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Lee, Charlotte Rebecca

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What is the Prevalence of Low Back Pain in Student Nurses Pre, During and Post Clinical Placement?

Author: Charlotte Rebecca Lee, BSc (Hons) MCSP

Director of Studies: Margaret Goodman
Supervisor: Elinor Clark

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Abstract

Aims: The main aims of the study were to identify the prevalence, severity and duration of low back pain experienced by student nurses prior to, during and after clinical placements. Also, to ascertain whether a history of low back pain is a predisposing factor to concurrent episodes during clinical placement.

Background: The nursing profession exhibits high rates of musculoskeletal injuries, specifically low back pain (Smedley *et al.* 2003). Occupational low back pain is commonly cited as a significant problem for nurses resulting in time off work and where serious, permanent disability. Many nurses have had to leave work due to the disabling effects of low back pain such as incontinence problems, immobility and use of medication. Despite there being a wide range of reasons why nurses are pre-disposed to low back pain such as age, fitness, workload intensity, staffing ratios and equipment, manual handling of patients is viewed as the key causative factor (Hignett 1996). These risks are also prevalent to student nurses where they work alongside qualified nurses in these high risk environments. Little research exists regarding student nurses and their risks to low back pain, giving justification for this research.

Method: A quantitative method was used to investigate the prevalence of low back pain using a questionnaire. The questionnaire was piloted and peer reviewed to increase its validity and reliability. Results were analysed using SPSS version 17 and Microsoft Excel for charts and graphs.

Results: 152 questionnaires were returned. Respondents experienced low back pain before, during and after placement (48.7%, 70.4% and 48.7% respectively). The mean VAS rating before placement is 1.6 (S.D 2.1, range=8), during placement is 3.8 (S.D 2.6, range=9) and after placement is 2 (S.D 2.4, range=8). Spearman's rank test shows there is a weak positive correlation between VAS pain scores of before and during placement (r_s=0.364, p=<0.000), and a weak positive correlation between VAS pain scale before starting the course and since finishing placement (r_s=0.293, p=<0.000). The strongest correlation between the VAS pain scales is experience of low back pain during placement and since finishing placement (r_s=0.665, p=>0.000).

Discussion/Conclusion: Findings from this research provide evidence to suggest that student nurses are at risk of experiencing low back pain during their university course, especially while on clinical placement. The specific risks for this remain unclear, leading to a gap in the literature base where more research is needed to lower the risks and therefore the prevalence of low back pain in student nurses.

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Chapter 1 - Introduction

1.2 ~ Background

This dissertation reports a quantitative study designed to explore the prevalence, severity and duration of low back pain experienced by student nurses pre, during and post clinical placements. The research is being carried out by a Physiotherapist who was a Manual Handling Teaching Instructor. The extent of low back pain being experienced by the students has been highlighted through health risk assessments prior to manual handling lessons which were of concern to the researcher. This chapter begins by describing the justification for the research and a review of the most pertinent issues surrounding the topic including current knowledge, policy and concerns.

Non-specific low back pain (LBP) without radiculopathy (neurological involvement), is defined as pain lasting for less than 6-weeks (acute) or over (chronic), from the lower ribs to the gluteal folds (National Institute of Clinical Excellence (NICE) 2009). Pain may be caused by tension, soreness and/or stiffness in the lower back region which it is not possible to identify a specific cause of pain (NICE 2009). There are several structures in the back which may be involved in causing the pain including the intervertebral discs, nerves, ligaments, muscles and the vertebrae. Some people with non-specific low back pain may experience pain in their upper thighs or legs, but low back pain usually predominates (NICE 2009).

Researchers site the prevalence of low back pain in the nursing population to be 38-80% (Smedley *et al.* 2003, Hignett 2003), and in the student population approximately 26-34% (Kneafsey and Haigh 2003). Currently, statistics from the National Health Service (2012) state that approximately 80% of all people in the UK will experience low back pain at some

point in their lives, a similar prevalence rate to that of the qualified nursing population. In the general population, low back pain is recurrent, people are likely to seek advice for their symptoms and it is one of the commonest reasons for days off work (Waddle and Burton 2000).

Within the whole of the population, workers in any job report higher rates of low back pain in heavier, more physically demanding jobs, however, even those who have lighter jobs or who do not work also report similar symptoms (Waddle and Burton 2000). The majority of causes of low back pain in these cases include lifting, bending and repetitive activities, which are common tasks for nurses and student nurses alike. Waddle and Burton (2000) suggest that the strongest predictor of low back pain prevalence is a previous history of such symptoms, particularly concerning the frequency and duration of episodes, pain radiating down the leg and previous absence from work due to low back pain.

Occupational low back pain is commonly cited as a significant problem for nurses specifically, resulting in time off work and where serious, permanent disability. Many nurses have had to leave work due to the disabling effects of low back pain such as incontinence, immobility and use of medication. Despite there being a wide range of reasons why nurses are pre-disposed to low back pain such as age, fitness, workload intensity, staffing ratios and equipment, manual handling of patients is viewed as the key causative factor (Hignett 1996). Risk factors commonly highlighted within moving and handling practice include poor techniques, especially repetitive bending and lifting for patient handling and movement of stock including the use of condemned manoeuvres, despite implementation of minimal lifting policies (Pennine Care 2008). Provision of equipment, ergonomics, staffing levels, caseload and time available are also contributing factors (Nelson *et al.* 2006). As student nurses are carrying out nursing activity tasks on clinical placements they may also be at risk of

experiencing low back pain. Researchers in this field suggest that preventative measures should be targeted at the undergraduate nursing population to begin to reduce the risk of injury to students (Mitchell *et al.* 2008, Kneafsey and Haigh 2007). However, the true risk of low back pain in student populations remains unclear (Kneafsey and Haigh 2007).

Physiotherapy management is a major part of treatment for low back pain and should be considered alongside drug therapy. Physiotherapists can provide patients with advice and information through exercise classes, manual therapy or acupuncture to manage their symptoms depending on patient choices (NICE 2009). The National Institute of Clinical Excellence (NICE 2009) have implemented guidelines on the management of non-specific low back pain based on clinical research to aid in the management of the symptoms. Other alternative therapies that are popular with the management of low back pain include chiropractors, acupuncture, ice and heat therapy, pilates and yoga. These are often more easily accessible to patients and may be ways in which the public self manage their back pain rather than seeking help from professionals.

Universities in the United Kingdom have the legal duty of preparing their students for clinical placement and carry a key responsibility to protect the health and wellbeing of the students while in the clinical setting (Kneafsey and Haigh 2007). To avoid student nurses being put at risk in the workplace, it is essential that Universities only place students into practice settings where risks are properly controlled, and policies are implemented and strictly followed (Kneafsey, Baker and Robinson, 2003). This is inclusive of having and using correct equipment needed to meet the needs of the patients and staff on the particular wards. However, from personal experience and feedback from student nurses this is not always the case.

There are many clinical perspectives of why low back pain exists in such high proportions in the nursing population. Lack of time and poor environment design are often noted as problems faced by nurses (Kneafsey 2007). Nurses often say they do not have enough time to collect and use the necessary equipment where it is available due to high demands on their time. Nurses are often faced with many patients' health care demands and are often reported to be understaffed (Hignett 2003). It is reported by several researchers (Kneafsey and Haigh 2007, Smallwood 2006 and Hignett 2003) that a culture exists on hospital wards where recommended manual handling techniques are not used due to lack of time, space, equipment and staff so staff reluctant to use correct techniques opt for quicker techniques such as a drag lift where no equipment and less staff are needed.

Chapter 2 ~ Literature Review

2.1 ~ Introduction

The purpose of this literature review is to examine and critique the identified problem of low back pain by determining its causal factors within the limited number of research papers available. The current selection shall review a representative selection of the literature on low back pain in both undergraduate and qualified nurses, poor compliance with recommended techniques, theory-practice gap, occupational socialisation and ergonomics and equipment. The aim of the review is to present an articulation of a comprehensive listing of the variables affecting low back pain prevalence. A summary of the research papers used can be found in Appendix 1.

2.2~ Search Strategy

This literature review used pre-authorised and authorative databases. Amed (EBSCO), CINAHL, Medline and Pedro databases were used to carry out specific searches. Dates of 1995-2010 were included to ensure the evidence is current and relevant to practice. Research from 1995 and onwards was chosen due to the relevance of the implementation of important manual handling legislation such as the Manual Handling Operations Regulations (1995). Reference lists of appropriate articles were also scrutinised for further articles.

Key search words included *'low back pain'*, *'manual handling'*, *'student nurse(s)'*, *'nurse'*, *'occupational injuries'* and *'musculoskeletal injury(ies)'*. These words were searched for individually and in combination to search for all of the available and relevant literature, for example, *'student nurse'* and *'musculoskeletal injury'*, *'nurse'* and *'low back pain'*. See Appendix 2 for detailed search strategies.

Inclusion criteria for the literature search were:

- Research dated from 1995 due to the implementation dates of relevant legislation
- Papers written in English from UK population samples only due to different working policy and procedures elsewhere in the world
- Nursing (students and qualified staff) related papers only to specifically focus on this population of interest.

Appraisal of the literature was intent on the achieving an understanding of each of the studies, the methodology of choice and its influences and understanding of the subject. This was used to justify and inform the research study.

2.3 ~ Low Back Pain in Student Nurses: The Magnitude of the Problem

Low back pain has been widely researched from a variety of different perspectives. Researchers have examined low back pain from the view of the qualified nurse, focusing on the inadequacies of manual handling, the continued use of poor practice and reasons why this still occurs despite the implementation of minimal lifting policies and strict guidelines from the Nursing and Midwifery Council (Smedley *et al.* 2003 and 1995). However, there are an extremely limited number of research papers including student nurses prevalence of low back pain (Kneafsey and Haigh 2007). Most of the research involving student nurses and low back pain focuses on the reasons why student nurses are failing to use recommended techniques while in clinical placements, blaming this for the consequences of low back pain (Cornish and Jones 2006). The Nursing and Midwifery Council (2008) requires nurses, including student nurses, to protect and promote the safety of their patients. This is seen to be a professional prescription and has a robust theoretical basis. However requirements from the Nursing and Midwifery Council (2008) also encourage students and staff to have respect for

their *own* safety but unfortunately patients' needs are often given priority over the safety of the nurse rather than more equal consideration (Barnes 2009).

Three research studies identified from the literature search (Kneafsey and Haigh 2007, Cornish and Jones 2006 and Barnes 2009) incorporated student nurses experiences of low back pain into their research. From these studies, it is estimated that 26-34% of student nurses may be experiencing low back pain at some point in their student careers, which are similar rates to those of qualified nurses (Hignett 2003).

However, limitations within the research hinder the rigour of the results. There are some factors the researchers did not considered in their inclusion and exclusion criteria. Aggravation of previous injuries may have exaggerated low back pain prevalence rates, as well as degenerative changes due to age, disease or disability (Barnes 2009). For example, older student nurses included may have had osteoarthritic changes in their spines, hips or knees leading to pain and functional limitations that were not a direct consequence of clinical work.

The use of self-reported questionnaires were commented on by all authors as a factor that may increase pain estimates, possibly due to ambiguity of experiences reported. For example, having a long time between the experience and reporting it for the study, or respondents not being able to recall the entire experience (Kneafsey and Haigh 2007 and Cornish and Jones 2006). Furthermore, none of these authors (Kneafsey and Haigh 2007, Cornish and Jones 2006 and Barnes 2009) questionnaires were either piloted or peer reviewed, decreasing the validity and reliability of the studies and the data collection tools. As all authors used different questionnaires and questions within them, therefore it is very difficult to make a comparison or obtain a consensus of the results decreasing the reliability

of the studies. The sample sizes of all the research presented are low, and none of the researchers present sample calculations to verify if the data is generalisable. This does therefore decrease the application of the findings to other groups of student nurses, again decreasing the overall rigour of these studies (Sim and Wright 2000). Although, where qualitative data was concerned, all authors provided examples of the semi-structured questions used and member checked their data increasing confirmability.

Kneafsey and Haigh (2007) explored the experiences student nurses had of university and practice based manual handling education, in an attempt to determine the effect of poor manual handling practices on students' low back pain experiences. They identify that UK Universities have the legal duty of preparing their students for clinical placement, including manual handling training, and carry a key responsibility to protect the health and wellbeing of their students while in the clinical setting. Student nurses have also been called upon to ask of their opinions of how they believe the incidence of low back pain can be reduced while on placements (Barnes 2009). Due to many students being at risk of low back pain while in clinical practice, it is essential to understand their views about how to begin to tackle this problem with their safety at the centre of investigation (Barnes 2009).

The review of the literature clearly establishes the magnitude of the problem of low back pain throughout the country. Kneafsey and Haigh (2007) report that 26% of the student nurses sampled had begun to develop musculoskeletal pain since starting their nursing course which is comparable with injury statistics in qualified nurses (Hignett, 2003). Barnes (2009) also reports that 34% of third-year students experienced low back pain during clinical placement within their study (Barnes 2009). The causative factors of low back pain are described as being due to excessive manual handling, clinical incidents and aggravation of previous injuries (Kneafsey and Haigh 2007). Smedley *et. al*, (1995) support this with their research

regarding qualified nurses who found that the strongest predictor of low back pain incidence in nurses was a previous history of the symptom, particularly if the symptoms lasted for over 1 month. This is also comparable to the general population of workers where a systematic review by Waddle and Burton (2000) found strong evidence to suggest that workers were at higher risk of low back pain at work if they had a previous history of the symptoms. Fifteen to twenty-three percent of students have required time off of work due to the pain experienced while in the clinical setting (Kneafsey and Haigh 2007, Barnes 2009). This is again similar, yet slightly exaggerated when looking at sickness statistics of qualified nurses where 11% required time off work due to back pain (Smedley *et. al,* 1996). Waddle and Burton (2000) again in the general population of workers found that low back pain was the most common cause of sickness absence from the workplace.

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (1992) require injuries in the workplace to be reported, and includes injuries to student nurses. Twenty seven percent of Students sampled by Cornish and Jones 2006 reported that they have witnessed qualified nursing staff sustain injuries in the workplace. Hignett (1996) identified from a literature review, that adequate accident and incident reporting is not always used and nurses tend to 'just cope' with low back pain. This may be a concept student nurses have adopted. When asked about recommendations to decrease the prevalence of low back pain in student nurses, needs for adequate equipment provision, encouraging the use of proper manual handling techniques and regular training for qualified staff were identified (27%, 64% and 22% respectively) (Barnes 2009). Students also suggest that all staff should be actively encouraged to adhere to local Trust policies to decrease the prevalence of low back pain, even though this is already a requirement of all nursing staff and student nurses (Nursing and Midwifery Council 2008).

Despite the critical limitations discussed, these single-institution studies do suggest that there are problems in the Universities sampled. It may be that there is a common problem of low back pain in student nurses in other universities, highlighting a need for more rigorous research to help fully explore injury rates in students (Kneafsey and Haigh 2007). This is particularly pertinent as musculoskeletal injuries, especially low back pain, is high among qualified nurses (Hignett 2003).

2.4 ~ Low Back Pain in Qualified Nurses

Two research papers (Smedley *et. al* 1995 and 2003) and two systematic reviews (Hignett 1996 and 2003) were the only articles found during the literature search concerning qualified nurses low back pain prevalence. Although research surrounding musculoskeletal injuries and low back pain is limited concerning student nurses in the UK, research including qualified nurses does have elements of transferability.

The statistics surrounding injury prevalence and absence from work in the NHS are high and a cause for concern, as highlighted by Smedley *et al.* (1995). Even though this is an older study, its relevance and contribution to this area of research is important. In 1996, Hignett undertook a review of the literature surrounding work-related back pain in nurses and again in 2003 with a systematic review. This examined the strategies used to reduce musculoskeletal injuries.

Similarly to the previous research reviewed (Kneafsey and Haigh 2007), the data collection tool used by Smedley *et. al*, (1995) was not reported to be pre-validated or peer reviewed, decreasing the rigour of the results gained. This repeated limitation may indicate there are no validated or reliable data collection tools for this topic, limiting the quality and quantity of research. Smedley *et. al*, (1995) report that incomplete responses to questionnaires could

have resulted in bias, in particular suggesting that completion of the questionnaire may have been higher in nurses with a history of pain, leading to increased estimates of prevalence.

