

**The impact of an interactive educational programme on children's nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal post-operative pain management in children**

**By**

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## LIST OF ABBREVIATIONS

ADDIE	Analysis, Design, Development, Implementation, Evaluation
AHCPR	Agency for Health Care Policy and Research
ANOVA	Analysis of Variance
ARAMCO	Arabian American Oil Company
BSc	Bachelor of Science
CASP	Critical Appraisal Skills Programme
CINAHL	Cumulative Index of Nursing and Allied Health Literature
CRD	Centre for Reviews Dissemination
DHHS	Department of Health and Human Services
DVD	Digital Video Disc
ERIC	Education Resources Information Center
GPA	Grade Point Average
IASP	International Association for the Study of Pain
IOM	The Institute of Medicine
JCAHO	Joint Commission Accreditation Health Care Organization
KSA	Kingdom of Saudi Arabia
MEDLINE	Medical Literature Analysis and Retrieval System Online
MOH	Ministry of Health
MSc	Master of Science
NANDA	North American Nursing Diagnosis Association
NHMRC	National Health Medical Research Council
NIPS	Neonatal Infant Pain Scale
PICOS	Population, Intervention, Comparison, Outcomes, Study design
PIPP	Premature Infant Pain Profile
PNKAS	The Paediatric Nurses Knowledge and Attitudes Survey Regarding Pain
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RCT	Randomised controlled trial
SCHS	Saudi Commission for Health Specialties
UCSF	University of California San Francisco
UK	United Kingdom
UNICEF	United Nations International Children's Emergency Fund
USA	United States of America

VHA            Veterans Health Administration  
WHO           World Health Organization

## DEFINITION OF TERMS

**Children:** A young person of either sex below the age of 19 years.

**Nurse:** A person who has completed a 4 years' educational programme and is registered by the Saudi Commission for Health Specialties (SCHS).

**Pain:** Physical or bodily suffering; a continuous, strongly unpleasant or agonizing sensation in the body (usually in a particular part), such as arises from post-operative injury.

**Attitude:** Settled behaviour, or manner of acting, as representative of feeling or opinion that the nurse holds about the pain experience and post-operative pain management practices.

**Knowledge:** The possession of information about pain assessment and management and post-operative pain management practices.

**Belief:** A set of propositions held by nurses about pain assessment and management and post-operative pain management practices.

**Perception:** The interpretation or impression that nurses hold about the pain experience and post-operative pain management practices.

**Barriers:** The obstacles that impede nurses from providing optimal post-operative pain management.

**Self-Efficacy:** The confidence, power or capacity to provide optimal post-operative pain assessment and management.

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## **ABSTRACT**

### **Background**

Although post-operative pain management has been researched extensively, it does not receive the same attention from paediatric nurses in Saudi Arabia. Practices are not based on sound evidence, but there is a willingness to improve. The factors addressed in this study had not been considered together in any study, and each in turn was supported by only minimal evidence of variable quality. No work of significance had been undertaken in the context of Saudi Arabia or other Gulf nations.

### **Aims**

The aim was to test the impact of an interactive online post-operative pain management education programme on paediatric nurses' knowledge, attitudes, beliefs and perceptions of children's pain; self-efficacy; and perceptions of barriers to optimal practice.

### **Study Design**

A non-equivalent groups pre-test post-test design was used. A sample of 229 paediatric nurses working in surgical wards in Hail region hospitals was recruited (intervention n=135; control n=94) and completed four instruments to test the study variables on three occasions: before the intervention, and at one and three months afterwards. The intervention was an interactive educational programme on DVD with explanations, exercises, video presentations and self-check games. Analysis of categorical variables was undertaken using descriptive statistics, and ANOVA inferential statistics were used to compare the results within and between groups.

### **Results**

In the intervention group statistically significant, positive changes were seen in all attributes other than nurses' perceptions of children's pain. Such changes were not observed in the control group. Participants were explicit in approval of the intervention.

