	1 week
Josephson 1997	90%	Sweden	NMQ	job strain: Karasek and Theorell, perceived exertion : self modified scale	? County hospital	1 county hospital	565	various ranks of nurses	not given	F	99 % (all registered on a manual handling course)	same day at a course
Lagerstrom 1995	90%	Sweden	NMQ	self developed, included job strain: Karasek and Theorell	urban	medium sized town	688	registered nurses, state registered, auxillary nurses	35-45 years	F	84%	prior to attending a course, data collected from personnel over 2 year period
Lipscomb 2004	90%	U.S.A (NY and Illinois)	NMQ	health care system changes items selected from Shindul-Rothchild	variable	variety	1163	random sample registered nurses from 2 state registers	45	M and F	74% initial, 58% after exclusion criteria applied	Oct 1999- Feb 2000

v

study	% quality		country	tool to measure MSD	tool to measure risk factors	urban or rural	setting	final sample size	population	mean age (yrs)	gender	response rate	data collection period
Smedley et al. 2003	90%		United Kingdom (England)	NMQ	psychological stressors: Whitehall; workplace activities and other non MS symptoms: self designed	variable	2 similar acutte hospitals	1157	all nurses (inc health care assistants and qualified staff) providing in-patient care excluding mental health nurses, students, agency staff and community staff	39	F	56% initial, 53 % after exclusion criteria applied	unclear
Smith 2003a	80%		Japan	modified Japanese version of NMQ	additional demographic details inc by author	rural	rural teaching hospital	363	registered nurses (surgery, ICU, internal, general, obs and gynae, psychiatry)	29	F	84%	2 weeks, late 2002
Smith 2003b	90%		Japan	modified Japanese version of NMQ	additional demographic details inc by author	rural	3 affiliated hospitals	247	nurses employed at 3 hospitals	33.4	F	75.10%	2 weeks
Smith 2004a	80%		China	Modified Chinese version of NMQ	additional work factors assessed by combination of questions derived from previous studies which included Karasek's theory	urban	large teaching hospital	282	registered nurses within the hospital (surgery, ICU, miscellanous, gynaecology, internal medicine	34	F	92%	2 days
Smith 2004b	90%		China	Modified Chinese version of NMQ	as Smith 2004a	urban	tertiary teaching hospital	180	registered nurses within the hospital (surgery, ICU, miscellanous, gynaecology, internal medicine	mean range: 30 35.5	F	84.10%	2 days
Smith 2006	90%		Japan	modified Japanese version of NMQ	as Smith 2004a	urban	large teaching hospital	844	all nurses employed at the hospital	32.9	F	72.60%	1 week
Tezel 2005	80%		Turkey	NMQ	self designed regarding work factors and general health	urban	4 large general hospitals	120	nursing staff who had worked at least 6 months in their department (either surgery, medical, obstetric and gynaecology, psychiatry, paediatric or neurology)	27	F	100%	not given
Trinkoff 2002	90%		U.S.A (NY and Illinois)	NMQ	not part of purpose of this study	variable	variety	1163	same population and sample group as Lipscomb 2004	45	M and F	74%	Oct 1999- Feb 2000

study	% quality		country	tool to measure MSD	tool to measure risk factors	urban or rural	setting	final sample size	population	mean age (yrs)	gender	response rate	data collection period
Trinkoff 2003a	90%		U.S.A (NY and Illinois)	NMQ	self designed regarding workplace	variable	variety	1163	same population and sample group as Lipscomb 2004	45	M and F	74%	Oct 1999- Feb 2000
Trinkoff 2003b perceived demands	90%		U.S.A (NY and Illinois)	NMQ	Job Content Questionnaire designed by Karasek et al, as well as additional physical demand items suggested by Karasek.	variable	variety	1163	same population and sample group as Lipscomb 2004	45	M and F	74%	Oct 1999- Feb 2000
Yeung 2004	80%		Hong Kong	Modified version NMQ	not measured	urban	2 local hospitals	97	registered nurses sampled from all units (rehabilitation, ICU, Geriatrics, surgery, outpatients, medical, others)	35	F	60%	Dec 2001 to April 2002
Harcombe 2009	80%		New Zealand	NMQ	not the aim of study	not stated	nurses off the Nursing Council of NZ register	181	nurses randomly selected from Nursing Council of NZ Register	46 (median age)	M and F	65%	during 2007
studies not meeting quality eligibility criteria													
Ando 2000	60%		Japan	self developed	self developed	urban	university hospital	457	registered nurses	29.5	M and F	90%	2 weeks
Kee 2007	50%		Korea	Nordic	not measured	not given	hospitals?	162	Various wards	29.9	female	100%	not given
Botha 1998	50%		South Africa	Pheasant 1987	Pheasant 1987	urban	3 private hospitals	100	full time nurses	39	not stated	62%	not given
Warming 2009	60%		Denmark	modified logbook designed by Gonge et al(2001)	task registration sheet, self designed	urban	university hospital	148	nurses	33 for female, 37.2 for men	M and F	100%	3 days
Hernandez, 1998	80%		Kuwait	nordic	not measured	not given	not given	14	registered nurses	42.4	not given	100%	6 days
Daraiseh 2003	60%		U.S.A (midwest)	Nordic Q	Genaidy et al (2000) model of work demands	Not clear	2 private hospitals	34	registered nurses	30	F	100%	1 week