Limitations within the study by Smedley *et al.* (1995 and 2003) also arise from the use of participants from only one hospital, producing bias and limitations in external validity as other hospitals may follow different manual handling polices. The mean age of the participants within the studies concerning qualified nurses was older than that of a student population, and did not include male nurses, limiting generalisation and comparison of results with student populations. It is acknowledged that the same authors produced similar results within two research papers, but this small community of researchers further highlights the need for research in this area (Smedley *et al.* 2003, Smedley *et al.* 1995).

When reviewing this literature an indication of the extent of the problem of low back pain is evident. Smedley *et. al,* (1995) identified that 322 (38%) of qualified nurses sampled had developed low back pain over an average time of 18.6 months. A history of low back pain was a particular risk factor, along with frequent low mood. Waddle and Burton (2000) identified similar findings in the general working population where workers with psychosocial problems were more likely to experience low back pain and have time off work. Risks were higher for nurses who performed repetitive patient handling tasks such as bed to chair transfer, manual repositioning in bed and using a bath hoist (Smedley *et. al,* 1995). Again, this is similar to the results of the systematic review by Waddle and Burton whereby workers performing repetitive twisting, stooping and heavy manual work reported a higher prevalence of low back pain. Results correspond with Government evidence that manual handling activities are commonly a high risk factor for low back pain prevalence, significantly affecting people with low mood and a previous history of low back pain (NICE 2009). Hignett (1996) confirms this in the review of the literature and identifies that nursing

is among the highest risk occupations for back injuries with a point prevalence of approximately 17%, an annual prevalence of 40-50% and a lifetime prevalence of 35-80%. Hignett (1996) continues to mention how this approximation is likely to be underestimated due to the reporting systems and nurses' attitudes towards reporting musculoskeletal injuries.

In a later systematic review (Hignett 2003) conclusions were made regarding interventions that can help to reduce the incidence of musculoskeletal injuries. There is strong evidence to suggest that interventions that are predominantly based on manual handling technique training have no impact on the working practices or injury rates seen in nursing staff. According to Hignett (2003) multifactor interventions based on client, movement and staff risk assessment are most likely to yield safer and better strategies in patient handling. When relating this to the wider working population, interventions to prevent occupational risks has been focused on ergonomic changes, but to what extent this has altered the risk of low back pain in the workplace has inconsistent evidence (Kaplansky 1998).

Even though this research is regarding a qualified sample, similarities could be seen in students. If students have a history of musculoskeletal pain they may be more likely to have recurring episodes while on placements or when qualified (Smedley *et al.* 2003). Due to the physical nature of the students' role, high risk low back pain activities may be undertaken repeatedly, putting them at risk of low back pain, as found in the reviewed studies.

Hignett (2005) produced a research paper in accordance with the Health and Safety Executive Research Report 315, looking at different organisations (hospitals) compliance with the Royal College of Nursing's (RCN) Manual Handling Competencies. The RCN guidance aims to provide definitive recommendations for standards in manual handling training, based on research evidence, in the context of an integrated risk management system (Hignett 2005).

The recommendations are based on principles of change management and participatory ergonomics where the traditional concept of training has moved forward to cover the main aspects of education (for core competencies); supervision of daily practice; and facilitation of problem solving (Hignett 2005). There are 63 competencies listed at three levels for the Back Care Advisor (BCA), Ward Manager and individual Staff Member. The study collected data regarding policies, procedures, supervision and communication (organisational question set), working postures (observations) and decision-making (verbal protocol analysis and semi-structured interviews). Sixteen sites were recruited representing acute and primary care organisations in England, Scotland and Wales. The Back Care Advisor at each site was sent an organisational question set and asked to provide evidence in support of all the answers. This document was scored and used to determine the level of compliance of the organisation. Three tasks were simulated (sitting-to-standing, repositioning-in-sitting and lying-to-lying transfer) and data were recorded about working postures and decision-making processes.

The results from the organisational question set found that overall, the sites recruited had an average score of 47% compliance with the RCN guidelines for manual handling (range 17%-77%). The organisations with higher compliance to the manual handling recommendations posed less risk musculoskeletal injuries (Hignett 2005). Better compliance meant better working postures, better problem solving skills and better use of ergonomic equipment and were more likely to use the correct manual handling techniques (Hignett 2005). This research stands alone to begin to tackle compliance to manual handling policies/competencies within working clinical settings. This has evidence to suggest that training and education are being transferred into the clinical setting and is being used reducing the risks of low back pain. However, it is noted that the presence of an observer may have influenced the choices made by the participants.

The question set used within the research by Hignett (2005) can be used as an indicator of the level of compliance an organisation has with the manual handling competencies. A score of over 50% is said to be likely to be following safe working practices, and organisations with a score of less than 40% will need further investigation into its manual handling practices (Hignett 2005).

2.5 ~ Musculoskeletal Injuries in other health-care Professions

Only two papers (Graham and Gray 2005 and Glover 2002) were found meeting the criteria of the search strategy regarding Physiotherapists. Physiotherapists are another profession, like nurses, who have been investigated with regard to work-related musculoskeletal injuries. International research suggests that, despite their specialist knowledge physiotherapists are not exempt from injuries. Musculoskeletal injury prevalence among physiotherapists varies between studies from 32% prevalence to 91% prevalence (Graham and Gray 2005).

With the use of a qualitative focus group design, Graham and Gray (2005) acknowledge this may have silenced certain individuals through articulation of group norms, owing to occupational socialisation. For example, if senior members of the group were commenting on how they did not use equipment due to lack of time, junior members may have felt they had to say the same. Similarly to the research with student nurses, the number of participants included was low. When interpreting the literature review presented by Glover (2002) it must be borne in mind that the research has been taken from all parts of the world, specifically Europe, Australia and the United States. The professional practices, policies and procedures of manual handling in these countries may be different to the UK, therefore reducing the external validity of the results gained. No inclusion or exclusion criteria were used within the presentation of the literature search, nor key words or databases, significantly decreasing the rigour of the review. The review does however present information gathered

from research within the UK and aids in understanding the issues surrounding work-related musculoskeletal disorders.

Glover (2002) presented a review of the literature surrounding prevalence and prevention of work related musculoskeletal disorders among physiotherapists. This summary (Glover 2002) of international research suggests physiotherapists are at risk of work related low back pain due to the nature of their work which can be repetitive and labour intensive. In particular younger physiotherapists (below the age of 30) are more at risk with a lifetime prevalence of musculoskeletal injury as high as 90%. As many as one in six physiotherapists may move profession or specialty as a result of injury, resulting from the highest risk factor of lifting or transferring patients (Glover 2002). Likewise to the risks identified by Graham and Gray (2005) and the nursing research, failure to take rest breaks, inadequate staffing levels and high caseloads are among the highest risks of developing low back pain. According to Glover (2002) physiotherapists, unlike the nurses, are more likely to seek treatment from a colleague rather than seek help from a GP or occupational health departments.

Graham and Gray (2005) used 2 focus groups to discuss views on musculoskeletal injuries at work, their risk factors, control methods, prevention, experiences and personal impact. Semi-structured questions are presented in the published article increasing transferability (Sim and Wright 2000). Attitudes towards personal risks of getting work related musculoskeletal injuries tended towards believing they were not at risk of serious injuries as they were more likely to take precautions, unlike nurses (Graham and Grey 2005). The group consensus was that they were less likely to be at risk of low back pain because they had better manual handling training than the previous generation and had not developed bad habits. However, the more recently qualified physiotherapists felt more at risk as they had less experience

handling patients (Graham and Grey 2005). This could be related to student nurses due to possible inexperience in manual handling when on clinical placements. The participants' main reason for carrying out preventative strategies was due to their high levels of self-awareness as a result of training, allowing them to be aware of biomechanics and injuries. Additionally, they stated that their knowledge of injuries allowed them to seek early treatment as form of secondary prevention. Interestingly, similarly to nurses, physiotherapists felt they had a moral obligation towards their patients and helped them move knowingly putting themselves at risk (Graham and Grey 2005).

Many of the sited risk factors associated with these musculoskeletal injuries in the workplace are comparable to nurses, including patient transfers, sustained postures and high volume caseloads (Glover 2002). The variety of research also summarises that younger physiotherapists in their first 5 years of practice, under the age of 30 years old are at a higher risk of injury.

2.6 ~ Student Nurses compliance to manual handling – Decreasing the risk of low back pain

During the literature search six research studies (Cornish and Jones 2006, 2010, Smallwood 206, Kneafsey 2000, Jootun and MacInnes 2005, Bellefontaine 2009 and Swain *et al* 2003) were found concerning nurses and student nurses' compliance with recommended techniques. Researchers have used questionnaires and/or interviews to ascertain why student nurses do not comply with the techniques taught in the university setting. Student nurses are required by law, Trust policy and by the Nursing and Midwifery Council to abide with the manual handling techniques taught in Universities (NMC 2008).

All of the identified research within this domain has very important implications to student nurses, but all entail limitations decreasing their rigour. A clear limitation in all of the studies is that they are single-university studies, with the potential of decreasing the generalisation of results (external validity) (Sim and Wright 2000). Other universities may have implemented different policies and procedures in the area of manual handling training and therefore they may have much less or perhaps more experiences and compliance with manual handling techniques. The studies are small scale, and in the case of Cornish and Jones (2010) only have a 29% response rate of 17 participants, which may render their results completely unreliable. Despite a strong quantitative methodology, Swain *et al.* (2003) did not confirm the qualitative data gathered from their questionnaire by means of interview, focus group or member checking. This decreased the trustworthiness of the qualitative data presented, causing its transferability to be questionable. Sim and Wright (2000) state that when using qualitative data collection methods, triangulation must be used in order to show the dependability of the results, increasing the rigour and trustworthiness of the research.

It is important to consider the research regarding compliance to manual handling techniques as manual handling training has been one of the main implementations to reduce the risks of low back pain in health related working environments (Hignett 2003). Research has shown a complexity of reasons as to why Student nurses do not comply with recommended manual handling techniques on clinical placements. Students report constraints within the working environment such as a lack of equipment, staff and time, perceiving situations falsely as an emergency where lifting is permitted, following poor practice seen by senior staff, and not feeling confident to confront poor practice due to fear of failing their placement (Cornish and Jones 2006 and 2010; Smallwood 2006; Swain *et al.* 2003). Survey results also show the extent to which students are being actively encouraged to participate in poor practice with 71% of students being asked to participate and 74% being asked to directly lift a patient

(Cornish and Jones 2006). Jootun and MacInnes (2005) also identified student nurses were taking part in manual handling techniques they knew were condemned to avoid confrontation from other staff:

Fifty percent of students reported they had at some point put themselves at risk of injury (Smallwood 2006). Smallwood (2006) identifies that many of the students perceived there were elements of acceptable risk in their roles, reflecting the previous thoughts of Barnes (2009) that the rights, safety and dignity of the staff are often ignored. Tendency to conform to hazardous practice was unified and identified in supporting research (Kneafsey 2000), which is particularly significant for pre-registration nurses. Results also imply that students prioritise their patients safety over their own, unknowingly putting everybody involved in the manual handling manoeuvre at risk of injury (Smallwood 2006).

Smallwood (2006) reports that 89% of student nurses believed that safe, risk-free working could be achieved although this was dependant on ideal circumstances of adequate staff, equipment and patient compliance. Despite results of poor practice, 88% of the students surveyed felt they had adequate training from their university to perform safe manual handling activities (Cornish and Jones 2006). Students mentioned ways in which poor compliance should be tackled, suggesting the role of their confidence and power issues needing to be addressed by a responsible role model in the clinical setting.

2.7 ~ Qualified Nurses Compliance to Manual Handling – Decreasing the risk of low back pain

Only one research paper was identified in the literature search (Health and Safety Executive (HSE) 2005) reporting specifically about compliance with recommended manual handling techniques of qualified nurses. The HSE (2005) investigated the compliance of organisations to the RCN Manual Handling Training Guidance and Competencies (2003). Data was collected about policies, procedures, supervision, communication, working postures and decision making. This data was collected through a series of observations, question sets and semi-structured interviews. With this mixed model approach trustworthiness, credibility and resultant rigour of the study is vastly increased (Sim and Wright 2000).

Sixteen different NHS organisations were included representing a mix of primary and acute care settings in England, Scotland and Wales making the results generalisable. The Back Care Advisor at each site was sent an organisational question set and was asked to provide evidence to support all of the answers (HSE 2005). This document was scored to determine the level of compliance the organisation had in working alongside the RCN manual handling guidance. Three tasks were also simulated; sitting to standing, repositioning in sitting and lying to lying transfer, and data were recorded about the working postures of the staff and decision-making processes they used.

The results from the organisational question set found that the sixteen sites studied had an average score of 47% compliance (range 17%-77%). It is stated that this question set can be used to identify organisations which are likely to be following professional guidelines and have safe working practices (score >50%) and will also identify the organisations at risk with a score of 40% or less (HSE 2005). Throughout the report it is clearly seen that those organisations scoring higher with compliance with the guidelines scored higher for problem

solving abilities and communication when observed, and had a safer working environment (HSE 2005). The problem-solving ability provides an indication that training and education is being transferred into working practice, with staff using the information to guide their manual handling practices. The content of the training at each site was reviewed and it was found that all of the sites used a mixture of training and educational approaches.

Further research is needed to evaluate the organisational question set score, programme content and effectiveness of reducing musculoskeletal injuries, sickness absence and manual handling incident reporting. This would be recommended in order to achieve a solid training approach and programme content (HSE 2005).

2.9 ~ Occupational Socialisation

Only two research studies (Swain *et al.* 2003 and Cornish and Jones 2010) were found relating to occupational socialization of student nurses. The socialisation process has been described in various terms. Merton (1957) describes it as "The process by which people selectively acquire the values and attitudes, the interests, skills and knowledge, in short the culture of the current group in which they are, or seek to become a member". Whereas Bradby (1990) infers that socialisation is a process whereby individuals acquire the values, attitudes, morals, knowledge and skills, espoused by the group. Du Toit (1995) opposes this simple idea, suggesting that socialisation is the interplay of experience with the individuals past experiences, personal qualities, values and motivations. Howkins and Ewen's (1999) study on the professional socialisation of community-nursing students' supports the theory that is not a linear process, but a dynamic and proactive one. Personal characteristics mix and influence the varied mechanisms in the environments of student experience; such as role instruction, interaction with professional groups, role modeling, role rehearsal and the setting in which learning takes place, to influence role development (Fitzpatrick, While & Roberts

1996, Melia 1987). Student socialisation is therefore a product of personality, past experience and present circumstances (Abbot 2009).

Many of these theories date back to Bandura (1965) who believed that people generally adopt the standards exhibited by exemplary models. Watson and Harris (2000) identified in their research that students' found it an important aspect of their clinical placements to have a good role model to reinforce safe practice. Savage (1998) stated that the three dimensions of role modelling are observational learning, participant modelling and the frequency of contact between learner and the role model. Observational learning is the demonstration of nursing practice by the competent role model.

The way in which nursing students attitudes are influenced by those around them is an important consideration in shaping safe practices. The way in which socialisation is acquired, shapes nursing culture and care (Kneafsey 2000). It is argued that the values, attitudes and skills that nurses learn as they are socialised into the nursing culture, serve to impede attempts to improve patient handling procedures. Many student nurses have been socialised into a culture where the poor manual handling of patients has become the norm of behaviour (COHSE 1992).

Swain *et al.* (2003) researched using a questionnaire to gain information from student nurse respondents about the influences of other staff on their manual handling practices. Respondents were asked to identify from a list of techniques used by the other members of the ward team which techniques they would also use, and to identify which were recommended techniques. Answers revealed that students rated other members of the ward team as being more likely to use non-recommended techniques. Reasons identified for using these techniques were due to time pressures (90%), unawareness of non-recommended

technique (58%) and preference of out-of-date techniques (76%) (Swain *et al*. 2003). To probe the students further specifically into socialization issues, scenarios were presented outlining patient handling tasks. A scenario was given where students were asked what technique they would choose, and what they would do if a staff nurse insisted on using a technique the student believed to be unsafe. Answers demonstrated that the student nurses would use the same technique as the staff nurse (12%) or a similar unsafe, non-recommended technique (32%). A weak negative correlation (Spearman's rho = -0.174, $P = 0.042$) between age of the student nurse and conformity with poor practice with Support Staff was found. This means that the younger the student nurse, the more likely they were to conform to poor practice (Swain *et al*. 2003). This accords with Welsh and Swann's (2002) suggestion that immature students are particularly susceptible to the ward socialization and identifies the influence other staff members have over manual handling practices.