### **Conclusion**

The online education programme was effective in equipping Saudi nurses with the skills, knowledge and self-confidence to undertake effective post-operative pain management. Shift patterns, geographical distances and cultural issues in Saudi hospitals make attendance at



educational events difficult, so this approach could exert a notable impact on clinical practice throughout Saudi Arabia.

## CHAPTER ONE

### INTRODUCTION AND BACKGROUND

#### INTRODUCTION

In 2012, 38,441 operations were undertaken on children in Saudi hospitals (Saudi Ministry of Health (MOH), 2012). Although the characteristics of children who undergo surgery are different, post-operative pain is a common experience and almost inevitable. Pain can be defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (International Association for the Study of Pain [IASP], 2012a). Post-operative pain results from a combination of different conditions, including the disease or medical condition, the incision, and the surgical procedure, as well as the type and dose of anaesthesia used during the surgery, the positioning of the patient during surgery, and the length of time spent on the theatre table during prolonged surgery (eMedicineHealth, 2014; University of California San Francisco (UCSF) Medical Center, 2014).

Despite decades of research in the area of pain management, improvement in pharmacological treatment, and enormous technological advances, many studies have concluded that patients generally do not receive adequate pain management (Brennan, Carr, & Cousins, 2007; Chung & Lui, 2003; Dihle, Bjølseth, & Helseth, 2006; Richards & Hubbert, 2007; Turner, 2012); specifically in paediatric patients (Cheng, Foster, & Hester, 2003; Van Hulle Vincent & Denyes, 2004; Van Hulle Vincent, 2005); and specifically post-operative (Twycross, 2007a, 2007b). Pain is a complex phenomenon and it requires doctors and nurses who are in direct contact with patients to collaborate and implement therapeutic treatment strategies (Textor, 2003). However, nurses, who are the most numerous members of the health team, who should advocate patients' rights, who have the most prolonged time with patients, who are often the first to know when patients are experiencing pain, and who frequently include pain as a diagnosis in the care plan (Cheng et al., 2003; Textor, 2003), were found to be ineffective in post-operative pain management (Rejeh, Ahmadi, Mohamadi, Anooosheh, & Kazemnejad, 2009; Turner, 2012). That is, children's nurses tend to assess children with developmentally non-appropriate pain scales (Schechter, Berde, & Yaster, 2003), and fail to document pain assessment frequently enough and consistently in the nursing notes (Ellis et al., 2007; Jordan-Marsh et al., 2004). When prescriptions are ordered “as needed” they usually under-medicate children by administering low doses of analgesic compared with what the physician ordered

(Van Hulle Vincent, 2005; Van Hulle Vincent & Denyes, 2004; Wiroonpanich & Strickland, 2004). Furthermore, nurses prefer untested traditional pain relief methods over pharmacological treatment to treat children's pain (McCaffery, 2002). Miscommunication between family, physician and nurses regarding pain is common (Griffie, 2003; Van Niekerk & Martin, 2003). The outcome is that children continue to suffer moderate to severe post-operative pain.

Effective pain management from the nurse's perspective depends on multidimensional factors such as good communication skill between nurses and patients, and appropriate nursing knowledge, attitudes and beliefs about pain and pain medications (McDonald, McNulty, Erickson, & Weiskopf, 2000; Rejeh et al., 2009; Taylor, 2002). A deficit in any of these factors can compromise the delivery of optimal pain management (McDonald et al., 2000). For instance, The Institute of Medicine [IOM](2011) reported the need to change health care provider attitudes toward pain management as there was a discrepancy between this and patients' attitudes toward pain management. It found that this can be achieved through research and continuing education. Perceptions of heavy workload, lack of time, and the child's inability to cooperate have been found to be the most important factors (He et al., 2010).