Appendix B continued:
b) Summary of pain definition, statistics and prevalence

					Prevalence estimates (NP: Neck pain; SP: shoulder pain; NSP: neck and shoulder pain)											
study	definition of NSP	NSP recall time period	severity classification/rate	relevant statistical tests	NP point	NP 6m	NP 1m	NP 12m	NP worklife	SP point	SP 1m	SP 6m	SP12	SP worklife	NSP various	NSP 12m
Ahlberg-Hulten 1995	not given	past month	sometimes to almost daily pain	univariate ordinal logistic regressions, multiple logistic regression with job strain and 'positive factors'			25%				12%					
Alexopolous 2003	according to body chart in NMQ	past 12 months	1) MS complaint of neck or shoulder: pain in last 12 m which continued for at least a few hours, 2) Chronic MS pain in past 12 m: pain present in neck or shoulder almost every day in preceding 12 m with minimal presence for at least 3 months, 3) MS complaint of neck or shoulder which led to period sickness absence in past 12	prevalence odds ratios(95% CI), univariate logistic regression , P<0.10, subsequent multivariate logistic regression, confounders: age and gender				47% (chronic:9%)					37% (chronic:7%)			59.83%
Bos et al 2007	according to body chart in NMQ	past 12 months	1) neck or shoulder complaints in the past year 2) severe: prolonged or occurred more than ten times a year	ANOVA P<0.1 for prevalence and risk factors, univariate and multivariate logistic regression												57.87%, severe: 8.96%
Eriksen 2003	according to body chart in NMQ	previous 14 days	not bothered, a little bothered, rather intensely bothered, and very intensely bothered (results only report pain of any intensity, and intense pain)	CH 2 tests for associations	past 14 days 95% CI: 53.5(52.3-54.7)%					past 14 days 95% CI: 47.1(45.9-48.3)%						
Hou 2006	according to body chart in NMQ	work-life prevalence (since entering current job)	yes/no but further qualified pain as pain, soreness, numbness or limited motion	CHI 2 test for associations of age, tenure work, duration employ and pain, logistic regression for risk factors, OR's for each					12.20%					17.10%		
Josephson 1997	according to body chart in NMQ	previous 12 months	symptoms vs ongoing symptoms (10 point scale nil=0 to very intense =10)	Demographic statisctics, estimated Risk ratios				53% (ongoing severe symptoms: 18%)					60% (ongoing severe symptoms 20%)			
Lagerstrom 1995	according to body chart in NMQ	unclear/states ongoing symptoms	severe symptoms (>=6/10) and symptoms (<6/10)	univariate and subsequent multivariate logistic regression				48% symptoms, 16% severe symptoms					53% symptoms, 18%severe symptoms			
Lipscomb 2004	NMQ body chart with operational definition having had relevant symptoms in the past year that lasted 1 week or occurred at least monthly with at least moderate pain (3/5) on average.	previous 12 months	none/no pain, mild/minimal, moderate, severe, worst pain ever in my life	age adjusted odds ratios for being a case, logistic regression				severe: 20%					severe 17%			