Cornish and Jones (2010) highlight a power struggle between students and their mentors with a perceived hierarchy. Students in the sample from Cornish and Jones (2010) study felt unable to challenge practice in fear of damaging the hierarchical order, increasing the risks posed to the patient and themselves when participating in poor manual handling practices.

One of the main conclusions from the research regarding conforming and socialization is that students see poor practice and are actively encouraged to participate in the poor techniques by people who they view as their role models. This is a contrast with the findings by Kneafsey (2007) where mentors did not recognize their role of being a role model to students in manual handling situations.

The knowledge, skills and attitudes demonstrated to students are incorporated within the 'ward routine' which reflects the established preferences of the ward staff

(McCaugherty1991). Qualified staff therefore have two main influences over student nurses. First as role models they are 'gate keepers' to the knowledge and skills required by nursing students (Abbot 2009) and second they initiate preferences to students ways of working in the established clinical practice of the area (Holland 1999). Holland asserts that this is a continuance of apprenticeship learning, as practices are learnt by working with knowledgeable staff and occurs through trial and error. Holland (1999) states that diploma student nurses continue to expect to fit in by doing the same practical skills as those around them.

Bannister (1996) highlighted a need to tackle the cultural beliefs that reinforce the harsh realisation of resultant patient handling accidents from poor techniques. The NMC (2008) stated that attitudes, behaviors and cultures which prioritise best practice are essential in achieving successful patient handling. Although many authors argue that ergonomic interventions, aids and training are essential to improve practice, problems relating to culture and socialization need to be equally addressed.

2.11 ~ Ergonomics and Manual Handling Equipment – Reducing the risk of injury

Three research papers (Nelson *et al.* 2006, Owen 2000 and Garg *et al.* 1991) were found specifically evaluating the use of equipment and ergonomics related to musculoskeletal disorders, and one incorporating it into a larger systematic review (Hignett 1996).

Ergonomic equipment is the application of scientific information concerning humans to the design of objects, systems and working environments (Ergonomics 2011). Specifically in the health care setting, ergonomics is used in equipment and environmental design to improve working postures, ease the load on the body and therefore reduces the incidence of work

related musculoskeletal disorders (Ergonomics 2011). An ergonomic approach to manual handling is advised in supporting research, but is not always available or suitable for the complexity of patient scenarios. However, Hignett (1996) in a systematic review identifies the importance of its application in practice.

The acute sample of the literature regarding ergonomics and equipment provision has been carried out internationally, and few researchers have followed-up this research in the UK. Limitations of the research are therefore prominent to owing for discrepancies in policy and ways of working in these international studies, specifically from the USA compared to the UK. Specifically to the study by Nelson *et al.* (2006) a high staff turnover (65%) was observed in the nurses sampled, meaning that the staff cohorts pre and post intervention were largely different. Further, since injuries are often cumulative a clear estimate of the exposure to injuries in new staff was unidentified (Nelson *et al*. 2006). Follow up periods of the studies, especially experimental studies is difficult and to achieve rigorous data a minimum of 2-3years is needed to ascertain the true effects of equipment provision.

Nelson *et al.* (2006) investigated the application of an ergonomic approach to patient handling in the hospital environment aiming to provide a safer working environment for nurses. The research interventions included six programme elements including ergonomic assessment protocol, state-of-the-art equipment and a no lift policy. The implementation of ergonomic working resulted in a statistically significant decrease in the rate of musculoskeletal injuries as well as the number of days of modified duties due to injury (Nelson *et al.* 2006). The research findings showed a statistically significant decrease in the number of unsafe patient handling techniques used, rating the provision of equipment followed by the no lifting policy to be the best intervention elements.

Owen (2000) reports that educating health-care workers in body mechanics is not the answer to preventing low back pain, correspondingly identified by Hignett (1996). Changing the physical demands of the job by using assistive devices has been proven to decrease the perceived stress and injury rates of staff and increase patient comfort (Owen 2000). This is evidence that the availability of manual handling equipment and education in how to use them is far more important than educating staff on body mechanics in lowering the injury rates among hospital workers.

A study by Garg *et al.* (1991) was conducted to ascertain how to reduce the incidence of stress on the lower back in nurses as they transferred patients from bed to wheelchair, and back. The experimental research looked at five manual handling techniques and three hoist-assisted techniques. The results of this trial found that it took significantly longer to transfer a patient using a pulling technique and the hoist than it did to manually lift the patients (Garg *et al.* 1991). This may explain why nurses and other health care workers opt for unsafe techniques over using equipment in an effort to save time. In the same way, Bewick and Gardener (2000) identified that nurses and health care assistants often avoided using equipment, which was reported to be due to a lack of equipment and having an over reliance on their physical strength.

2.12 ~ Conclusion: Significance of literature related to proposed research

The reviewed articles all contribute important ideas and suggestions regarding prevalence rate and risk factors associated with low back pain in student and nursing populations. The results all reveal implications about low back pain, with student nurses in particular experiencing a 26% prevalence rate (Kneafsey and Haigh 2007). The reviewed articles suggest that newly qualified nurses are at a high risk of low back pain. When considering the

results from Smedley *et al.* (1995) and Smedley *et al.* (2003), previous history of low back pain is one of the highest risk factors, so student nurses experiencing pain on clinical placements may be likely to experience pain as a qualified nurse. Therefore, subsequent research is needed in the UK to analyse the prevalence of low back pain in student populations, to identify if risks are evident.

Even though the articles reviewed provide important suggestions, there are limitations apparent, resulting in cautious interpretation of the results. Methodological limitations exist in all the relevant literature resulting in a clear lack of empirical research in the UK with student nurses. Therefore, further research is justified to help determine the prevalence of low back pain in student nursing populations.

2.13 ~ Research Questions

Research Question

What are the rates of prevalence, severity and duration of low back pain in student nurses pre, during and post clinical placement?

2.13.1 ~ Supplementary Questions:

1. *Do the students with pre-existing low back pain experience more low back pain during and after placement than those who have no previous history?*

2. *Is there a higher rate of low back pain during clinical placements?*

Chapter 3 ~ Methods

3.1 ~ Introduction

This section will explain why a descriptive, quantitative study has been used, utilising a questionnaire to yield the necessary data to answer the research questions. The questionnaire can be found in Appendix 3.

3.2 ~ Research Design

The design of this proposed theory-testing research will be a survey design of descriptive nature. Descriptive studies answer the question of '*What is going on*' where explanatory research studies answer the question of '*Why is it going on'* (de Vaus 2002). This research is asking '*What'* to determine the answers to the research questions, so it is therefore descriptive. This method will be used as survey techniques have gained considerable credibility from widespread use in academic institutions and the social sciences (Rea and Parker 2005:4). Descriptive studies enable detailed development of an existing theory or field of knowledge, quantify pre-defined variables and identify pre-specified relationships of potential theoretical interest (Sim and Wright 2000).

Advantages and justification for this method include the ability to generalise assumptions about a population from drawing inferences based on data from a proportion of the population. The study can be performed in a natural setting and there is no manipulation of any other attribute or variable as with most experimental research (Sim and Wright 2000). As with experimental research, survey research allows the researcher to have some control over the data collection, for example, the same measurement tool is used, at a specific point in time and in the same setting. All of the participants also satisfy the same inclusion and exclusion criteria creating more control and rigor of the study (Sim and Wright 2000).

Surveys also control for the influence of external factors by using statistical control in data analysis while experiments control these external influences by random allocation to interventions and control groups (de Vaus 2002).

In order to use a survey method, assumptions need to be met such as:

a) The generality of the research being the important factor in this research rather than individual cases as would be the aim with interviews.

b) The participants share a common framework of knowledge; they all have experience of moving and handling and by volunteering to complete the questionnaire have expressed a shared interest in the topic.

c) The data collection method is from a questionnaire, which allows concepts to be quantified into descriptive data sets (Sim and Wright 2000, Hicks 2009).

All of the survey assumptions are met within this research.

All of the studies found within this field of research are based on survey questionnaires. By using this method this research may have comparable aspects allowing this study to effectively build upon existing research. This could strengthen the field of research surrounding the topic of low back pain in student nurses, strengthening evidenced base practice application to practice and education.

A qualitative method with a survey design and use of a questionnaire as the outcome measure was the best method to use for this research. To answer the research questions extensively, information on prevalence and experience of low back pain is needed from as many students as possible, not just a small representative sample. By using a questionnaire for these questions, many students were able to express their experiences, giving an extensive picture of the problem. The research is not dealing with how students found their experiences of low

back pain and is not exploring this in depth, but simply to ascertain whether they did or did not experience low back pain. This type of question is suitable for questionnaire data collection techniques (Sim and Wright 2000). It was also felt that students may be more reciprocal to filling out a questionnaire rather than attending interviews due to confidence, confidentiality and willingness to consent.

3.3 ~ Questionnaire Design

A questionnaire can be described as a formalised series of questions. The data required from the questionnaire depends solely on the research question. For this research the questions were focused towards finding out about participants' experiences of pain, history of pain and intensity of pain, including where this pain was felt (anatomically). The questionnaire used in this research was to enable the collection of quantifiable data. Complex concepts such as behaviour, feelings or emotions can be measured by the construction of rating scales such as the visual analogue pain scale used in this research (Sim and Wright 2000). This quantifiable property allows for comparison between groups or individuals, for example, between visual analogue rating of pain between student nurses in year 2 and year 3.

Open-ended questions can be a part of questionnaires, although providing qualitative data it still does not pass questionnaires into the qualitative research domain. There would have been no opportunity to clarify or triangulate any qualitative data within this questionnaire, although this could be achieved with interviews or focus groups to clarify the data (Parahoo 2006). If the qualitative data is not clarified, it is un-validated and unreliable. This is justification of why open-ended questions were not used in this research as time constraints did not allow for interviews or focus groups, however, this may have strengthened the research and given a broader picture of the problem.

The principles needed to be followed with the design of this questionnaire were as follows:

1. *Reliability:* Ambiguous or vague wording was eliminated by peer review and pilot of the questionnaire, allowing for students to understand the questions, and if given repeatedly to the same student would yield the same answers.
2. *Validity:* Measurement of low back pain was validated through use of a pre-validated tool (VAS for pain).
3. *Response Rate:* Response rate was increased by providing a range of ways to give the questionnaire in, simplicity of the questionnaire and providing time within lessons for completion.
4. *Same meaning for all respondents:* Due to the topic of the questionnaire and the knowledge of the students, it is hoped that all respondents had the same understanding of the questions. However, as pain rating is subjective and often different between individual pain tolerances, this may reduce the validity of the results.
5. *Relevance:* All questions included in the questionnaire were relevant as decided from feedback from peer review and pilot study.
6. *Inclusiveness:* All possible answers were provided so all respondents could answer all of the questions. All alternative responses were mutually exclusive so only one response for each variable is applicable to any respondent.

(de Vaus 2002).

Response formats were either rating scales (Visual Analogue Pain Scales) or Check lists for *'yes or no'* responses. Descriptive data was a mix of blank responses for respondents to fill in the answer, e.g. Age, height, weight, and check lists e.g. gender, branch, year group. These were used as they were the most relevant options to answer the questions specifically.

3.4 ~ Maintenance of Validity and Reliability

Validity

The questionnaire being used has been subjected to peer reviews from other professionals in the field of research, statistics, manual handling and physiotherapy. This has enabled the questionnaire to be more reliable to obtain the data needed to answer the research questions. For example, after peer review the questions posed have been made more specific and unambiguous. Involving experts in the decision making process has utilised expert knowledge, strengthening the methodology (Sim and Wright 2000, Hicks 2009).

Inclusion and exclusion criteria have been adopted as lack of these was one of the major limitations of the reviewed literature. Inclusion and exclusion criteria have enabled a homogenous sample, helping to reduce the number of variables that could have affected the results of the study. Inclusion and exclusion criteria have increased internal and external validity.

Reliability

Reliability of this study is unknown, as no inter-rater or test-retest calculations were made for the outcome measure, namely the questionnaire. If the questionnaire was to be used again on a similar population, reliability may be established. However, the components within the questionnaire such as the visual analogue scale and components of the methodology aimed to increase the reliability of the study.

3.5 ~ Design Components

3.5.1 ~ Study Setting

The questionnaire was distributed in the first manual handling lesson of the term for students in years 2 and 3, to those who met the inclusion criteria. This took place on Coventry University Campus.

3.5.2 ~ Data Collection Tool

The questionnaire devised for this research was not previously used in any other research study. The questionnaire was devised by the researcher to collect information on the research question and aims of the study. The Nordic Musculoskeletal Questionnaire was a pre-validated and reliable questionnaire that was used to inform the construction of the study's low back pain questionnaire, with relation to the presentation of a diagram for clarification of anatomical sites, question wording and loosely its contents, for example, yes and no answering and time periods of symptoms.

The Visual Analogue Scale (VAS) for pain was added to the questionnaire to assess severity of pain experienced, also as a measure of indicating the clinical significance of symptoms. Visual analogue scales have been used by therapists since the late 1960's, introduced by Aiken (1969, cited by Cole *et. al.,* 1995). A visual analogue scale comprises of a 100mm line drawn horizontally or vertically, labelled with two verbal expressions either end to signify the severity of the feeling. A visual analogue scale is commonly used to assess the intensity, severity or magnitude of a subjective experience, for example, pain, breathlessness or fatigue (Fawcett 2009). The most frequently used visual analogue scale is the visual analogue pain scale (VAPS) (Strong *et al.* 1990) which is used for obtaining self-reported data from patients on the intensity of their pain. The pain scale uses a horizontal line measuring 100mm with the opposing ends labelled 'no pain' on the left and 'unbearable pain' on the right (Fawcett 2009). The patient is then asked to mark along the line the point which represents their pain, and the therapist then measures this from the left (range 0-100).

To enable this to be a useful outcome measure, the patient must be able to conceptualise their pain on the continuum. This scale is easy to administer and easy to assess and note changes in the patients reports (Fawcett 2009). This is relevant to this research as the VAPS may be

one student nurses have used on placement with their patients so will be familiar with its use, is unambiguous and quick to fill out within the questionnaire. The visual analogue scale for pain is a useful tool in the clinical setting but is also used popularly in health care related research. Whilst normally it is completed by patients, in the context of this research it is the respondents who were using the scale, not patients.

Boonstra *et al.* (2008) researched into the reliability and validity of the visual analogue scale in patients with chronic low back pain. Results from the test retest data showed moderate to good levels (rho 0.60-0.77) of reliability of the visual analogue scale. Validity level of the visual analogue scale was poor to moderate (rho 0.38-0.43). There is limited research and available data to statistically quantify further validity and reliability of the visual analogue scale, especially in this field of research and population.

The level of data of the visual analogue scale is interval level. It is defined as this because the levels of data are purely quantitative. Interval level data are classified by both order and by a known and equal interval between points. It is also known that the 'zero' level on the scale is not defined as a specific value (Fawcett 2009). When using the visual analogue scale it is important however to consider that the scale is subjective and interpreted differently with each individual that uses it depending on their interpretation of their pain. Interval level data can be classed as parametric data, thereby analysed using parametric statistical tests. However, within this research study non-parametric statistical tests were used as the data did not fully satisfy parametric assumptions of normal distribution, equal variances and a randomised sample (Sim and Wright, 2003).

3.5.3 ~ Procedure

To accommodate for ethical considerations, the questionnaire was distributed by another member of the Clinical Skills Team at Coventry University to eliminate researcher/teacher

bias. The Clinical Skills Instructors were all briefed about the research study and provided with a crib sheet (Appendix 4) containing information about the study and where the Students could hand in their completed questionnaires. The questionnaires were distributed in the Students Manual Handling lessons so they would be able to link the questionnaire with the content of the lesson, allowing it to be contextualised. The Students were given time in their lesson to complete the questionnaire and also had the opportunity to take it out of the lesson to complete in their own time. By allowing the Students to complete the questionnaire in the lesson time, compliance and response rate was hoped to be increased. It was observed that students who completed the questionnaire in the lesson time were more compliant to handing the questionnaire back to the Clinical Skills Instructors.