Adequate pain knowledge is an essential component for providing optimal pain control, which in turn accelerates post-operative recovery and enhances the quality of care provided to patients (Godfrey, Parten, & Buckner, 2006; Messmer, 2009). Although researchers are aware of the importance of nurse education in pain management and the need for sustained efforts to educate nurses, nurses still experience lack of understanding of pharmacology, and may be disgruntled with their educational experience (Cousins, Brennan, & Carr, 2004; King, 2004). This can result from the information provided in post-operative pain management training courses failing to reflect the practice-based insights held by the nurses (Manias, Botti, & Bucknall, 2002). Consequently, nurses remain anxious because of their inadequate pain knowledge (Cousins et al., 2004; King, 2004). This should prompt the development of new education plans and evaluation of the effectiveness of education plans in improving to knowledge and attitudes, beliefs and perceptions. It might also prompt the promotion of educational packages in non-traditional methods. These issues stimulated the design of this study to test the impact of implementing an interactive online post-operative pain management education programme on paediatric nurses' knowledge and attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal practice.

This chapter will outline an overview of pain, the context of the study, the clinical importance of the problem, the potential significance of the study, the researcher's engagement with the issue, aim and research questions, and ending with a summary and overview of the organisation of the thesis.

## **OVERVIEW OF PAIN**

This section gives a detailed background to pain. A definition of pain is offered, together with discussion of major pain theories, classification of pain, the consequences of untreated pain, pain assessment, and pain management. Pain can be defined as any obnoxious feeling or experience related to actual or potential tissue damage ([IASP, 2012b). Pain is an absolute subjective phenomenon. Neonates and children who are unable to communicate vocally require additional skills in the nurse to recognise their needs (Twycross et al., 2009).

### **Pain theories and classification of pain**

Several theories have been formulated to describe the physiology of pain. These include Central Inhibition Theory, Pattern Theory, Specificity Theory and Gate Control Theory. Of these, Gate Control Theory is the most popular in nursing literature and still receives global support since it was first proposed in 1965 (Twycross et al., 2009). In short, this theory suggests that stimulation of the skin arouses nervous impulses which then flow along the peripheral nerves to the spinal cord and on up to the brain. The spinal cord contains a neurological "gate" that either blocks pain signals or allows them to continue on to the brain. Pain signals travelling via small nerve fibres are allowed to pass through, while signals sent by large nerve fibres are blocked (Brunner, Smeltzer, Bare, Hinkle, & Cheever, 2010). While Gate Control Theory has been found to be erroneous in some aspects, particularly with regard to the hypothesised neural pathways and structures (Treede, 2006), it offers a framework to reconcile the apparent contradictions between Specificity Theory and Pattern Theory (Moayed & Davis, 2013). In the absence of an alternative and more convincing theory, it was adopted to influence the theoretical part of this study.

Several classifications of pain have been proposed based on its location, duration, and aetiology. However, the most widely accepted version relates to acute, chronic and cancer-related pain (Brunner et al., 2010). Acute pain, which is the focus of this thesis, is abrupt in its onset and is usually related to specific tissue injury. As healing occurs and no systemic disease remains, acute pain usually diminishes. Chronic pain, exists beyond the expected

healing time and can rarely be attributed to a specific cause or injury. Chronic pain is any pain prolonged to more than six months. Cancer-related pain, may be either acute or chronic and is associated specifically with cancer (Brunner et al., 2010).

### **Consequences of untreated pain**

Untreated pain can be responsible for varied physical and psychological effects which are summarized in Table 1 below. Post-operative pain can result in negative health outcomes: increased morbidity; increased hospital stays; increased recovery time; delayed return to normal life activities; and increased risk of chronic pain (Kehlet, Jensen, & Woolf, 2006; Twycross et al., 2009).

**Table 1: Consequences of unrelieved pain (Twycross et al., 2009, p.2)**



Nurses can avoid all undesired negative health outcomes of poor pain management by performing effective pain assessment. This depends on the ability of nurses to identify many variables; for example, the intensity of the pain, location of the pain, duration of the pain, and patient ability to vocalise and describe their pain (Twycross et al., 2009). However, the last variable can be challenging to nurses working with children as language limitation can be a barrier to comprehensive pain assessment. Fortunately, strategies are available to overcome these obstacles which are detailed later in this thesis.