study	definition of NSP	NSP recall time period	severity classification/rate	relevant statistical tests	NP point	NP 6m	NP 1m	NP 12m	NP worklife	SP point	SP 1m	SP 6m	SP12	SP worklife	NSP various	NSP 12m
Smedley et al. 2003	pain lasting longer than a day in an anatomival distribution bounded by the occiput and the lower edges of the scapulae, illustrated by a diagram (def. derived from Nordic Q)	lifetime, past 12 m and past month	nil	risk ratios related to incident pain hence not applicable to this review											49% (lifetime), 22% (past month)	35%(past 12 m)
Smith 2003a	references Smith et al, 2003 but unclear there as well	previous 12 months	nil	descriptive statistics for prevalence and logistic regression for risk factors, CHI 2 for				27.90%					46.60%			
Smith 2003b	according to body chart in NMQ	previous 12 months	nil	descriptive statistics for prevalence and logistic regression for risk factors, CHI 2 for				36.8% (95%CI: 31.1-43.0)					61.1% (95%CI: 54.9-67.0)			
Smith 2004a	according to body chart in NMQ	previous 12 months	nil	descriptive statistics for prevalence and logistic regression for risk factors,				45%					40%			
Smith 2004b	according to body chart in NMQ	previous 12 months	nil	descriptive statistics for prevalence and logistic regression for risk factors, CHI 2 and one way ANOVA for differences in				42.80%					38.90%			
Smith 2006	according to body chart in NMQ	previous 12 months	nil	descriptive statistics for prevalence and logistic regression for risk factors, CHI 2 for dichotomous and one way ANOVA for continuous variables relating to demographic,				54.70%					71.90%			
Tezel 2005	according to body chart in NMQ	previous 6 months	1) MS complaint of neck or shoulder: pain in last 6 m which continued for at least a few hours, 2) Chronic MS pain in past 6 m: pain present in neck or shoulder almost every day in preceding 6 m with minimal presence for at least 3 months	descriptive statistics (vaguely reported)	46% (chronic: 25%)							54% (chronic =33%)				
Trinkoff 2002	nordic Q body chart with operational definition of a case having had relevant symptoms in the past year that lasted 1 week or occurred at least monthly with at least moderate pain (3/5) on average. Those who didn't meet full definition, were classified as having musculoskeletal symptoms	previous 12 months	**frequency** : 'almost never' (2x per year) to 'almost always' (daily) **duration**: 7 point scale, less than 1 hour to 'more than 3 months' **pain intensity**: 5 point scale: 'none' to 'worst pain ever'	descriptive statistics fro prevalence point estimate and 95% CI; association examined through correlation analyses				45.8% had neck symptoms, 20% were neck cases					35.1% had shoulder symptoms, 17% were shoulder cases			

X

study	definition of NSP	NSP recall time period	severity classification/rate	relevant statistical tests	NP point	NP 6m	NP 1m	NP 12m	NP worklife	SP point	SP 1m	SP 6m	SP12	SP worklife	NSP various	NSP 12m
Trinkoff 2003a	as per Trinkoff 2002	previous 12 months	as per Trinkoff 2002	individual logistic regressiion for each preventative device												
Trinkoff 2003b perceived demands	as per Trinkoff 2002	previous 12 months	as per Trinkoff 2002	logistic regression to calculate odds of being a case, adjusted for age; generated models of physical demands with confounding factors considered												
Yeung 2004	based on Standardised Nordic Questionnaire (Kuorinka et al, 1987): to be defined as a **case** required high frequency (fairly often to very often) and/or intensity (high and very high) symptoms	previous 12 m and previous 30 days	intensity: 5 point scale from 'very low' to 'very high' frequency: 6 point scale from 'very rare' to 'very often'	descriptive statistics for prevalence point estimates and 95% CI, correlations for associations,			0.38 (0.28, 0.48) 0.93 (	any symptoms 96%(95%CI 92-99) cases: 20% (95%CI 12-27)			0.38 (0.28, 0.48) 0.93 (		any symptoms: 93% (95% CI 88 to 98) cases: 21%(95%CI 13 - 29)			
Harcombe 2009	based on Standardised Nordic Questionnaire (Kuorinka et al, 1987)	previouw 12 months	pain lastng more than one day	CH 2 tests , Fisher for differences in groups, Kruskall Wallis to				52%					39%			
studies not meeting quality eligibility criteria																
Ando 2000	not given	1 m	continuous, occasional, seldom or painless	cox proportional hazards ratios			31.30%				42.80%					
Kee 2007	pain, ache, numbness, burning, swelling, discomfort of neck/shoulder according to Nordic body chart	12 m	3 criterion taken from Smith 2003, and Trinkoff 2002 (Criterion 1: Sx for at least a week or occuring once a month for the past 12 m	CHI 2 test for associations with pain, subcategories for age, weight and length of tenure				17.3% criterion 1					27.2% criterion 1			
Botha 1998	injuries or pain in cervical/shoulder region or in the shoulder/arm region	past 12 months	not given	CHI 2 test for associations of anthropometry and pain												41.00%
Warming 2009	discomforts, aches or pain while conducting work taks, area of NSP not clearly defined	during the 3 workign days	11 box scale ranging 0="none at all" to 10: "worst possible"	univariate and multiple logistic regression											55 % for 3 days prevalence	
Hernandez, 1998	Nordic : specified aches, pain and injuries	lifetime, 12 m and 7 d	nil	ANOVA of different risks associated with various levels of discomfort				55%	lifetime: 64%				43%	lifetime: 64%		
Daraiseh 2003	based on Standardised Nordic Questionnaire (Kuorinka et al, 1987)	past 12 months	moderate to severe aches, pains and discomforts	correlation and multiple logistics regression				24%					18%			