Respondents were able to hand the questionnaire back to the Instructor in the lesson, to another Instructor on a different day, or to put it in an assigned box outside the Clinical Skills Office. The variety of ways in which students could hand the questionnaires back allowed for ethical considerations of social stigma of pack pain, confidentiality and consent.

3.6 ~ Sampling

The study accessed a non-probability, purposive sample of student nurses from one University Department at Coventry University over a 3 month period. The target population were student nurses currently studying at Coventry University in Years 2 and 3. The sampling was purposive as time and resources were constrained, and this was the most appropriate method. The aim of the research is not to make specific statistical generalisations about the population, but to gain overview about the students' back pain experiences. Non-probability, purposive sampling allows for this. Similarities of this sampling method can also be seen in comparative research (Kneafsey and Haigh 2007). Due to this sampling method

there is no way to assess the quality of the sample representativeness to the population as a whole, which leaves the sample open to criticism (Lynn 2002).

Ideally the sample would have been from a probability sampling method, increasing the statistical representativeness of the data and therefore the generalisation of the results (Sim and Wright 2000). The main advantage of probability sampling is that any anomalies in the population should be randomly distributed throughout the sample so the sample is representative of the population, inferential statistical procedures can be used on the data allowing for generalisation and in an ideal world the results would be 'truer' than non-probability sampling (Lynn 2002). However, in reality these representative samples are difficult to achieve requiring more time, effort and knowledge of the population.

3.7 ~ Recruitment

One hundred and fifty two questionnaires were distributed between each year group to get a representative and comparable sample with other research papers and the population as a whole (Kneafsey and Haigh 2007 and Hicks 2009:74). The research involved Coventry University student nurses only. This may be seen as a limitation however, due to the need for widespread multi-organisation research, as identified in the literature review.

3.8 ~ Ethics and Consent

This study had minimal ethical implications for respondents. The only highlighted ethical consideration for discussion is the issues associated with undertaking research with students by their lecturers / teachers. Issues arise when the researcher / teacher has competing or dividing loyalties with those involved in and around the research. In this case, it is the dual role and importantly the competing responsibilities of the researcher / teacher. Students may

see the teacher as having influential power, and therefore may feel obliged to participate in the research. Here, bias would be the factor affecting the research, but the procedure of the data collection method eliminated this bias. Also highlighted are issues relating to voluntary informed consent, where coercion must be eliminated. This was fully eliminated due to the thorough data collection procedure with another member of staff handing out the questionnaires, and having a confidential procedure to collect the questionnaire back in.

Anonymity of which students completed or handed back their questionnaires was maintained by all students being given a questionnaire, and those who did not wish to complete the questionnaire handed in a blank questionnaire.

Conflict of interest is concerned with compromised professional judgement and reporting scientific data, where conflict of commitment concerns conflictions in carrying out the professional responsibilities for the employer. This affects this research as the funding body is also the employer. To overcome these conflict issues objectivity needs to be maintained, methodological protection against bias and separation of teacher-student and researcher-student relationship (Beach, 1996:28). This was achieved by separating time spent completing ‘teacher responsibilities’ and time spent completing ‘research work’.

Ethical consent forms, participant information sheets and participant informed consent forms can be found in Appendix 5, 6 and 7.

The proposal of this research study was presented to an Ethics Board at Coventry University for approval prior to any data collection. It was identified as low risk. Potential participants were presented with an information sheet which informed the respondents about the study, enabling them to make an informed decision whether to participate. Specific informed

consent forms were also used to confirm that the respondents were consenting for their information to be used. Informed consent was also gained from the Nursing and Midwifery Programme Manager as part of ethical approval.

By using a self completion questionnaire the responses are kept anonymous, and a short talk prior to administration highlighted these points, as well as:

- ✓ Respondents can withdraw at any time.
- ✓ All information will be kept confidential, stored on a secure computer system and in files only the researcher and supervisor will have access to.
- ✓ Anonymity will be assured
- ✓ Coercion to participate will be eliminated by another member of staff distributing the questionnaire.

3.9 ~ Pilot Study

The questionnaire was piloted on a small sample (n=10) of the same population who were recruited for the full study at Coventry University, however, the respondents who participated in the pilot study were excluded from the main study. Ten questionnaires were distributed to Undergraduate Student Nurses from year 2 Adult branch and year 3 Mental Health branch and 9 of the questionnaires were returned completed (90% response rate). The recruitment process of the pilot study was the same as in the main study, where another member of staff gave a brief overview of the study and left the information sheets, consent forms and questionnaires to be picked up by the students who wished to participate.

All of the 10 respondents in the pilot study were also asked to provide feedback on the questionnaire for improvements in the main study via a short feedback questionnaire, which

can be found in Appendix 8. The main feedback received was to include metric and non-metric height and weight, and to space the questions more on the pages so they were all separate. The pilot study also allowed for a data set on SPSS version 17 (Statistical Package for the Social Sciences) to be set up which could then be taken for analysis in preparation for the main study helping to familiarise the researcher with the analysis of results. Results from the pilot study can be found in Appendix 9.

Chapter 4 ~ Data Analysis

This Chapter will describe in detail the descriptive and inferential statistical results gained from the questionnaires. Results will be presented in words, tables and charts to represent the findings.

4.1 ~ Descriptive Statistics

4.1.1 ~ Demographic Information

One hundred and fifty two questionnaires were returned by the respondents over a 3-month period of data collection. Respondents from Year 2 provided 112 (73.7%) of the questionnaires and respondents from Year 3 provided 40 (26.3%). All respondents were from a January Cohort intake where 44 of the respondents (28.9%) were following a Degree programme and 108 of the respondents (71.1%) were following a Diploma programme. Adult, Child, Mental Health and Midwifery branches were included, but no Learning Disability students were included due to the timing of the data collection to meet strict deadlines. In Year 2, Branches were represented for Adult (66 respondents), Mental Health (4 respondents), Child (15 respondents) and Midwifery (27 respondents). In Year 3, Branches were represented as Adult (33 respondents) and Mental Health (8 respondents).

Of all the respondents, 8 were Male (5.3%) and 144 were Female (94%). The average (mean) age of the respondents was 25years (S.D 5.5years), the average height was 163cm (S.D 8.3cm) and the average weight was 66kg (S.D 15kg).

4.1.2 ~ Response Rate

The overall response rate of the study was 84% (n=152). According to supporting literature, a response rate of 60-70% is acceptable to increase confidence in the study and decrease the likelihood of bias (Sim and Wright 2003). Sampling bias from a low response rate can

reduce the external validity and resultant generalisation of the study findings. With a response rate of 84%, confidence can be placed on the findings of having a representative sample and improved generalisation of results.

4.1.3 ~ Frequencies

Low Back Pain Prevalence:

Figure 1: **Stacked bar chart showing 'yes' and 'no' responses to experiences of low back pain pre, during and post clinical placement.**

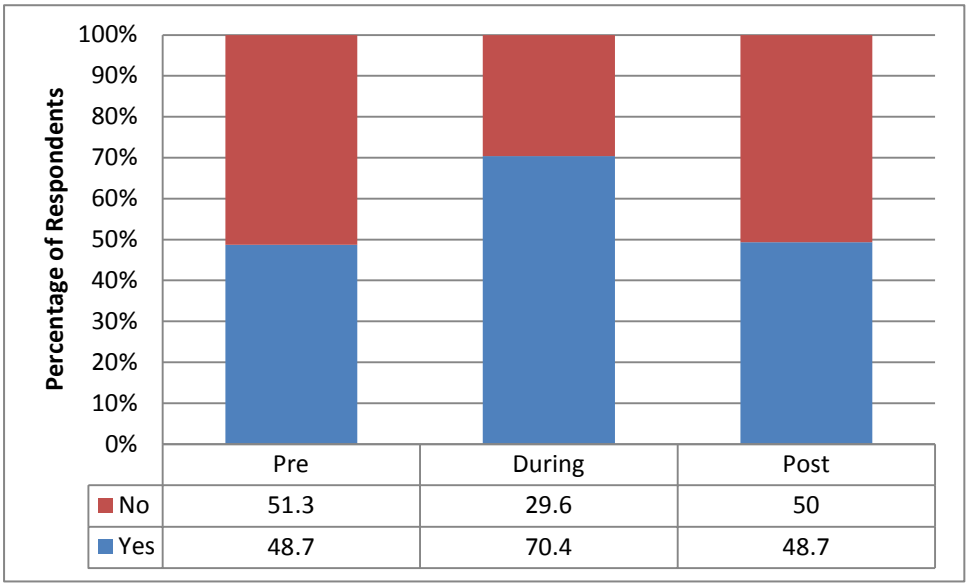

Figure 1 shows that respondents have experienced low back pain pre, during and post placement (48.7%, 70.4% and 48.7% respectively) or have not experienced low back pain (51.3%, 29.6% and 50% respectively).

Pain Duration:

Figure 2: **Graph showing percentage of respondents' experiences of spinal pain duration before, during and after the course**

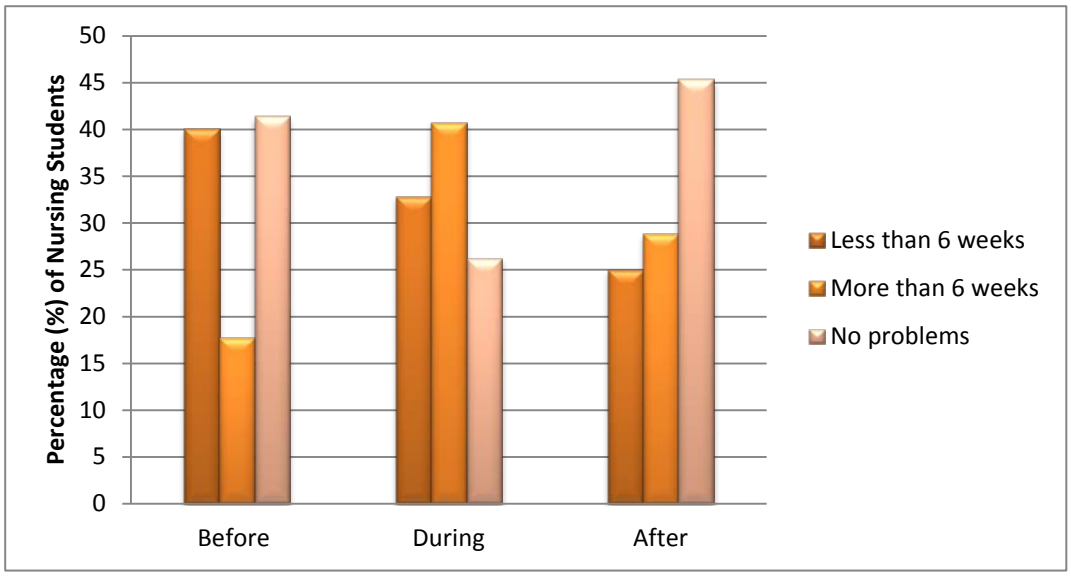

Figure 2 shows that before starting the course a combined total of 57.8% (n=124) of respondents (40% <6 weeks and 17.8% >6 weeks) were experiencing spinal pain. During clinical placements, 40.8% of the respondents (n=62) were experiencing pain lasting over 6 weeks, and 33% were experiencing pain over a period of less than 6 weeks. Since finishing clinical placements 53.9% (n=107) were still experiencing pain of either less than, or more than 6 weeks duration.

Low Back Pain Severity:

Figure 3: **Graph showing mean VAS low back pain ratings for Pre, during and Post Clinical Placement.**

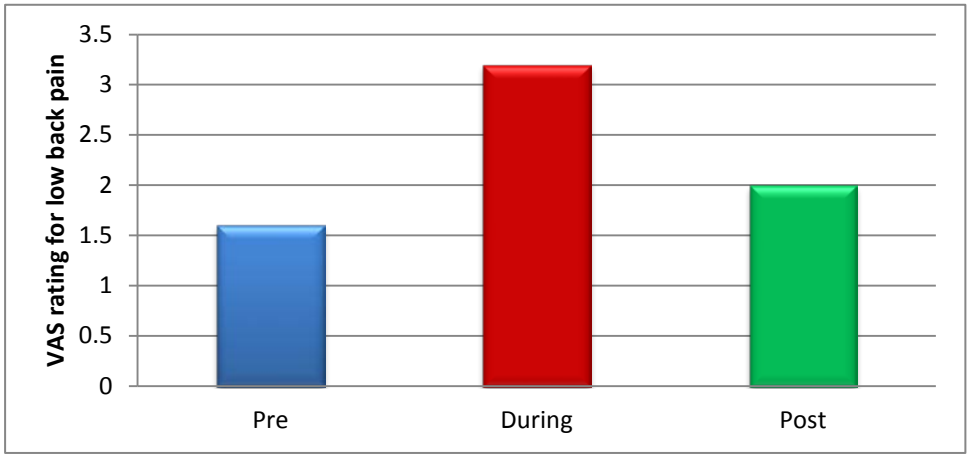

Figure 3 shows the mean visual analogue scale ratings for low back pain reported by the respondents pre (mean=1.6, S.D=2.1), during (mean=3.2, S.D=2.6) and post clinical placement (mean=2, S.D=2.4). During clinical placement, low back pain severity rises by 1.6 on the visual analogue scale and post placement does not fall back to the 'pre placement' level.

Figure 4: **Graph showing percentage of respondents experiencing each VAS rating for low back pain pre, during and post clinical placement.**

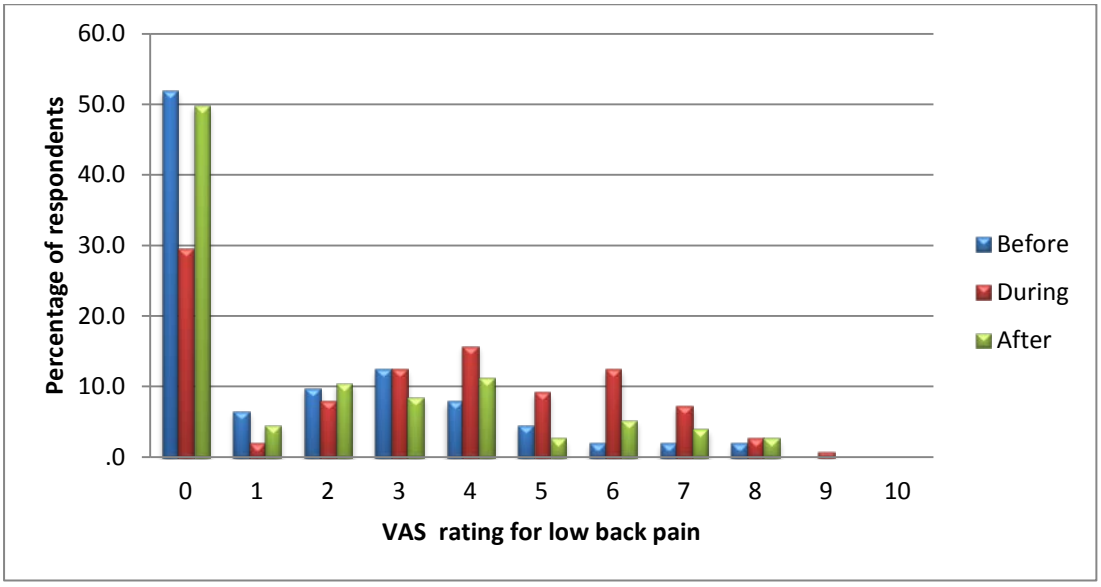

Figure 4 shows the percentage of respondents rating each VAS score pre, during and post clinical placement. VAS ratings 3-8 show that the percentages of respondents experiencing these levels of pain during placement were equal to, or more than pre and post placement levels, showing a rise in VAS rating during placement. A drop in over 23% can be seen by students rating VAS '0' during clinical placement, providing support that approximately 23% of student experience new episodes of low back pain during clinical placement.

4.2 ~ Inferential Statistics

See Appendix 10 for detailed statistical tables.