### **Assessing and managing pain**

Three critical steps have been identified for effective pain assessment practices in children. Nurses should record a detailed history for children before, during and after the pain experience. Nurses should use developmentally appropriate pain assessment tools of which there are many. These include, for example, verbal rating scales; faces pain scales; numerical pain scales; graphic rating scales; visual analogue scales; Neonatal Infant Pain Scale (NIPS), and Premature Infant Pain Profile (PIPP) (McCaffery & Pasero, 1999). Health care practitioners should be trained to know which one is the most appropriate to the case circumstances. Finally, nurses should re-assess the pain after intervention to ensure that pain is controlled (McCaffery & Pasero, 1999; Twycross et al., 2009). This last step is vital since there is no advantage in using strategies that fail to eliminate or decrease the intensity of pain.

Pain management may be either pharmacological or non-pharmacological (Anderson & Palmer, 2006; Ball, Shapiro, Monheim, & Weydert, 2003; Berde et al., 2005; Brunner et al., 2010; Gold et al., 2006; He, Pölkki, Pietilä, & Vehviläinen-Julkunen, 2006; He, Pölkki, Vehviläinen-Julkunen, & Pietilä, 2005; Pölkki, Vehviläinen-Julkunen, & Pietilä, 2001). Pharmacological pain management relies on the use of medication, while non-pharmacological pain management methods may include acupuncture, biofeedback, distraction, cognitive behavioural therapy, heat and cold, hypnosis, massage, and relaxation. In practice, both pharmaceutical and non-pharmaceutical strategies are commonly used in order to achieve effective pain management (Twycross, 2002). Effective pain management needs collaboration from the multidisciplinary health care team members and the combination of pharmacological and non-pharmacological techniques to achieve positive outcomes (Brunner et al., 2010; Twycross, 2002; Warrén Stomberg & Haljamäe, 2003).

### **CONTEXT OF THE STUDY**

Although this study took place in an Arabic country in the Middle East, it was supervised in an English university by British academics. The transnational basis of the research team lent strength to the perspectives considered during the work but also characterised the need to understand the geographical and cultural context of such a study. Situating the sample and detailing the setting of the study are important elements in increasing the outward-facing rigour of the study (Polit & Beck, 2004).

## The Kingdom of Saudi Arabia (KSA)

The Kingdom of Saudi Arabia, commonly known as Saudi Arabia, is a developing country in the Middle East, bordering the Persian Gulf to the East and the Red Sea to the West. It has borders with Yemen and Oman to the South, and Jordan, Iraq and Kuwait to the North (Mufti, 2000). (See Figure 1)



**Figure 1: The location of Saudi Arabia and its regions (World Atlas, 2016)**

## Demographic profile of the Saudi population

Saudi Arabia is a member of the Gulf Cooperation Council. It is the largest country in the Arabic region, with an area of more than 2.149 million square kilometres. However, desert covers approximately 95% of the Saudi country, including Alrub'Alkhali, the largest sand mass in the world. The country consists of thirteen regions and has one of the largest oil reserves in the world (United Nations International Children's Emergency Fund [UNICEF], 2014). Arabs are the main ethnic group of Saudi Arabia and account for 90% of the population, with the remaining 10% percent comprised of Afro-Asian ethnic groups (General Authority for Statistics of Saudi Arabia, 2016).

Saudi Arabia has a population of approximately thirty-one million people, growing at 2.11% per year (General Authority for Statistics of Saudi Arabia, 2016). Population to gender

classification indicates that the male population was 18.37 million (56%), and the female population was 13.36 million (44%) in 2016 (General Authority for Statistics of Saudi Arabia, 2016). Twenty million are Saudi and the remainder are expatriates (General Authority for Statistics of Saudi Arabia, 2016). Young people of 19 years or younger make up 30.1% of the total Saudi population. (General Authority for Statistics of Saudi Arabia, 2016). More detail of the Saudi population according to age groups is presented in Figure 2. Islam is the official religion in Saudi Arabia, and Arabic is the first spoken language (Aboul-Enein, 2002; Luna, 1998).