Appendix C.

Consent from Tygerberg hospital nursing management

17/07/2008

Jeanett Clark
24 Dover Place
64 Razmead Avenue
Claremont

Geagte Jeanette

Met ons gesprekvoering tot bogenoemde op 16 Julie 2008 het die volgende aan die lig gekom :

- Navorsingstuk 'n vraelys is wat 10 min neem om dit in te vul.
- U self die vraelyste sal uitdeel en insamel.
- Studie - Epidermologie - begin in Oktober 2008 (Fase I)
     - Lab. Fase 2 - begin in Februarie 2009

In oorlegpleging met Mev R M Basson, Verpleeghoof, word toestemming verleen dat u kan voortgaan met die navorsingsprojek.

U moet ons vroegtydig in kennis stel wanneer u wil begin sodat ons die Areabestuurders van die verskillende modules kan inlig.

U samewerking word waardeer.

MEV G C JOSEPH

WAARNEMENDE VERPLEEGHOOF

Appendix D.

Communication with TBH nursing management

a) <u>Correspondence with Tyberberg hospital nursing manager's secretary requesting consent to survey other wards,</u>

23/04/2009

Dear Marilese

Here is an update on progression of this study:

I have been handing out questionnaires in TBH and have had 60 of the 160 questionnaires returned. I have visited the wards three times in order to encourage the nurses to complete their questionnaires. I will continue to do so, in order to visit a variety of shifts.

The second stage of the study involves taking those nurses who qualify certain criteria, for the LODOX scans. With the low response rate, it has been difficult to recruit sufficient nurses for the second phase.
Is it possible to visit other wards in TBH to ensure a broad spectrum of nurses is surveyed?

Thank you for your help and support.
Kind regards
Janet
_____

23/04/2009

Geagte Janet

Mev Joseph versoek dat jy 'n paar afdelings moet identifiseer bv.
Teater, BP sodat sy dit môre 24 April 2009 op hul Dagbestuursvergadering kan bespreek.

Baie dankie.

MEV G JOSEPH
_____

23/04/2009

Dear Marlise
Thank you for your quick response.
I will have a look at the ward list again and see what would be good.
Theatre nurses, have demonstrated a higher rate of Musculoskeletal
problems in European studies, therefore it may be good to survey them as
well. I would just need to arrange when to deliver the questionnaires so as
not to get in their way.

I also thought of the renal unit where the nurses are maybe not as active,
but occasionally do have heavier lifting tasks.

Another possibility could be J6, paediatrics?

Thank you very much.
Kind regards
Janet

_____

23/04/2009

Geagte Janet

Mev Joseph het met die areabestuurder gepraat met betrekking tot die
vraelyste. Indien jy nog wil uitgee is jy welkom.

Mnr Visagie, Areabestuurder van Teater sis ook bereid om te help.
Indien u vraelyste in Teater wil uitgee kontak Mnr Visagie, tel. nr. 021
938 6466 (verkieslike soogens ±07:00) oor hoe jy te werke moet gaan.

    MEV G JOSEPH

Appendix E.

Letter from the Ethics board for Human Research of the Stellenbosch

University

19 March 2009   **MAILED**

Ms JR Clark
Deptof Interdisciplinary Health Sciences
Division of Physiotherapy
4th Floor, Teaching Block

Dear Ms Clark

"The 2D Biomechanics of the scapula in nurses without shoulder or neck pain: A Lodox study"

ETHICS REFERENCE NO: N08/09/259

RE : PROGRESS REPORT APPROVAL

At a meeting of the Committee for Human Research that was held on 4 March 2009 the progress report for the abovementioned project has been approved and the study has been granted an extension for a period of one year from this date.