Data were analysed using a computer software package PASW (Predictive Analytics SoftWare) SPSS Version 17 (Statistical Package for the Social Sciences). This software package allows the input of data and subsequent analysis and presentation of tables, graphs and diagrams.

As the data was not of parametric nature due to not meeting all of the parametric assumptions (randomisation, normal distribution, interval/scale data) appropriate non-parametric tests were used.

- **Differences Between Groups:**
    - *Wilcoxon Matched Pairs Test*
        - Pain Duration Before Course compared to Pain Duration During Placement
        - Pain Duration Before Course compared to Pain Duration After Placement
        - Pain Duration During Placement compared to Pain Duration After Placement

The Sign test and the Wilcoxon matched-pairs (signed-rank) tests are nonparametric statistical tests that can be used with ordinally, or above scaled data when the comparing pairs have two levels and the participants have been matched or the samples are correlated (Academic 2012).

The sign test uses only directional information while the Wilcoxon test uses both direction and magnitude information. Therefore the Wilcoxon test is more powerful statistically than the sign test and was used to analyse the data in this study (Academic 2012).

- *Friedman's 2-way Analysis of Variance Test*
  - Pain Duration Before Course compared to Pain Duration During Course compared to Pain Duration After Course.

Testing for differences between the variables gave a statistically or non-statistically significant result (StatSoft 2010).

- **Relationships Between Variables:**
  - *Spearman Rank Correlation Coefficient Test*
    - VAS Pain rating pre placement related to during placement
    - VAS Pain rating pre placement related to after placement
    - VAS Pain rating during placement related to after placement

Testing for relationships between the variables will give a positive or negative correlation so a pattern of recurrence can be predicted (StatSoft 2010).

4.3 Statistical Results:

- *Testing for differences between VAS before, during and after clinical placements:*

The Friedman's Test of differences between two or more groups shows that there is a statistically significant difference between the median values of the VAS pain scores for before, during and after placements (p=<0.000).

The Wilcoxon Signed Ranks Test of differences between two groups shows that there is a significant difference between VAS pain scores before and during placement (p=<0.000) and during and since finishing clinical placement (p=<0.000). However, there is no significant difference between the VAS pain scores of before and since finishing clinical placement (p=0.108).

- *Testing for correlations (relationship) between VAS scores before, during and after clinical placements:*

Spearman's rank correlation coefficient test significance was set at p=<0.01 (<1%). Spearman's rank test shows there is a weak positive correlation between VAS pain scores of before and during placement (r_s=0.364, p=<0.000). This means that if respondents had experienced low back pain before starting the course, they were more likely to experience it during placement.

Spearman's rank correlation coefficient also shows there is a weak positive correlation between VAS pain scale before starting the course and since finishing placement (r_s=0.293, p=<0.000). This means that if respondents had experienced low back pain before starting the course, they are more likely to experience it when finishing placement.

The strongest correlation between the VAS pain scales is experience of low back pain during placement and since finishing placement (r_s=0.665, p=<0.000). This means that if respondents experienced pain during clinical placement, they were more likely to experience pain when finishing clinical placements.

Chapter 5 ~ Discussion

This chapter will discuss the results of this study in relation to the prevalence, severity and duration of back pain experienced by respondents pre, during and post clinical placement. It is also an aim to discuss the results in relation to the supplementary questions of this study of whether students experiencing low back pain prior to commencing the course experience more low back pain whilst on clinical placement compared with those students with no previous history. The limitations of this study will also be examined. The discussion has been set in this way to enable each aim of the study to be dealt with separately, and in turn related to existing research.

Internationally, the nursing profession inclusive of students has exhibited high rates of low back pain and occupational injuries (Hignett 2003, Kneafsey and Smallwood 2009). Despite there being a range of factors which may pre-dispose nursing staff to these injuries, manual handling is viewed as the key causative factor (Kneafsey and Smallwood 2009). In accordance to UK legislation and professional requirements moving and handling as a therapeutic intervention is taught prior to the students' first placement and then annually, with the expectation that further in-depth instruction will be gained while in the clinical setting (Kneafsey and Smallwood 2009).

Previous studies on the prevalence of low back pain in the student nursing population have been sparse with little methodological quality. However, by using a piloted and peer-reviewed questionnaire the rigour of this study is increased. Many of the earlier studies have included qualified staff whereas this study almost stands alone with limited research involving student nurses.

Research Question: What is the prevalence, severity and duration of low back pain pre, during and post clinical placement?

The findings from this study suggest that approximately half the respondents have experienced low back pain prior to commencing clinical placement. The prevalence rate of low back pain rises dramatically to 70% during clinical placement, and decreases to half of the respondents experiencing low back pain once clinical placement is finished. This has evidence to suggest that there is a higher prevalence of low back pain during clinical placement (supplementary question 2).

From these findings it can therefore be supported that approximately 20% of respondents develop low back pain while on placement. Kneafsey and Haigh's (2007) study found that 26% of student nurses developed musculoskeletal pain while in the clinical setting, with 48 students specifically citing the cause to be as a result of manual handling. Experiences of low back pain when not on clinical placement, as found through this study are in agreement with national statistics that suggest that approximately 49% of adults in the UK will experience low back pain at some point in the year (Back Care 2011).

Barnes (2009) found a lower prevalence rate of low back pain in student nurses prior to starting clinical placement of 26% (n=27). However differences in the methodological approach, data collection tool and a lower number of respondents used by Barnes (2009) may have contributed to the large difference in findings. Hignett (1996) states that qualified nurses experience a 35-80% prevalence rate of low back pain, which is mirrored in this student population. Swain *et al*. (1995 and 2003) rate the prevalence of low back pain in qualified nurses to be 38%, a much lower rate than found in this student population.

Although the average score on the visual analogue pain scale rating and prevalence rose while the respondents were in the clinical setting, clinically it could be said this rise in pain is somewhat clinically insignificant as it was low. However, it does give rise to the theory that low back pain in student nurses is not a progressive problem but a recurring problem. Low back pain in the general population is also generally recurring and is regarded as the true nature of the problem (NICE 2009).

Reasons as to why low back pain prevalence increased is still unclear from this research as questions regarding work type, intensity, accidents and manual handling were not asked of the students. However, the HSE (2005) give poor postures, stress at work, mental health state, lifting of patients, lack of training and the working culture as risk factors associated with back pain in nursing. This is in line with many other researchers (Jootun and MacInnes 2005, Barnes 2009, Kneafsey and Smallwood 2009, and Hignett 2003) who provide evidence to suggest these are the most common risk factors in clinical practice. It may be necessary to consider the affect of different wards such as 'heavy' wards where more patient handling occurs such as on stroke units, medical wards, intensive care or areas of little manual handling such as outpatients or specialist clinics. No research regarding this has been identified which highlights another area of little or no specialist research.

The level of severity for respondent's experiences of low back pain was identified by use of a visual analogue pain scale. Prior to commencing the course, the average (mean) VAS rating was 1.6; during placement was 3.2 and after placement was 2.

However, when looking at these average visual analogue scale pain ratings, they are low and anecdotally clinically insignificant. From experience in a physiotherapy outpatients department, patients who require treatment for low back pain typically present with a visual

analogue scale pain rating of 7 and over. However, the range shows important figures. Although a questionnaire is aimed at giving a representative picture of a given population, here it was thought important to pick out individual data due to the severity of individual visual analogue pain ratings of some students. The range of low back pain visual analogue scale ratings reported are clinically significant in many cases, for example, 21% of respondents reporting pain prior to placements rated their low back pain at 5-9 on the visual analogue scale, 46% rated this level during clinical placement and 29% rated this level after clinical placement. These ratings are clinically significant and are at levels equal with patients presenting to GP surgeries and Physiotherapy practices for treatment. Further research is required to determine whether students seek medical help for low back pain experienced, and if so why; what they do; and if it helps.

The visual analogue scale ratings as analysed by the Wilcoxon Signed Ranks Test for differences between groups showed a statistically significant difference between visual analogue scale rating for low back pain prior to- and during clinical placement. This supports the statement that there was a significant change in low back pain experienced by the respondents while in the clinical setting. This is in line with much of the research regarding the prevalence of occupational low back pain, where activities within the clinical setting are significant risks to staff and students alike (Hignett 2003).

Before starting the course, 40% of respondents were experiencing acute spinal pain for a period of less than 6 weeks, and 18% of respondents for over 6 weeks, determining that the majority of respondents did not have chronic pain before starting the course. During clinical placements the prevalence of chronic pain experienced rose to 40% of respondents experiencing chronic pain (pain lasting over 6 weeks), and for 33% of respondents pain lasted less than 6 weeks. This suggests that during clinical placement, for the majority of

respondents experiencing pain, their pain would be classified as chronic pain. After finishing clinical placement, 29% of respondents (an increase by over 10%) were left with chronic pain, and a quarter of respondents (a drop of 15% from before clinical placements) were experiencing acute pain of less than 6 weeks duration.

These findings of the prevalence and duration of pain suggest the necessity to begin to find solutions to protect students from injury. Kneafsey and Smallwood (2009) suggest that some universities have a hesitant attitude towards practice placement skills and education, and that there is a lack of clear boundaries of which skills are best taught in the university or practice setting. A starting point for this may be collaborative working advised by many researchers (Kneafsey and Smallwood 2009, Barnes 2009, Hignett 2003), to monitor and support student progression and fitness to practice, along with the practices within clinical and non-clinical settings.

It is not known if any of the respondents required time off work due to their back pain, sought help from their GP or Occupational Health. When people experience chronic low back pain many other health problems can arise in conjunction with these symptoms. People's mobility can be affected with their ability to perform everyday activities impaired, including tasks at work. Frequent low mood can be associated with low back pain (Smedley *et al.* 1995), conjuring theories pointing towards the possibility of students' mental health being affected by experiencing low back pain. These are of course simply anecdotal but potentially could lead to a reduction in the quality of patient care. This could occur physically, as when nurses are in pain they may not be able to provide the necessary mobility, physical or personal care to patients due to a lack of mobility in themselves, or restrictions in movement due to pain. Neglect of patients could also occur due to the mental problems associated with low back

pain, rendering the nurses unable to support patients emotionally, or hurrying non-physical care such as paperwork or drug-rounds.

No other research has been identified that has investigated the duration of low back pain in relation to clinical exposure in students or qualified nurses and hence, there is no comparable data. However, these findings and anecdotal evidence suggest that the incorporation of the management of low back pain within manual handling training may be beneficial for student nurses. Increasing their knowledge of risks, symptoms, preventative strategies and treatments, much like physiotherapy treatment would include in the outpatient setting, may empower the students to self-manage their symptoms. This in turn may lower the prevalence of low back pain and duration of their symptoms, increasing ability for students and staff alike to remain in work, resulting in a possible decrease in sickness time spent off work due to low back pain.

Supplementary question 1) Do respondents with pre-existing low back pain experience more pain during and after clinical placement than those with no previous history?

Using the Spearman's rank correlation coefficient to look at the relationship between visual analogue scale rating before and during clinical placement, a statement can be made to suggest that if students are experiencing low back pain before starting the nursing course, they are more likely to experience low back pain while on clinical placement. The statement of 'respondents experiencing high severity of low back pain (higher VAS rating) before starting the course are likely to experience a higher severity while on clinical placement' can be supported. This is in agreement with the research by Smedley *et al.* (1995), where the strongest predictor of low back pain in the clinical setting was a previous history of low back pain. This may have implications for training where student presenting with a history of low

back pain could be given lighter tasks, more training or pre-placement rehabilitative exercises to lower their risks of recurring low back pain.

Spearman's rank correlation coefficient also shows there is a weak correlation between visual analogue pain scale before starting the course and since finishing placement. This suggests that, if respondents had experienced low back pain before starting the course, they are likely to experience it when finishing placement.

One of the strongest correlations was seen between visual analogue scale rating of low back pain during and since finishing clinical placement, suggesting that the respondents experiencing pain during placement are more likely to experience pain after clinical placement. Respondents who rated their low back pain higher on the visual analogue scale during clinical placement were more likely to rate their low back pain higher when clinical placement was finished compared with respondents rating their low back pain lower during clinical placement. This is commented on by Smedley *et al.* (1995) suggesting that the recurrence of low back pain whether during or when finishing nursing work, is not surprising given the recurrent nature and chronicity of low back pain in any population.

Smedley *et al.* (1995) also suggest that prevention of low back injuries lies in an approach to screen potential employees, to recruit staff who are at a lower risk of low back pain. The authors go on to mention how there may be a justification to exclude potential employees who have a previous history of prolonged and recent low back pain from the most physically demanding nursing jobs, but feel this would only eliminate a small amount of cases. This may also present issues of discrimination within the workplace. Smedley *et al.* (1995) therefore suggest that the main route to preventing back disorders in the clinical setting lies in improved ergonomics. However, more recent research by Hignett (2003) identifies this is not

necessarily the answer and that more proactive patient and staff risk assessments are the way forward in occupational back pain prevention.

5.1 Study Limitations

As with other research investigating the complexity of low back pain prevalence the reliability of the data relied upon self-reported data from the respondents. As a result the perspectives of respondents may not be a true reflection. There may have been an element of bias due to the nature of the lessons the questionnaire was handed out in. When in the manual handling lesson low back pain was frequently talked about and referenced, possibly making the respondents think more about experiences of low back pain compared with whether the questionnaire was given out in an unrelated lecture. The prevalence reported may have been subject to false interpretation due to the self-reported data as respondents may have increased or decreased their true prevalence rates to conform to the social expectation of low back pain being expected in nursing practices. However, a large degree of confidence can be put on the results of this study as they are consistent with findings from related research using similar tools for data collection, in similar populations (Kneafsey and Haigh 2007).

The questionnaire required the respondents to recall information from up to two and a half years ago, and relying on this recalled data can decrease its reliability (Sim and Wright 2000). Ideally, information required for questionnaires should be no more that 12months in the past to ensure reliability of the recalled data (Sim and Wright, 2000).

Although the questionnaire was subjected to a thorough pilot study and peer review to increase the validity, inadequacies in the questionnaire design such as true validity and reliability and ambiguity of the questions posed within the data collection tool should be

borne in mind. However, it is noted that this research could be used as a pilot study for this questionnaire, though further analysis would need to be undertaken into the validity and reliability of the questionnaire itself.

This investigation explored the experiences of a small sample, from one organisation. Nevertheless, a degree of confidence can be placed on the results found as they are consistent with related research. However, a much larger scale study is needed to quantify the prevalence of musculoskeletal injuries across a number of universities to provide a more robust evidence base. This could then be used to inform education, training and ongoing manual handling practices.

5.2 ~ Recommendations for Future Practice

It is clear that low back pain exists within student nursing populations. Therefore it is essential that the risks posed to students are eliminated, or lowered to the most practicable level, as required by the Health and Safety at Work Act (1974). Students at risk of low back pain must be identified and provided with the knowledge and skills to reduce their risks, whether this is through training, occupational health support or reduced clinical workload (Hignett 2003). Along with this must come the identification of the risks which contribute to low back pain. As made clear throughout this discussion rigorous, methodologically high quality research must be undertaken on a large scale to ascertain the true prevalence, risks and contributing factors to low back pain.

The ongoing need to fulfil the objective of creating potentially more effective ways of teaching safe manual handling techniques must acknowledge and respond to the notion that *clinical* manual handling is one of the greatest influences on student practice, as shown in supporting research (Kneafsey 2000). As students tend to lack the power to be assertive and

influential in changing the norms of poor practices they see in the clinical setting, emphasis must be put on those members of staff who set these norms (Abbot 2009). Although organisations have adopted many working practices from the Manual Handling Operations Regulations (1995), emphasis has be set on training and ergonomic changes, neglecting the issues of the wider environment and cultural factors.

Emphasis of new research should be focused on identifying the key causative risks contributing to not only students' low back pain experiences, but that of qualified staff.

5.3 ~ Discussion Summary

This discussion has set out the findings and discussed them in relation to supporting evidence. All the aims of the study have been demonstrated and met, and recommendations with regard to the findings have been highlighted and discussed.

Overall it is clear that a large proportion of the student nurses within the one university sampled are experiencing low back pain before starting, and throughout their nursing education, specifically while on clinical placement. Although it is still not clear what activities or risks within the clinical setting are exacerbating the prevalence of low back pain, manual handling tasks are repeatedly cited as the main cause (Smedley *et al.* 1997 and Kneafsey and Haigh 2007).