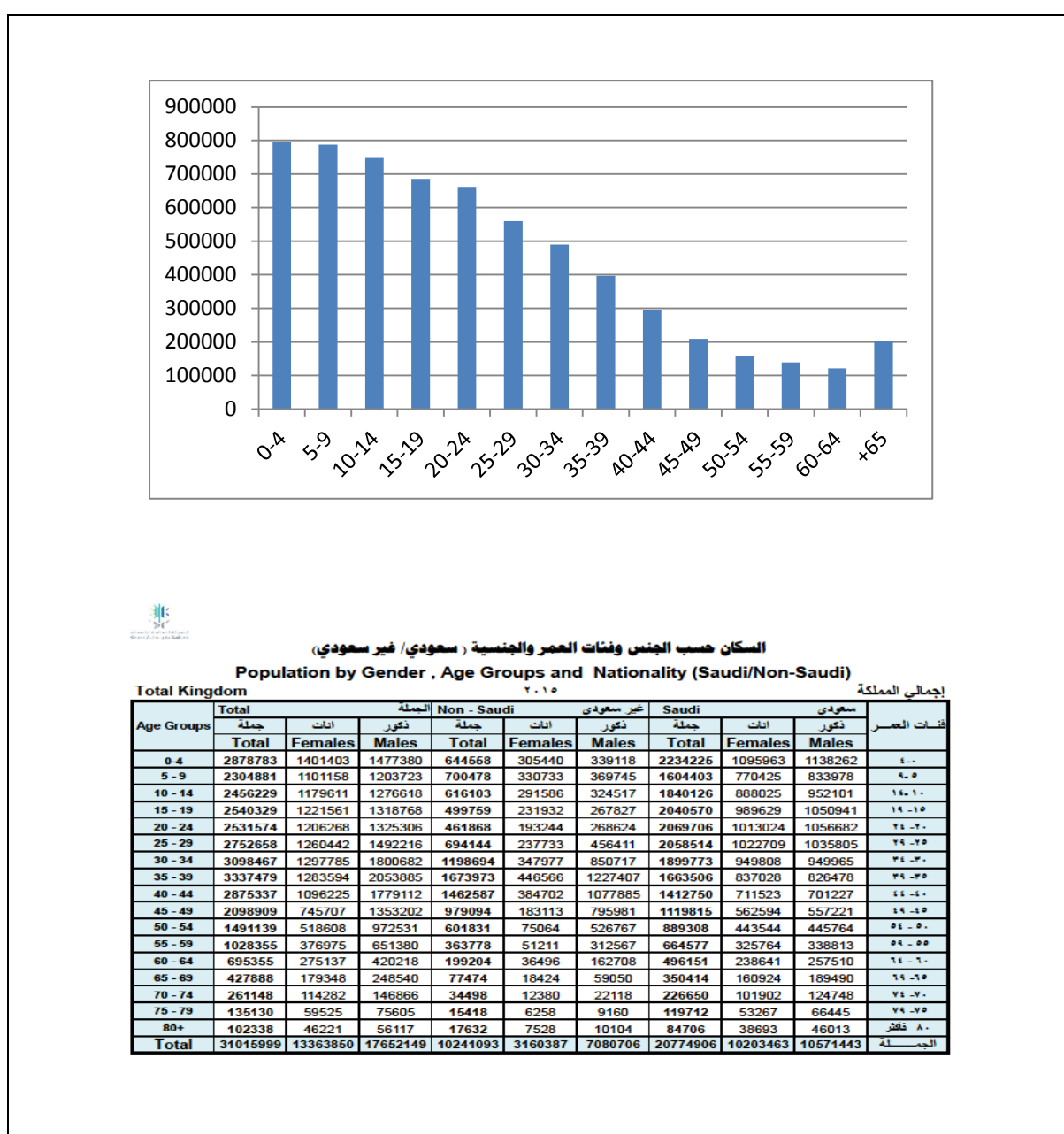


Figure 2: Saudi population according to age group (Saudi Central Department of Statistics & Information, 2011; General Authority for Statistics of Saudi Arabia, 2016)