Please remember to submit progress reports in good time for annual renewal in the standard CHR format.

For standard CHR forms and documents please visit:
www.sun.ac.za/knowledgepartner/committees_CHR.htm

Yours faithfully

MRS MERTRUDE DAVIDS
RESEARCH DEVELOPMENT AND SUPPORT
Tel: 021 938 9207 / E-mail: mertrude@sun.ac.za
Fax: 021 931 3352

19 March 2009 14:42   Page 1 of 1

Appendix F.

NSPn questionnaire used to capture prevalence and risk associations

The Neck/Shoulder Pain screening tool for nurses (NSPn)

This questionnaire addresses your general health and musculoskeletal symptoms particularly with regards to how this relates to your work as a nurse. We are interested in preventing musculoskeletal problems in nurses. This will bring nurses a better quality of life both at work and home.

Most questions can simply be answered by ticking the yes or no. Please do not think too long about each question and do not consult with your colleagues.

You should only mark one answer, unless otherwise indicated. Choose the answer that in your opinion best describes your situation.

Answer all the questions, unless otherwise indicated.

Please don't skip any questions!

EXAMPLE HOW TO COMPLETE THE QUESTIONNAIRE:

Do you have headaches regularly?   *yes* ☒ *no* ❑

If you make a mistake, correct your answer as is indicated here:

Do you have headaches regularly?   *yes* ❑ *no* ☒

Please do not mark "yes" and "no" for the same question.
Your answers will be treated in the strictest confidence. Apart from the research workers no one will ever have access to the data without your permission, not even your superiors! In the report about this study your personal data cannot be recognised.
Thank you very much for your cooperation!

Reference number
for analysis:

Your demographics

1. What is your age? _____ years
2. What is your gender?
male ☐   female ☐
3. Can you speak, read and understand English well?
yes ☐   no ☐

Your Work

1. Please circle in which module you currently work:

Surgery   Internal medicine
Paediatrics   Oncology
Theatre   Out patients
Intensive care unit   Obstetrics and Gynaecology

2. How long have you worked in this module   _____ years ___ months

3.   Have you worked in any other full time jobs besides nursing within the past 12 months?

                                                yes ☐   no ☐

4.   Do you work left-handed?   yes ☐   no ☐
5.   Do you supervise people in your daily work?   yes ☐   no ☐

6.   Are you working on a full time basis   yes ☐   no ☐

Your General Health

1.   How is your health status in general?

                good ☐   reasonably good ☐   not too bad ☐   poor ☐

2.   How is your physical fitness nowadays (in your opinion)?

                good ☐   reasonably good ☐   not too bad ☐   poor ☐

3 Have you been given a radiological diagnosis of scoliosis/curvature of your spine?

                                                yes ☐   no ☐

page 2 NSPn questionnaire

Your Musculoskeletal symptoms

1. Have you experienced any areas of discomfort, stiffness, pain or tingling over the past 12 months ?   yes □ no □

2. If yes, shade in which areas of the body have you experienced these symptoms
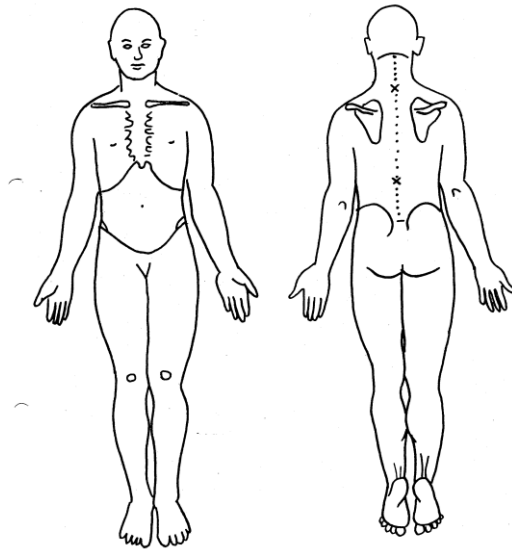
3. During the past 12 months did you have a work or leisure time injury which forced you   to stop working or training
         yes □   no □

4. If yes: tick the region(s) where you were injured in the last 12 months?

neck	shoulders	hips/thigh	head	groin
upper back	elbows	knees	arms	legs
lower back	wrists/hands	ankles/feet	belly	

5. Have you ever had:
     – a frozen shoulder?   yes □   no □
     – a herniated cervical disc?   yes □   no □
     — surgery of your neck/upper limb ?   yes □   no □

Thank you for your participation in this study!