An extensive field of research has been reviewed within this discussion and related literature, most of which points towards the need to examine in detail the true risks within the clinical setting and nursing education of low back pain experience. Thorough examination is needed from a large sample of student nurses from a multiple of universities across different NHS sites, with a longitudinal follow up. This would ensure a large, representative sample of

students and a national base to work with. Findings could then be implemented into manual handling training and working policies and procedures to ensure the safety of students and all staff. It may be of interest to sample different health care professions within universities and clinical settings to ascertain who are most at risk, how and why.

Chapter 6 ~ Conclusion

This final Chapter aims to draw together the discussion and recommendations for further research.

Occupational low back pain is a common disorder which affects approximately one-third of the adult population (aged over 18) in the UK each year, of which 20% of people will consult their GP about the pain. There is a generally accepted way of managing low back pain of less than 6 weeks duration. Early management is important to maximise recovery and reduce personal, social, physical and emotional effects of low back pain (NICE 2009). A key focus in managing low back pain is for people to be self-helping, in that they self-manage their symptoms, and providing advice and information is an important part of this. Self management is such an important part of the rehabilitation process as low back pain is notoriously a long-term problem which is often recurrent. By empowering people to manage their own symptoms they will experience less time off sick, require less hospital treatment and the cost of the problem is decreased. The aims of low back pain management strategies are to reduce the pain experienced and the impact it has on the person's every-day-life, even if the pain cannot be completely eliminated.

Management of low back pain may be an area universities could educate students in, to prepare them with the necessary knowledge and skills to be able to self manage low back pain experienced, or to know when they should consult their GP or occupational health department.

The history surrounding back pain in the student nursing and qualified nursing population points towards a theme emerging making low back pain socially acceptable and in

contemporary society deemed the individual continue their normal activities (Barnes 2009). The pressures surrounding job security, increasing workload and financial strains in all health care professionals can have a spiralling effect on individuals who experience back pain (Barnes 2009).

The literature on low back pain in student nurses is inconclusive and problematic as no literature offers a solid evidence base for clinical practice. This research clearly has evidence to suggest that during clinical placement there is a significant increase in low back pain, but the cause of this pain experienced by the respondents is unclear. There are many possible causes including poor patient handling practices, poor working environment, lack of equipment and training, lack of staff, heavy and dependant patients, socialisation and time constraints (Kneafsey and Haigh 2007). Much of the research available offers suggestions on how to decrease the prevalence of low back pain.

Kneafsey and Smallwood (2009) suggest that training in universities lacks realism, unable to reflect the complexities of real life. The dichotomy between students' experiences within the different settings is leaving them confused and feeling that university training is irrelevant. Recommendations are stated in The Health and Safety at Work Act (1974) imposing regular training, and advised by regulatory bodies such as the Royal College of Nursing, the Chartered Society of Physiotherapy and guidelines by the National Back Exchange Training Guidelines (2002).

Research provides evidence that training alone is not an answer to the growing problem of low back pain in the clinical setting (Hignett 2003). In the systematic review carried out by Hignett (2003) the strongest evidence was found to support the statement that interventions based on technique training alone have little or no impact on working practices or injury

rates. Importance of regular risk assessment training and continued patient risk assessments was stressed as a possible intervention for decreasing the number of musculoskeletal injuries experienced by health care workers.

Clearly, a multi-faceted approach is needed to address the many difficulties which have arisen in this field of occupational injuries. Students not only require a physical and organisational framework to enable them to practice safely, but a social environment that enables them to resist some of the pressures which may persuade them otherwise. There is arguably a need for educators to take these factors into account; the challenge lies in upholding the ideal while preparing students for reality within the clinical environment (Smallwood 2006).

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"Do not follow where the path may lead, but go instead where there is no path and leave a trail".

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Swain, J., Pufahl, E. and Williamson, G. (2003) 'Do they practice what we teach? A survey of manual handling practice amongst student nurses'. *Journal of Clinical Nursing*. 12, 297-306.

Waddle, G., Burton, A.K. (2000) 'Occupational health guidelines for the management of low back pain at work: evidence review.' *Oxford Journals*. [online] available from <http://occmed.oxfordjournals.org/content/51/2/124.full.pdf> [9. Feb. 2012].

Watson, H.E., Harris, B., (2000) Supporting students in practice placements in Scotland. Glasgow Caledonian University and National Board for Nursing, Midwifery and Health Visiting for Scotland, Glasgow.

Welsh, I. and Swann, C. (2002) *Partners in learning: A Guide to Support and Assessment in Nurse Education.* Radcliffe Medical Press: Oxford.

Appendices

Appendix 1 ~ Summary of Research Papers

Author	Barnes, A.F. (2009) 'Reducing the incidence of back pain: student nurse's recommendations'.
Aims	Investigate the incidence of back pain for student nurses in clinical practice. Establishing experiences of back pain while on clinical placement and how they would reduce the incidence of back pain in the workplace.
Sample	Pre-registration Adult, Child and Learning Disability branch, Diploma and Degree. n=103, 94% response rate.
Methodology	Explorative Survey
Data Collection	Voluntary Questionnaire, non-validated.
Results	Back Pain : 26% (n=27) had experienced low back pain prior to starting their course. 34% (n=35) experienced back pain while on placement but only 20% (n=21) reported this. 11% of the students highlight that their experience of back pain was due to manual handling patients. Students highlighted they were reluctant to take time off sick, and to self-manage their pain with rest, heat packs and anti-inflammatory medication. Student Recommendations to lower incidence of back pain: 70% of the Students mentioned adherence to local Trust policy and using evidence based techniques. 27% of the students recommended suitability of the equipment and having equipment fit for purpose, and 64 % of students recommended Staff compliance to patient handling. 22% percent of the students also commented on the need for regular manual handling training.
Conclusion	This study provides an insight into back pain in student nurses who cope with their back pain and usually self-manage. The student nurses recommendations on this issue are profound and are concurrent with up-to-date evidence based literature. Nurses need to make decisions to safeguard themselves and to protect their health and safety, thus not compromising their autonomy as practitioners.

Author	Bellefontaine, N. (2009) 'Exploring whether student nurses report poor practice they have witnessed on placements'.
Aims	Explore what influences student nurses' ability to report potentially unsafe practice witnessed in clinical placement.
Sample	2nd and 3rd year Student Nurses (n=6), Mental Health, Child and Adult Branch.
Methodology	Qualitative, interpretative phenomenological approach.
Data	Semi-Structured Interviews, member checking.

Collection	
Results	Content analysis, coding and interpretation of themes and patterns. 4 themes were identified: 1. The student-mentor relationship 2. Actual or potential support provided by the practice area and university 3. Students confidence and professional knowledge 4. Fear of failing the placement.
Conclusion	Students identified the need for a robust relationship with their placement mentor, who need to be a positive role model. A larger multi-centred study is needed for establish current practice nationally.

Author	Cornish, J. and Jones, A. (2007) 'Evaluation of moving and handling training for pre-registration nurses and its application to practice'.
Aims	To improve manual handling training for students making it more relevant to their practice.
Sample	Second year pre-registration diploma and degree nursing students who had all attended a manual handling class. Adult, child and mental health branches.
Methodology	Descriptive, mixed methods.
Data Collection	Voluntary Questionnaire, non-validated. Structured to represent the content of the training delivered, techniques they had seen in practice, and techniques they had used. 106 questionnaires received, 34% response rate. Unstructured Interviews (n=4).
Results	Training and Experience: 70% of the students had not received additional manual handling training on placement. 80% of the students recall being shown all of the techniques, and higher recall rates were seen with techniques the students had practiced in the lessons. Two key themes were identified through interview: 1. Poor Practice 2. Constraints on practice Poor Practice: Seventy-one percent of students had been asked to participate in a manual handling procedure they thought was wrong. Injuries: 27% reported they had seen staff injure themselves relating to their back, neck, shoulder or ankle.

Conclusion	Students appreciate training and this should be comprehensive. Students are able to identify good and poor practice, but are sometimes unable to separate themselves from poor practices. Students need scenarios to help them to challenge poor practice, reducing the risk of injury to themselves and their patients.

Author	Cornish, J. and Jones, A. (2010) 'Factors affecting compliance with moving and handling policy: Student nurses' views and experiences.
Aims	Highlight factors that affect students' compliance to moving and handling policy.
Sample	2nd Year Degree and Diploma students, 59 expressed an interest of which 17 (29% response rate) were able to attend. Adult, Mental Health and Child branches.
Methodology	Qualitative study.
Data Collection	3 Focus groups, semi-structured question prompts used.
Results	3 themes emerged: 1. Poor Practice – Using incorrect equipment, poor communication, lack of assessments. 2. Factors affecting student compliance with poor practice – Power relationships, students 'fitting in'. 3. Factors affecting compliance with M&H regulations – Size and complexity of the patient, handover, staff consistency.
Conclusion	Need for management of the gap between theory and practice, needing to discuss the realities of the workplace. Simulating scenarios to help students cope with difficult situations. Provision for the right equipment needed in education and practice.

Author	Graham and Gray (2005) 'Recently qualified physiotherapists' perception of work-related musculoskeletal disorders'.
Aims	To answer the question: 'How do a group of U physiotherapists, within their first 5 years of work, perceive work-related musculoskeletal disorders?'
Sample	Purposive sampling, (n=11)
Methodology	Qualitative.
Data Collection	Two Focus Groups
Results	Attitudes towards their personal risk – less risk than nurses, will take more precautions. Newly qualified physiotherapists feel more at risk due to inexperience.
Conclusion	A need for ongoing education to prevent low back pain among all professions, especially newly qualified. Student physiotherapists need more training in the management of caseload prioritisation to aid in time management for more dependant patients.

Author	Glover (2002) 'Work-related Strain Injuries in Physiotherapists: Prevalence and prevention of musculoskeletal disorders'.
Aims	Not Specified.
Sample	Not Specified.
Methodology	Literature Review
Data Collection	Not Specified
Results	Younger physiotherapists are more at risk, Lifetime prevalence is up to 90%, biggest problem is low back pain, lifting and transferring patients is a high risk task, and physiotherapists seek treatment from colleagues.
Conclusion	More investigation is needed into younger physiotherapists. The rate of injury is a cause of concern, especially as the funding for physiotherapists is in short supply.

Author	Hignett, S. (1996) 'Work-related back pain in nurses'
Aims	Literature review to extract the current information about manual handling operations in nursing work.
Sample	Studies reviewed categorised into: a) epidemiology, b) 'testing out', c) exploratory.
Methodology	Literature Review
Data Collection	80 studies reviewed.
Results	Epidemiological: Accident and incident reporting, nursing speciality and grade, cumulative load. 'Testing out' Studies: Training, Ergonomics. Experimental Designs: Intra-Abdominal Pressure, Biomechanical Models, Physiological Measures, Force Plates, Observation. Exploratory Studies: Work Organisation.
Conclusion	Nursing is among one of the highest risk occupations with respect to low back pain. Point prevalence of 17%, annual prevalence of 40-50% and lifetime prevalence of 35-80%. More frequent patient handling correlates with increase in pain. The use of training has been shown to be little to no use in reducing low back pain. More qualitative studies (interviews) are needed to ascertain a more in-depth picture of the problem.

Author	Hignett, S. (2003) 'Intervention strategies to reduce musculoskeletal injuries associated with handling patients'.
Aims	To report, analyse and discuss the results of a systematic review looking at intervention strategies to reduce the risk factors

	associated with patient handing.
Methodology	Searches between 1960-2001. Inter-rater reliability was established between 6 reviewers. Each paper was read by 2 reviewers and given a quality rate score. Papers were grouped by category: multifactor, single factor and technique based interventions.
Data Collection	2796 papers were collected, of which 880 were reviewed.
Results	Multifactoral interventions based on risk assessment are successful at a moderate level by 10 studies, and limited with 4. Single factor interventions based on the provision of equipment can be effective based on moderate evidence in 2 studies. Interventions based on technique training have no impact on working practices or injury rates is supported by strong evidence from 4 studies, 8 moderately and 5 limited.
Conclusion	Multifactoral interventions are most likely to be effective when focusing on risk assessment. Local authorities should review their teaching and working policies in light of this evidence.

Author	Jootun, D and MacInnes, A. (2005) 'Examining how well students use correct handling procedures'.
Aims	Explore the extent to which students apply taught principles when performing handling and moving activities during their placements, and the factors that influence their application.
Sample	10 Undergraduate student nurses.
Methodology	Mixed methods.
Data Collection	10, 7-item-questionnaires, open and closed questions, followed by semi-structured interviews (n=10).
Results	The study found it was no easy to use taught handling techniques in practice. Patients handling and moving needs are not being assessed, or documented on their care plans. 2 students felt confident enough to opt out of handling procedures due to health and safety of themselves and their patients. A lack of ward protocols, hierarchy and time were negative influences.
Conclusion	Ergonomics is an are in need of work, with the continued training for students in safe handling procedures. Importance of lecturer-practitioner collaboration.

Author	Kneafsey, R. and Haigh, C. (2000) 'Learning safe patient handling skills: Student nurse experiences of university and practice based education'.
Aims	Examine student experiences of moving and handling education in academic and clinical settings.
Sample	Student Nurses (n=432, 75% response rate).

Methodology	Quantitative Survey.
Data Collection	34 item questionnaire.
Results	Many students undertook unsafe practices. There was a medium statistically significant correlation between the variables 'provision of supervision' and 'awareness of patient handling needs' (r_s=0.390, p=0.000). 20% of the sample stated they had begun to develop musculoskeletal pain since becoming a student nurse, 48 stated it was due to manual handling related incident on placement.
Conclusion	Students need to take university based manual handling techniques seriously, or this training will not be beneficial. Students should be supervised by responsible mentors when carrying out manual handling in placements.

Author	Nelson *et al.* 'Development and evaluation of a multifaceted ergonomics program to prevent injuries associated with patient handling tasks'.
Aims	To create a safer working environment for nurses.
Sample	23 high risk units, 825 (73%) nurses, randomised 300 nurses completed a survey.
Methodology	Pre/Post experimental design without control group. Mixed methods.
Data Collection	300 Survey questionnaire, 18 Focus Groups, Injury logs, Cost logs.
Results	Overall injury rates decreased p=0.036. Modified working days decreased significantly (p=0.02). Statistically significant in reported unsafe techniques (p=0.027). Job satisfaction increased.
Conclusion	The multi- faceted program resulted in positive outcomes associated with injury rates, days off sick, job satisfaction and self-reported poor practice. Further research is needed to assess the effectiveness of this program in other areas of work and less 'at risk' areas.

Author	Smallwood, J. (2006) 'Patient handling: student nurses' views'.
Aims	Seek to address the disparities between taught practices and clinical application.
Sample	Final year student nurses, adult branch.
Methodology	Mixed methods.
Data Collection	Self-reported questionnaire designed to explore values and beliefs, clinical culture, conflict between patient and personal wellbeing, transfer of skills and equipment, (n=51). Focus groups in the classes where the questionnaire were distributed (n=not reported).

Results	89% of the students believed safe patient handling was achievable, but 51% quite often placed them self at risk, and 40% had failed to implement safe techniques. The confidence of the students to be able to speak up increased as they progressed throughout their course. Students emphasized that they knew how to implement safe techniques, but were unable to use these in practice. Classroom training did not correlate with the realities of clinical placement.
Conclusion	Compliance with recommended techniques is influenced by the environment of the clinical placement and the students' ability to overcome barriers. There is also a clear disparity between the classroom and clinical placement.

Author	Smedley, J. *et al.* (1995) 'Prospective cohort study of predictors of incident low back pain in nurses'.
Aims	To assess the impact of handling patients and indicators of individual susceptibility on risk of low back pain in nurses.
Sample	838 female qualified nurses who were free from back pain for at least 1 month at the time of completing the baseline questionnaire.
Methodology	Repeated measures design.
Data Collection	Self administered questionnaire every 3 months over 2 years.
Results	322 (38%) of nurses had developed low back pain during the time of the study, 93 (11%) who took time off work due to the severity. The biggest predictor of low back pain was a history of the symptom, particularly if the previous pain had lasted for over 1 month. Frequent low mood was associated with an increase in back pain (odds ratio 3.4; 95% CI, 1.4 – 8.2). Risk was higher in nurses who reported frequent lateral transfer, repositioning and lifting patients out of the bath with a hoist.
Conclusion	The main predictor was a history of low back pain which may justify exclusion from some applicants into nursing. Improved ergonomics may help in the nursing environment.