## **Health care system and health care workers in Saudi Arabia**

The Saudi Ministry of Health was established in 1951 (Saudi Ministry of Health, 2014) and it is responsible for providing health care through primary health care centres and referral hospitals. The Ministry of Health is the responsible authority that is able to resolve any conflicts related to health at the national level (Saudi Ministry of Health, 2014). It is also responsible for developing strategic plans and policies, supervising and monitoring all health-related activities (Aldossary, While, & Barriball, 2008).

In 2012, the total governmental expenditure on health was 3.2% of the total gross domestic product of the country (World Health Organization [WHO], 2012). The ultimate goal of the Saudi government is to provide free health insurance to all Saudi nationals and to provide health care insurance to non-Saudi nationals with the support of their employers (Al-Yousuf, Akerele, & Al-Mazrou, 2002). In order to do this, Saudi Arabia has three main types of health care providers: Ministry of Health hospitals, other governmental hospitals (Military hospitals, Educational hospitals, and Arabian American Oil Company (ARAMCO) hospitals), and private hospitals (Al-Yousuf et al., 2002; Saudi Ministry of health, 2012). (See Table 2)

**Table 2: Hospitals and bed numbers in all health sectors (Saudi Ministry of Health, 2012)**

	<b>Number of hospitals</b>	<b>Number of beds</b>
Ministry of Health hospitals	259	35828
Other governmental hospitals	40	11043
Private hospitals	137	14165
ARAMCO	1	400
Total	437	61436

There are 437 hospitals in Saudi Arabia with a potential bed occupancy of 61436 (Saudi Ministry of Health, 2012). Of the 81,182 doctors in Saudi Arabia only 21% have Saudi nationality, while the majority is made up of several other nationalities (Alriyadh, 2011). The hospital nursing workforce in Saudi Arabia depends on expatriates. The majority of nurses working in Saudi Ministry of Health hospitals are Indian and Filipino. Nurses are also recruited from North America, the United Kingdom, Australia, South Africa, Malaysia and countries of the Middle East (Aboul-Enein, 2002; Luna, 1998; Tumulty, 2001). The reason for the low number of Saudi nurses may be because of the negative view of nurses held in the Saudi culture (AlYami & Watson, 2014). There is a general agreement among Saudis that nursing as a profession is not suitable for women (AlYami & Watson, 2014). The Saudi

government is striving to fill the gap in the indigenous nursing workforce through its own Bachelor of Nursing programme. In 2014, more than 34 private and public institutions were awarding Bachelor degrees to male and female Saudi nurses (Saudi Ministry of Higher Education, 2014a). Three universities also offer Masters Degrees to Saudi nurses (Saudi Ministry of Higher Education, 2014b, 2014c). Through the King Abdullah scholarship programme, the Ministry of Health offers Saudi nurses the chance to continue into postgraduate study.

The health sector in Saudi Arabia is still young compared with western countries. Therefore, the system is accepting of any new evidence-based practice knowledge in order to promote patients' health through enhancing the skills of health care team members.

## **THE STUDY LOCATION**

This study was undertaken in Hail City located in northern Saudi Arabia, 700 kilometres north-west of the capital, Riyadh. Hail lies between the mountains of Aja (1400 metres) and Salma (1100 metres), part of the northern end of the Najd highlands of the Arabian Peninsula. It is 400 kilometres north-east of Medina Al-Manwarah, 300 kilometres south-west of the settlement of Rafha near the Iraq border, and 600 kilometres south of Qurayyat close to the border with Jordan. The estimated population of Hail is 597,144, and the land area is about 125,000 km<sup>2</sup>: 6% of the total land area of Saudi Arabia (Ministry of Economy and Planning, 2010). Hail city experiences continental desert weather, but due to the height of its location, it has more moderate weather conditions compared with other cities in Saudi Arabia. During summer, mid-day temperature reaches up to 45°C, but during the winter months' temperature can fall below 2°C. Humidity is very low, with average rainfall of less than 125 millimetres per year. Most of the rain falls during March.