Page 3: NSPn questionnaire

Appendix G.

Reference chart for participants of quantitative study

name	module	reference

Appendix H.

Data capture form for Quantitative survey

a) Demographics: results from three questionnaires

reference	age	gender	english	module	duration	gen health	fitness
	years	m/f	y/n		months	(1/2/3or4)	(1/2/3or4)
average/% total	38.90	90.97%	93.06%	0.00%	120.26	0.00%	0.00%
totals	5602.00	131.00	134.00	0.00	17196.5		
3	42	1	1	surgery	156	4	3
10	38	1	1	theatre	84	4	3
11	39	1	1	theatre	216	4	4

b) Areas of pain (a selection only)

area of pain					
neck	shoulder L	shoulder R	left elbow	right elbow	Lower back
2	5	4	8	6	23
29.37%	29.37%	26.57%	2.80%	2.10%	44.06%
42	42	38	4	3	63
0	0	0	0	0	0
0	0	0	0	0	0
1	1	0	0	0	0

c) Injury and pathology

injury	area injured past 12 months	frozen shoulder	cervical disc	surgery UL
15.38%	0.00%	7.69%	0.70%	2.10%
22		11	1	3
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Appendix I.

Body chart Grid for analysis of shaded areas on NSPn (Grimmer-Somers, Nyland & Milanese 2006)
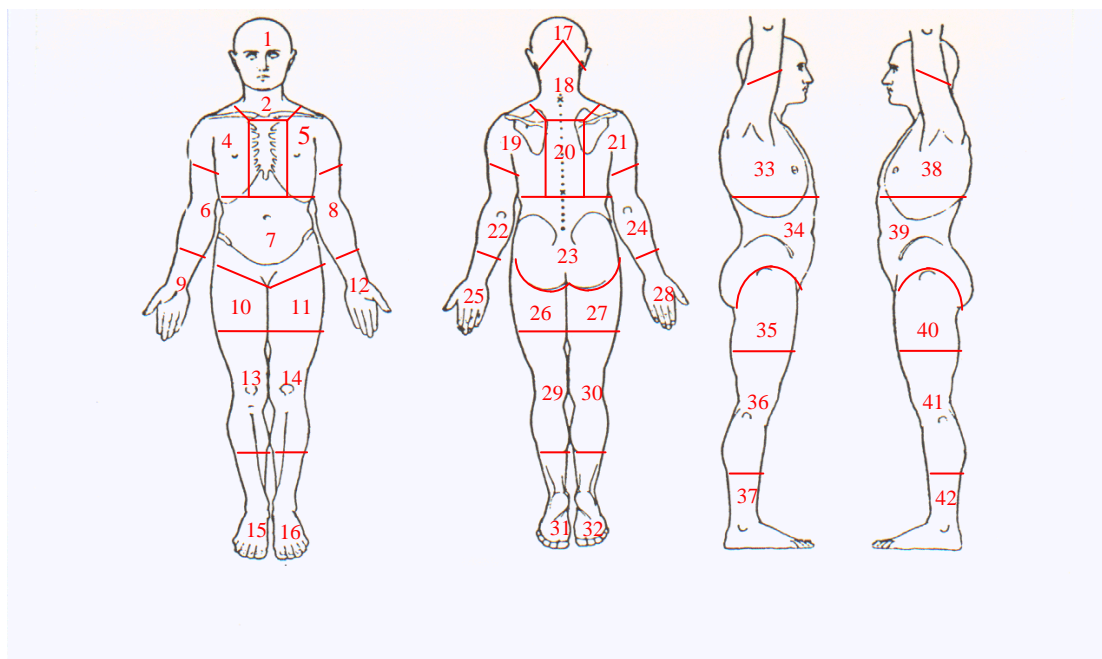
ANTERIOR	POSTERIOR	LATERAL
1. Head	17. Head	33. Right side chest
2. Neck	18. Neck	34. Right side abdomen
3. Sternum	19. Left shoulder	35. Right side hip/thigh
4. Right shoulder	20. Upper middle back	36. Right side knee
5. Left shoulder	21. Right shoulder	37. Right ankle/foot
6. Right elbow	22. Left elbow	38. Left side chest
7. Abdomen	23. Lower back	39. Left side abdomen
8. Left elbow	24. Right elbow	40. Left side hip/thigh
9. Right wrist/hand	25. Left wrist/hand	41. Left knee
10. Right hip/thigh	26. Left hip/thigh	42. Left ankle/foot
11. Left hip/thigh	27. Right hip/thigh	
12. Left wrist/hand	28. Right wrist/hand	
13. Right knee	29. Left knee	
14. Left knee	30. Right knee	
15. Right ankle/foot	31. Left ankle/foot	
16. Left ankle/foot	32. Right ankle/foot	

Appendix J.