Author	Swain, J. *et al.* (2003) 'Do they practice what we teach? A Survey of manual handling practice amongst student nurses'.
Aims	To answer the questions: 1) Do students know what they should be doing? 2) Do students report doing what they should be doing? 2) If not, why not?
Sample	139 students from 1st, 2nd and 3rd years who had been in a variety of community and district general hospitals.
Methodology	Qualitative Survey
Data Collection	Self reported questionnaire to address the aims of the study. Diagrams were included.
Results	Students knowledge was good (86% or more correct answers). 131 (94%) reported they did not always use recommended techniques. Over 70% incorrectly believed condemned techniques to be recommended. 40% (56) were influenced not to

	practice safely due to influences from other staff, 32% (40) gave lack of time, and 29% (14) gave lack of equipment. Males were more likely to conform with poor practice (p=0.005). There was no correlation between age and likelihood to conform to poor practice.
Conclusion	There is a severe problem in implementing evidence based practice guidelines and tackling poor practice should be a priority. Manual handling needs to be given more priority as it is a basic nursing skill.

Appendix 2 ~ Search Strategy

Search ID	Search Terms	Databases	Result Hits
S1	low back pain	AMED, CINAHL, MEDLINE	4129
S2	student nurses	"	155
S3	S1 *"Search with AND"* S2	"	1
S4	occupational injuries	"	1271
S5	S2 "*Search with AND"* S4	"	0
S6	Student	"	5163
S7	S6 *"Search with AND"* S4	"	21
S8	Nurse	"	4274
S9	S8 *"Search with AND"* S1	"	24
S10	S9 "*Search with AND"* S6	"	1
S11	musculoskeletal injuries	"	827
S12	S11 "*Search with AND"* S8	"	10
S13	manual handling	"	65
S14	S13 "*Search with AND"* S2	"	0
S15	S13 "*Search with AND"* S8	"	5
S16	S13 "*Search with AND"* S11	"	6

Search ID	Search Terms	Databases	Result Hits
S1	low back pain	PeDro	1291
S2	Student nurse	"	4
S3	Nurses	"	204

Search limits of date (1990 – 2010) and peer review papers were included where databases allowed.

Appendix 3 ~ Back Pain Questionnaire

Investigation into the prevalence of low back pain pre and post clinical placement in Student Nurses. Are they at Risk?

1. *Please fill out the following information:*

a. Gender: *(please tick)*	Male ☐	Female ☐	
b. Age:	Please State ___		
c. Height (cm or ft and ins):	Please State ___		
d. Weight (kg or stone):	Please State ___		
e. Year of Study: *(please tick one)*	Year 1 ☐	Year 2 ☐	Year 3 ☐
f. Qualification:	Degree ☐	Diploma ☐	
g. Nursing Branch: *(please tick one)*	Adult ☐ LD ☐	Child ☐	MH ☐

****

2. **Before** starting this course, have you ever experienced pain in your neck, upper or lower back (*see diagram below for clarification of area*), for a period of:

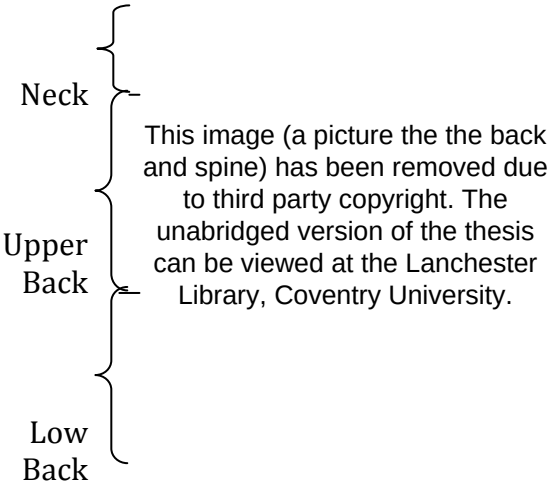
Please tick one option:

a. Less than 6 weeks ☐
b. Over 6 weeks ☐
c. Never experienced pain in these areas ☐

3. **Before** starting this course have you ever experienced aches, pain, discomfort or numbness in any of the following areas?

Please tick as many options as are appropriate:

	Region	Yes	No
a.	Neck	☐	☐
b.	Upper Back	☐	☐
c.	Low Back	☐	☐



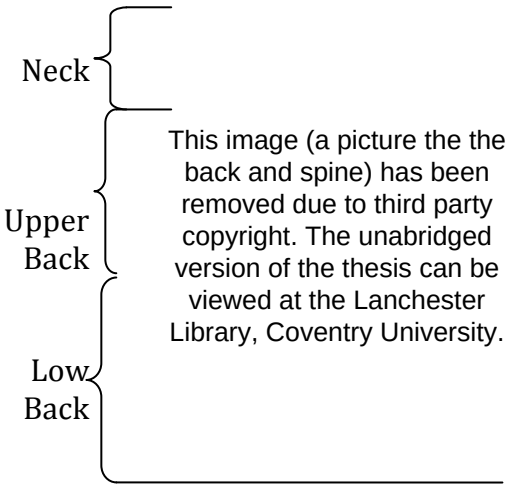
This image (a picture the the back and spine) has been removed due to third party copyright. The unabridged version of the thesis can be viewed at the Lanchester Library, Coventry University.

4. **During** the course, have you ever experienced pain in your neck, upper or lower back (*see diagram below for clarification of area*), for a period of:

Please tick one option:

a. Less than 6 weeks ☐
b. Over 6 weeks ☐
c. Never experienced pain in these areas ☐

5. **During** clinical placement have you experienced pain in any of the following regions?



Please tick as many as are appropriate:

	Region	Yes	No
a.	Neck	☐	☐
b.	Upper Back	☐	☐
c.	Low Back	☐	☐

6. **Since Finishing** this course, have you ever experienced pain in your neck, upper or lower back (*see diagram below for clarification of area*), for a period of:

Please tick one option:

a. Less than 6 weeks ☐
b. Over 6 weeks ☐
c. Never experienced pain in these areas ☐

7. **Since finishing** clinical placement have you experienced pain in any of the following regions?

Please tick as many as are appropriate:

	Region	Yes	No
a.	Neck	☐	☐
b.	Upper Back	☐	☐
c.	Low Back	☐	☐

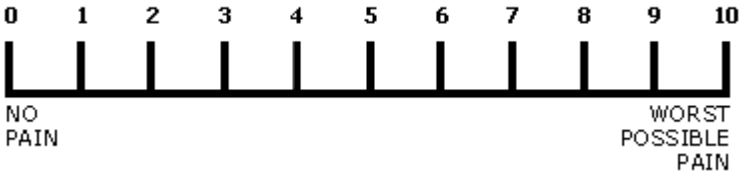
****

*For the following questions please circle the number on the scale that best represents the pain in your **lower back only**.*

8a. Have you ever experienced low back pain **before** starting clinical placements? (*Please Tick)*

Yes: ☐ **No**: ☐ *(If no, proceed to question 7)*

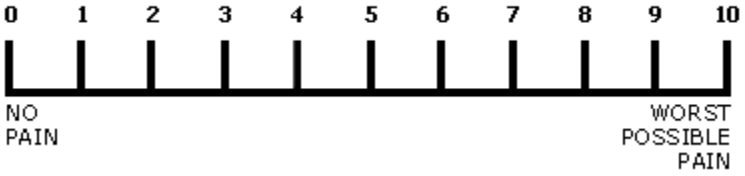
8b. If YES, what was your **NORMAL/USUAL/AVERAGE** pain **before you started placements**? *(Please circle)*



9a. Have you experienced low back pain **during** clinical placement? (*Please Tick)*

Yes: ☐ **No**: ☐ *(If no, proceed to question 8)*

9b. If YES, what was your **TYPICAL** or **AVERAGE** pain, **during placement**? *(Please circle)*



10a. Have you experienced low back pain **since finishing** clinical placement? (*Please Tick)*

Yes: ☐ **No**: ☐

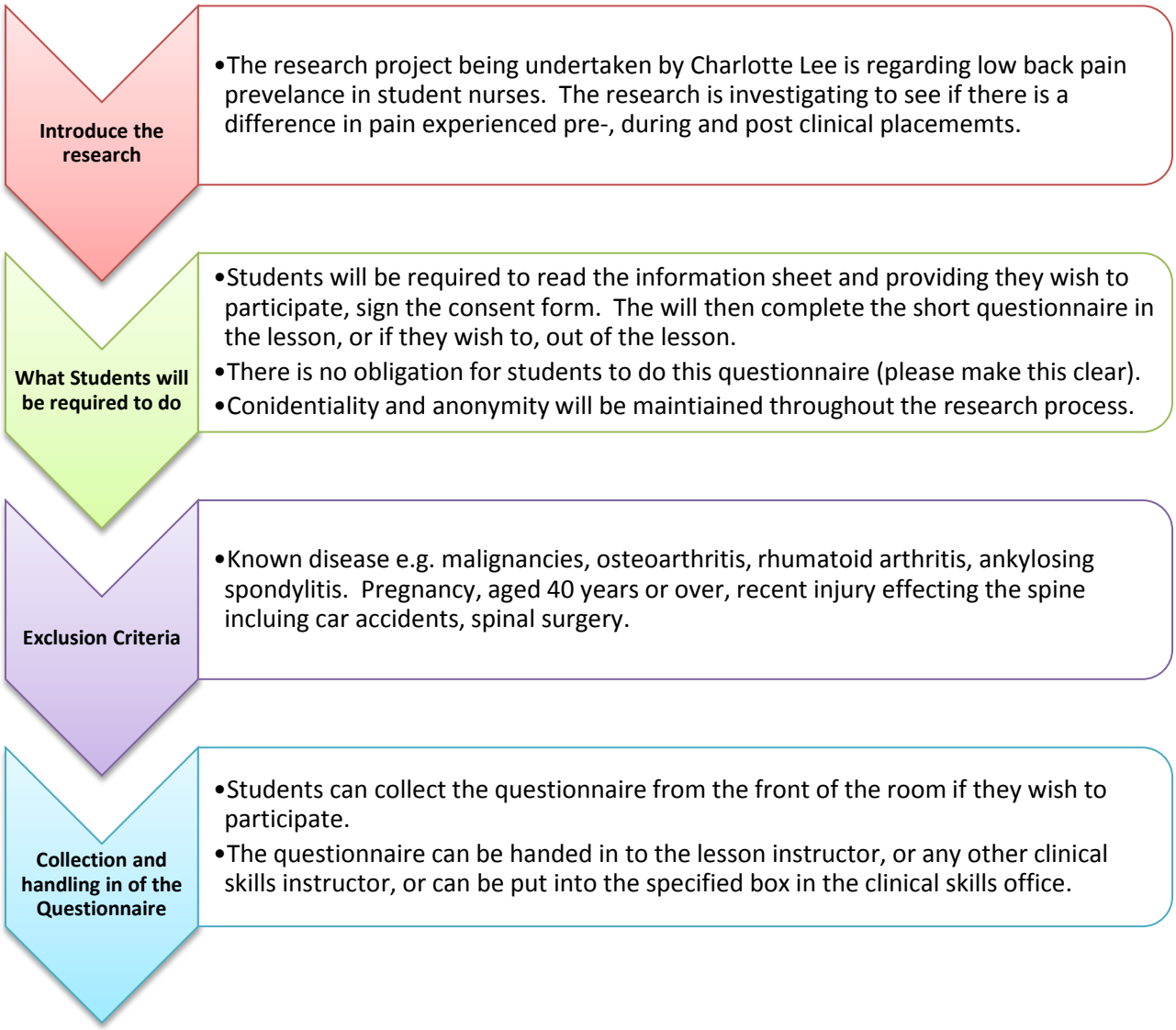
10b. If YES, what is your **TYPICAL** or **AVERAGE** pain now, **after placement**? *(Please circle)*

You have now completed all of the information needed for the research.

Thank you for taking time to completing this questionnaire, please return it to the lecturer or the designated box in Clinical Skills Office RC342.

Appendix 4 ~ Crib Sheet for Clinical Skills Instructors

When distributing the questionnaires for back pain to the student nurses, please follow the steps below.



If you have any questions please do not hesitate to contact me or the research supervisor.

Thank you!

Researcher: Charlotte Lee aa6484@coventry.ac.uk ext:5933

Research Supervisor: Margaret Goodman m.goodman@coventry.ac.uk

Appendix 5 ~ Informed Consent Form

Investigation into the prevalence of low back pain pre and post clinical placement. Are Student Nurses at Risk?

Dear Nursing and Midwifery Manager,

Please read and sign the declaration below to give your consent for me to involve the Nursing Students in my research project.

The project:

This research proposes to look into the prevalence of low back pain (LBP) pre and post clinical placement of student nurses, to ascertain the relationship clinical exposure may have on pre-existing or new onset of LBP. Research in this field repeatedly demonstrates that controversial patient handling occurs in hospital and care environments, and that practitioners cannot always employ recommended practices (Kneafsey, 2009). Student nurses may therefore be at risk of back pain early on in their training.

Requirements of Students:

Students will be required to complete a short questionnaire (as attached subject to peer review and pilot test) after giving informed consent. They will be advised that they do not have to complete the questionnaire if they do not wish to. Those who do will be informed about their rights of withdrawal, anonymity and confidentiality.

Declaration:

I …….. (name) …… (position) consent to all students in all branches and years of the Nursing courses (not midwifery) to be involved in the above research project, subject to their individual consent.

Signed ……..
Date ……..

Signed …….. (Researcher)
Date ……..

Appendix 6 ~ Participant Information

Investigation into the prevalence of low back pain pre and post clinical placement. Are Student Nurses at Risk?

Invitation: Why me?

You have been invited to take part in this study by Charlotte Lee (Physiotherapist, Clinical Skills Team, Coventry University) because you are a student nurse at Coventry University, who has completed a clinical nursing placement. However, **you do not have to fill out the questionnaire if you do not wish to – there are no obligations.** Even if you decide to fill out this questionnaire, you can contact the researcher to wthdraw your information at any time using the contact details below. Please take some time to read the information below carefully and discuss it with others if you wish to. Please ask the Clinical Skills Instructor in this lesson if you have any questions or concerns. Thank you for reading this.

The Project:

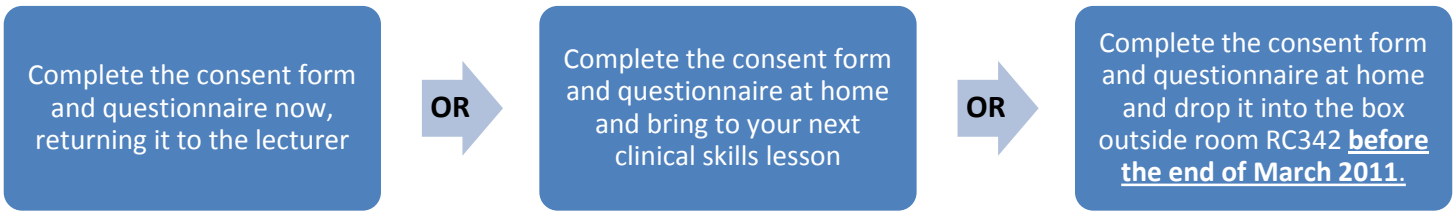
This research proposes to look into the prevalence of Low Back Pain (LBP) pre and post clinical placement of student nurses, to ascertain the relationship clinical exposure may have on pre-existing or new onset of LBP. Research in this field repeatedly demonstrates that controversial patient handling occurs in hospital and care environments, and that practitioners cannot always employ recommended practices in safe manual handling (Kneafsey, 2009). Student nurses may therefore be at risk of back pain early on in their training.

Because the University has an obligation to look after your wellbeing while you are on placement, we would like to know about any risks you may be encountering. It is hoped that the results of this study may provide the researcher and University with enough information to begin to implement strategies into clinical placements or preparatory lessons to reduce any risks that may prevail.

Do I have to take part?