Letter to participants of qualitative study

10 September 2009

Dear _(nursing subject)_

You have been selected to take part in a study of the development of neck and shoulder pain in nurses.

The study will involve you being interviewed for approiximately thirty minutes on _____ at _____.

The purpose of the discussion will be to hear from you how **you** feel about your neck and shoulder pain and how **you** feel it has come about. The interview will be recorded in order for the researcher to collect information from the interview and use it to inform the nursing management and nursing policy makers of the problems nurses face with neck and shoulder pain.

Kind regards

Janet Altmann

Masters of Physiotherapy candidate

Appendix K.

Consent form for participants in qualitative study

This form is to be completed by all nurses who are selected to participate in the qualitative study. This form allows you to give your informed consent to be involved in this study. Please read through the form carefully before signing. I am available to answer any questions should you require further information.

Janet Altmann has requested my participation in a research study at Tygerberg Hospital . The research is entitled:

"The epidemiology of neck and shoulder pain in nurses working at Tygerberg hospital"

1. "I have been informed that the purpose of the research is to explore the experiences and perceptions of nurses with neck and shoulder pain.
2. "I recognise that my participation will involve participating in an interview of approximately thirty minutes. I understand that my participation in this research will benefit nurses with shoulder and neck problems and that I will not be remunerated in any way for my participation in this study".
3. "I understand that my name will not be published in the event that the results of this study are published. I will be given an identifying code, which will maintain confidentiality of my records."
4. "I have been advised that participation in this study does not involve more than minimal risk."
5. "I have been informed that I will not be compensated for my participation."

6. "I understand that I may ask the researcher questions regarding the study via personal contact, telephone, or mail (Janet cell: 0793980253, email: jclark@sun.ac.za)."

7. "I understand that in the case of any complaint, I can contact the Chair if the Human Subjects Research Ethics Board of the University Stellenbosch."

8. "I have read the above information. I understand the nature, the risks and the benefits of this project. I knowingly assume the risks involved and understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of potential for further treatment at a later stage. In signing this consent form, I am not waiving any legal claims, rights or remedies. A copy of this consent form will be given to me."

Subject's signature _____Date _____

9. "I certify that I have explained to the above individual the nature, purpose, benefits and potential risks involved in participation in this study. I have addressed any questions that have been raised."

10. "This study conforms with the University of Stellenbosch standards of ethics for research with human subjects. It has been approved by the University of Stellenbosch Committee for Human Research."

11. "I have provided the participant with a copy of this signed consent form."

Janet Altmann _____Date_____
(Researcher)

Appendix L.

Interview questions for qualitative study

<u>**Semi –structured interview opening questions**</u>

1. Tell me your story as to how you experienced your neck and shoulder pain in the past year?
2. *Vertel vir my jou storie oor hoe u jou nek en skouer pyn die afgelope jaar ervaar het?*
3. .What do you feel causes the pain? *Wat voel u veroorsaak die pyn?*
4. Where are the problems of living and working with neck and shoulder pain? *Wat is die probleme om met nek en skouer pyn te lewe en te werk?*
5. Are your problems the same all the time or do they change/have they changed with time? *Bly jou probleme dieselfde die hele tyd of verander die probleme durentyd?*
6. What do you experience when your problems get worse? *Wat ervaar u wanneer jou probleme vererger?*
7. How does it make you feel when your problems are at their worst? That is to say, do you experience the problem along with certain emotions or feelings?
8. *Hoe laat dit u voel wanneer jou probleme op hulle ergste is? Dit will se, ervaar jy sekere emosies and gevoelens saam met die probleem.*
9. How does it make you feel to keep working along with shoulder and/or neck? *Hoe laat dit u voel om saam met hierdie nek en skouer pyn aanhou te werk?*
10. Could you tell me what you feel originally caused the neck and shoulder pain./ *Kan u my laat weet wat die nek en skouer pyn oorspronklik veroorsaak het?*
11. How did the pain first start: was it an accident or was it a gradual onset? *Kan jy my laat weet hoe die pyn begin het? Was dit 'n ongeluk of het dit geleidelik begin?*

12. Are there things that you do in your daily life that seem to maintain or aggravate the problem? *Is daar dinge wat u in jou daaglikste lewe doen wat die problem onderhou of vererger?*

13. Do you feel that work issues have influenced your neck and shoulder pain? Staffing levels? moving and handling patients? Work load ? And beliefs about patient care. How does your health fit in with patient care?(Gilworth, 2007).

14. *Voel u dat werk instansies 'n invloed het op u nek en skouer pyn? Byvoorbeeld, het die hoeweelheid personeel op diens 'n invloed? Die hanteering van pasiente? Die werk lading? Wat glo u oor pasient sorg? Waar pas jou gesondheid daarby?*

15. Are there changes that can be made to the way the ward is physically set up to prevent nurses from injuring their necks and shoulders? *Is daar veranderinge aan die saal se fisiese opset wat gedoen kan word om te verhoed dat verpleegsters hul nek en skouers beseer?*

Appendix M.

Excerpts from the thematic analysis of the qualitative study

Objectives :	Theme: pain experiences and expressions		Theme: coping mechanisms		Theme: influence of 'being a nurse' on beliefs about pain and work	
A. experiences of wellness and illness	categories of pain experiences and expressions	"extracts from the data"	categories of coping mechanisms		categories of beliefs	"extracts from the data"
	frustration, anger, self pity	"you don't know what to do as you don't have lighter work to do" (S1	requesting help	you can ask someone to help you (S1,S5,S6,S8	can't stop your work	"you must go on as if its normal, meanwhile you have pain" (S1
		"you feel kindof that you have neglected yourself" (S2		"we support one another (the nursing team)" (S6		you cant stop your work, you must go on until you get home'(S1, S4, S6, S7, S8
		"you feel sorry for yourself and frustrated" (S2		"The doctor must refer me for physio" (S1		bottomline is that you must work and you don't have a choice" (S2
		"you can't please everyone… its those sort of things that make one angry "(S5		"you go to private doctors" (S5.S6		reluctant to take sick leave due to the workload left for others(S2,S3,S5
		"at night when I relax, then its at its worst" (S3, S6		"the doctor sent me to physio" (S6		There are advantages to night shift , you get overtime, so you overcome the discomfort due to the finances" (S2
		"you feel a bit irritated (with self and the pain) especially when you must do everything and you have pain" (S4	delayed requests for help	"If it gets worse, I must I suppose see my house doctor" (S1		" its not an option (to take time off work)" (S8
		"I feel frustrated.. you still have to do what you need to do that makes you feel frustrated sometimes and it makes you feel incompetent or like you cant do your best actually" (S8		I told the sister when it got very bad (S1,		"when the ward is busy, there is no time to rest" (S4
				you don't go immediately to the doctor when first experience pain, only after a while (S2	Patient comes first	we say that the patient always comes first" (S1, S2, S6, S8
				"I didn't report the pain initially" (S6		"put your own needs aside while giving patient care" S2, S7

Appendix N.

Short CV of Janet Rosemary Altmann

Surname: Altmann (nee: Clark)

Full first names: Janet Rosemary

Gender: Female

Nationality: South African citizen, United Kingdom

ID number: 7503200072086

Date of birth: 20 March 1975

Address: 3 Selby road, Plumstead, Cape Town, 7800

Contact numbers: +27 793980253

Email address : janet.altmann@gmail.com

Qualifications :

- B.Sc. Physiotherapy (Stellenbosch University), 1996
- Post Graduate Diploma in musculoskeletal physiotherapy (Auckland University of Technology), 2007
- 'Foundations of business' Certificate, Stellenbosch University Business School Executive development program, 2008

Work experience

- 2008 to present: sole practitioner at Janet Altmann Physiotherapy
- 2007 to present: part-time lecturer at Stellenbosch University
- 2008-2009: locum at Sports Injuries Clinic, under Helene Simpson, Cape Town, SA
- 2006-2007: Physiotherapist at Sport Science Clinic under Theo Calligeris, Newlands, Cape Town, SA

- 2002-2006: Senior physiotherapist at Sportsmed Canterbury in New Zealand
- 1999-2002: Senior physiotherapist at Bedford Hospital, United Kingdom
- 1997-1999: Physiotherapist at Rob and Kim Sims Physiotherapy, Vincent Pollotti hospital, Pinelands, Cape Town, SA

Professional board memberships
- Health Professions Council of South Africa reg. no. : PT0060569
- South African Society of Physiotherapy reg. no. : CLA0259