NO. It is completely up to you whether you complete the questionnaire, or not. If you do decide to take part you will be given this information sheet to keep, and you will be required to complete the following consent form. You may contact the researcher at any time to withdraw the information you have provided. Completing or not completing this questionnaire WILL NOT disadvantage you in any way.

What do I need to do?



What are the benefits of taking part?

The researcher cannot guarantee this research will help you; however, the information gained from this study may help make improvements in the future for Student Nurses.

Are there any disadvantages or risks from taking part?

It is unlikely you will be confronted with any risks from this study. Please think carefully about your past experiences of low back pain, and if this brings back emotional or psychological feelings or problems, please make concerns known to your Instructor, Personal Tutor or the Researcher for advice.

Data Protection, Confidentiality and Anonymity

All information received will be treated as confidential and the procedures for data storage, handling, processing and destruction are compliant with the Data Protection Act, 1998. ALL information held within the questionnaire will be kept in a secure file, backed up by the researcher on a personal secured laptop. Only the researcher and research supervisor will have access to the data. If publication occurs, no personal identification data will be used – anonymity will always be respected and maintained. This means no information will be able to be traced back to you.

What about the results of the study?

The results will be presented as part of a dissertation report as part of a Masters by Research (MREs) qualification, so will be available to other students within Coventry University. Depending on the results of the study, presentation posters may be created to present the research around the Health and Life Sciences buildings at Coventry University as part of health promotion.

Thank you for taking your time to read this.

If you have any concerns, please speak to the Instructor of you lesson, Personal Tutor, Researcher or Research Supervisor.

Contacts:

Principal Researcher: Charlotte Lee leec24@uni.coventry.ac.uk *02476 795933 or 5884*
Research Supervisor: Margaret Goodman m.goodman@coventry.ac.uk *02476 795800*

Appendix 7 ~ Informed Consent Form

Investigation into the prevalence of low back pain pre and post clinical placement. Are Student Nurses at Risk?

	Please tick
1. I confirm that I have read and understood the participant information sheet for the above study and have had the opportunity to ask questions.	☐
2. I understand that my participation is voluntary and that I am free to withdraw at anytime without giving a reason.	☐
3. I understand that all the information I provide will be treated in confidence	☐
4. I agree to take part in the research project by filling out the attached Questionnaire	☐

Name of Participant: …… Signature of Participant: …….

Date: ……

Name of Researcher: …… Signature of Researcher: ……

Date: ……

Thank you for filling out the Informed Consent Form, please take approximately 5 minutes to now complete the attached questionnaire.

Appendix 8 ~ Pilot Study Feedback Questionnaire

Pilot Questionnaire Feedback

Q1 – Did you feel the research was relevant to you?

Q2 – Did you feel the research was relevant to Student Nurses?

Q3 – How long did it take you to complete the questionnaire?

Q4 – Was this time reasonable?

Q5 – How easy was the questionnaire to complete? *Please circle:*

Very Easy ***Easy*** ***Slightly Complicated*** ***Complicated*** ***Very Complicated***

Comments about specific Questions?

Q6 – How difficult were the questions to understand? *Please circle:*

Not Difficult ***Slightly Difficult*** ***Difficult*** ***Very difficult***

Comments about specific questions?

Q7 – Any other comments about the design/look/questions or anything else about the questionnaire?

Thank you for taking the time to complete the pilot study.

Appendix 9 ~ Pilot Study Results

Questionnaires were distributed to 10 Student Nurses, and 9 were returned.

Descriptive Statistics

Table a: Participants ages, heights and weights

		Age	Height	Weight
N	**Valid**	9	8	8
	Missing	0	1	1
Mean		28	155.5 cm	62.75 kg
Median		27	159 cm	65 kg
Mode		19	160 cm	65 kg
Std. Deviation		6.051	12.581 cm	3.24 kg

Table 'a' shows the descriptive statistics of the respondents with a mean age of approximately 28years, Height of 155.5cm and weight of 62.75Kg.

Table b: Respondents Gender

Gender	Frequency
Female	9
Male	0

Table b shows all of the respondents were female.

Table c: Respondents Year group

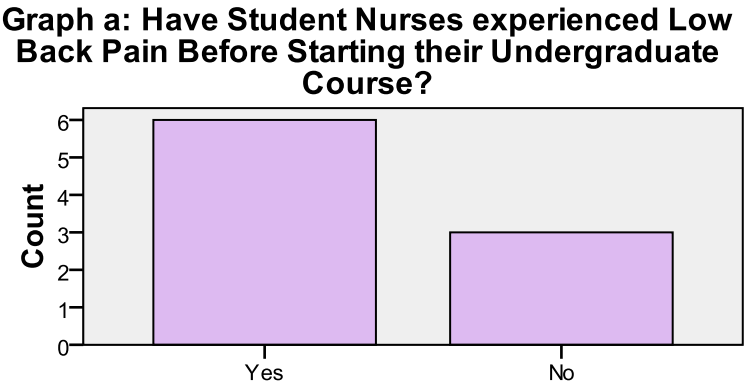
	Frequency	Percent
Year 2	5	55.6
Year 3	4	44.4
Total	9	100

Table 'c' shows 55.6% (n=5) respondents were in Year 2, and 44.4% (n=4) were in Year 3.

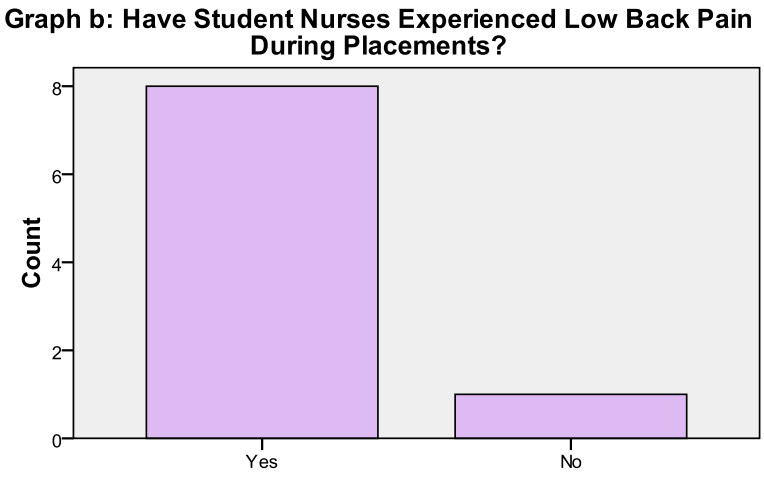
Table d: Respondents Nursing Branches

	Frequency	Percent
Adult	5	55.6
Mental Health	4	44.4
Total	9	100

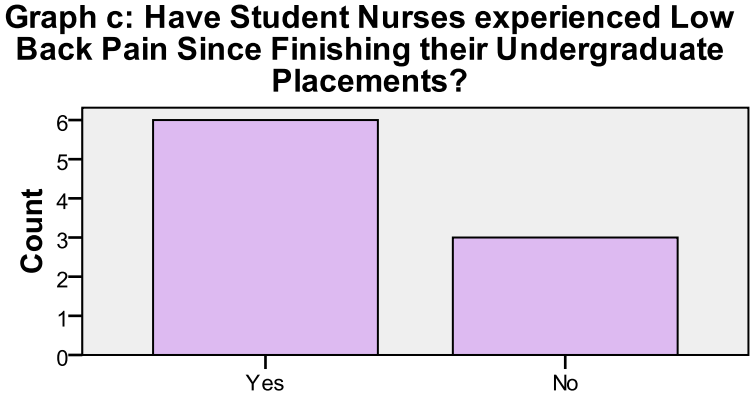
Table ‘d’ shows that 55.6% (n=5) of the respondents were from the Adult Branch and 44.4% (n=4) were from the Mental Health Branch.



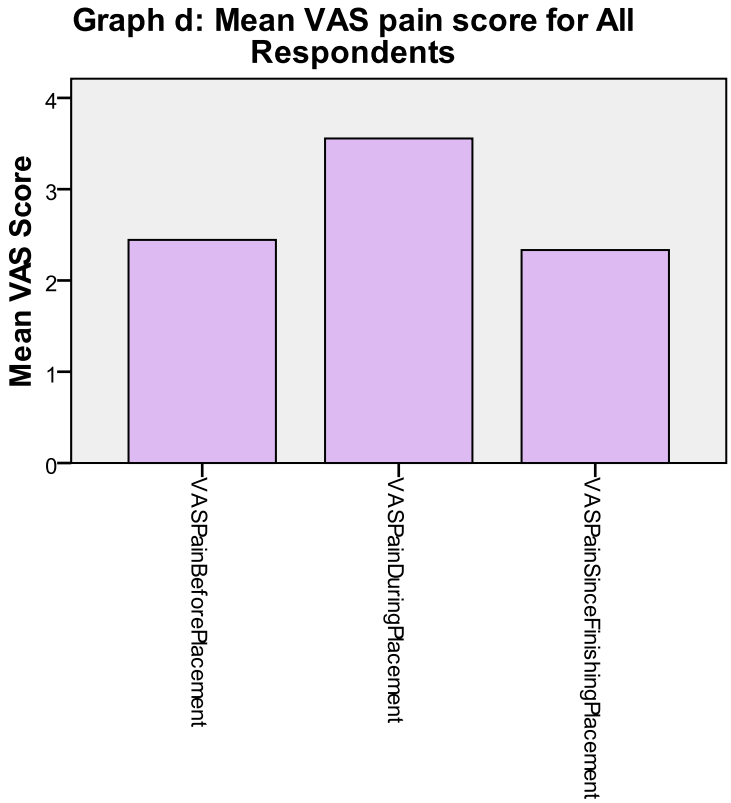
Graph ‘a’ shows that 6 students have experienced low back pain previously to starting their undergraduate course.



Graph ‘b’ shows that 8 of the participants have experienced low back pain during clinical placements.



Graph ‘c’ shows that 6 students have experienced low back pain since finishing clinical placements.



Graph ‘d’ shows there is a higher mean VAS score for low back pain from all respondents during their placements. There is however worrying signs that there is also an average low back pain before they even begin their placements, which is continued after clinical placements are finished.

Inferential Statistics

Descriptive Statistics of Friedman’s Test

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
VAS Pain Before Placement	9	2.44	2.455	0	7	.00	3.00	4.00
VAS Pain During Placement	9	3.56	2.555	0	7	1.00	3.00	6.00
VAS Pain Since Finishing Placement	9	2.33	2.398	0	7	.00	2.00	4.00

Ranks of Friedman's Test

	Mean Rank
VAS Pain Before Placement	1.61
VAS Pain During Placement	2.50
VAS Pain Since Finishing Placement	1.89

Test Statistics[a]

N	9
Chi-Square	4.467
df	2
Asymp. Sig.	.107

a. Friedman Test

Friedman's test shows there is no significant difference between the median measures of the VAS pain scores between before, during and after placement (p=0.107). However, this may become more significant with more participants as the current p value is quite high.

Descriptive Statistics of Wilcoxon Test

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
VAS Pain During Placement	9	3.56	2.555	0	7	1.00	3.00	6.00
VAS Pain Since Finishing Placement	9	2.33	2.398	0	7	.00	2.00	4.00

Ranks of Wilcoxon Test

		N	Mean Rank	Sum of Ranks
VAS Pain Since Finishing Placement – VAS Pain During Placement	Negative Ranks	5[a]	4.60	23.00
	Positive Ranks	2[b]	2.50	5.00
	Ties	2[c]		
	Total	9		

a. VASPainSinceFinishingPlacement < VASPainDuringPlacement

b. VASPainSinceFinishingPlacement > VASPainDuringPlacement

c. VASPainSinceFinishingPlacement = VASPainDuringPlacement

Test Statistics[b]

	VAS Pain Since Finishing Placement – VAS Pain During Placement
Z	-1.549[a]
Asymp. Sig. (2-tailed)	.121

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

The Wilcoxon test has compared the median values of the VAS pain scores for pain since finishing placement and pain during placement. There is no significant difference (p=0.121) between the VAS scores, however, with more subjects this may become more significant.

Spearman's rho Correlations – Pain experienced "yes or no"

			Pain Areas Before Course	Pain Areas During Placement	Pain Areas After Placement
Spearman's rho	Pain Areas Before Course	Correlation Coefficient	1.000	.364	.358
		Sig. (2-tailed)	.	.335	.345
		N	9	9	9
	Pain Areas During Placement	Correlation Coefficient	.364	1.000	
		Sig. (2-tailed)	.335	.	.001
		N	9	9	9
	Pain Areas After Placement	Correlation Coefficient	.358	**.887****	1.000
		Sig. (2-tailed)	.345	**.001**	.
		N	9	**9**	9

**. Correlation is significant at the 0.01 level (2-tailed).

Spearman's rho identifies that there is a positive correlation between students experiencing pain during placement and experiencing pain after placement (rho=0.887, p=0.001) which is a significant finding.

Spearman's rho Correlations – VAS pain scores

			VAS Pain Before Placement	VAS Pain During Placement	VAS Pain Since Finishing Placement
Spearman's rho	VAS Pain Before Placement	Correlation Coefficient	1.000	.227	.304
		Sig. (2-tailed)	.	.557	.427
		N	9	9	9
	VAS Pain During Placement	Correlation Coefficient	.227	1.000	.655
		Sig. (2-tailed)	.557	.	.055
		N	9	9	9
	VAS Pain Since Finishing Placement	Correlation Coefficient	.304	**.655**	1.000
		Sig. (2-tailed)	.427	**.055**	.
		N	9	**9**	9

Spearman's rho shows there is nearly a significant positive correlation between the VAS pain score of Students low back pain during placement and since finishing placement (rho=0.655, p=0.055).

Appendix 10 – Inferential Statistics

Inferential Statistics:

- *Testing for differences between VAS before, during and after clinical placements:*

Friedmans Test

Ranks

	Mean Rank
VAS Pain Before Placement	1.66
VAS Pain During Placement	2.48
VAS Pain Since Finishing Placement	1.86

Test Statistics[a]

N	151
Chi-Square	82.371
Df	2
Asymp. Sig.	.000

a. Friedman Test

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
VAS Pain During Placement – VAS Pain Before Placement	Negative Ranks	14[a]	75.64	1059.00
	Positive Ranks	96[b]	52.56	5046.00
	Ties	42[c]		
	Total	152		
VAS Pain Since Finishing Placement – VAS Pain Before Placement	Negative Ranks	31[d]	44.85	1390.50
	Positive Ranks	52[e]	40.30	2095.50
	Ties	68[f]		
	Total	151		
VAS Pain Since Finishing Placement – VAS Pain During Placement	Negative Ranks	80[g]	50.53	4042.50
	Positive Ranks	16[h]	38.34	613.50
	Ties	55[i]		
	Total	151		

- *Testing for correlations (relationship) between VAS scores before, during and after clinical placements*

Spearman's Rank Correlation Coefficient

Correlations

			VAS Pain Before Placement	VAS Pain During Placement	VAS Pain Since Finishing Placement
Spearman's rho	**VAS Pain Before Placement**	Correlation Coefficient	1.000	.364**	.293**
		Sig. (2-tailed)	.	.000	.000
		N	152	152	151
	VAS Pain During Placement	Correlation Coefficient	.364**	1.000	.665**
		Sig. (2-tailed)	.000	.	.000
		N	152	152	151
	VAS Pain Since Finishing Placement	Correlation Coefficient	.293**	.665**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	151	151	151

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

			Age	VAS Pain Before Placement	VAS Pain During Placement	VAS Pain Since Finishing Placement
Spearman's rho	Age	Correlation Coefficient	1.000	.196*	-.233**	-.145
		Sig. (2-tailed)	.	.016	.004	.075
		N	152	152	152	151
	VAS Pain Before Placement	Correlation Coefficient	.196*	1.000	.364**	.293**
		Sig. (2-tailed)	.016	.	.000	.000
		N	152	152	152	151
	VAS Pain During Placement	Correlation Coefficient	-.233**	.364**	1.000	.665**
		Sig. (2-tailed)	.004	.000	.	.000
		N	152	152	152	151
	VAS Pain Since Finishing Placement	Correlation Coefficient	-.145	.293**	.665**	1.000
		Sig. (2-tailed)	.075	.000	.000	.
		N	151	151	151	151

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).