### **Hail context**

Hail City has 12 hospitals, of which 9 perform surgical procedures. King Khalid Hospital is classified as the sole major referral hospital in the region, with a specialised children's surgical ward. Hail General Hospital has 245 beds. The rest of the hospitals are small (about 50 beds), conducting general surgery to a population which includes child patients (usually appendicectomy, tonsillectomy, herniotomy, and laparotomy. (See Table 3)

**Table 3: Number of bed capacity and surgical words beds in Hail Region**

<b>Hospital name</b>	<b>Group</b>	<b>Bed Capacity</b>	<b>Surgical beds</b>
King Khalid Hospital	Intervention	280	80
Hail General Hospital	Control	245	30
Baqa General Hospital	Intervention	50	15
Moqaq General Hospital	Intervention	50	17
Samara General Hospital	Control	50	15
AlShamali General Hospital	Intervention	50	15
AlGazalah General Hospital	Control	50	16
AlSulami Hospital	Control	50	15
AlShanan General Hospital	Control	50	10

Regardless of the size of hospitals, all are managed and directed through the Ministry of Health. They have the same rules and regulations. These hospitals have qualified general surgeons and registered nurses who have met the Saudi Commission for Health Specialties requirements and have been interviewed by a Ministry of Health committee in order to ensure their competence before employment. As a general rule in Saudi Arabia, children under 13 years are admitted to children's surgical wards while children older than this are accommodated in adult surgical wards.

Health care facilities are accessed by patients based on their residential address. The corresponding doctors evaluate cases and refer them either to the local hospital or to the referral hospital based on the circumstances of each case. Although most operations are planned and scheduled, the system allows for urgent cases to receive medical review and intervention without any previous appointment.

Nurses have expressed their inability to provide patients and their parents with educational sessions and effective pain management because they are always too busy with new patients, and pain management is not emphasised in their education (King Khalid Hospital, 2014). However, pain management is stressed in some hospitals in other regions as a central nursing role in children's surgical wards (King Faisal Specialist Hospital & Research Centre, 2014). Therefore, it is important to shed light on this important aspect of care and to prepare the nurses who work in children's surgery wards for this role. There are 2800 nurses in the Hail region. Of these, 251 nurses work in surgical wards as detailed in Table 4 (Nursing Directorate in Hail Region, 2014).

**Table 4: Hospitals in Hail Region, Saudi Arabia**

Hospital Names	Surgical Ward	Surgical Nurses		Children's Surgical Nurses
		M	F	
King Khalid Hospital	Yes	7	45	15 surgery 6-day surgery
Hail General Hospital	Yes	7	25	-
Maternity Hospital	No	-	-	-
Psychiatric Hospital	No	-	-	-
Baqa General Hospital	Yes	4	15	-
Moqaq General Hospital	Yes	3	18	-
Samara General Hospital	Yes	4	15	-
AlShamali General Hospital	Yes	3	20	-
AlGazalah General Hospital	Yes	1	25	-
AlSulami Hospital	Yes	1	20	-
AlHayat Hospital	No	-	-	-
AlShanan General Hospital	Yes	7	10	-
<b>Total</b>	<b>12</b>	<b>37</b>	<b>193</b>	<b>21</b>

**THE CLINICAL IMPORTANCE OF THE PROBLEM**

The clinical importance of pain management cannot be disputed. Health care professionals are charged with the professional and ethical responsibility of reducing pain, yet it is also a fundamental human right that patients be entitled to a life free from pain (Cousins et al., 2004). Being free from pain is associated with faster post-operative recovery, fewer pulmonary and cardiac complications, accelerated wound healing, earlier mobilisation, and increased comfort for children. This in turn increases satisfaction and decreases the cost of care (Bristol-Myers Squibb, 2009; Dolin et al., 2002; Michaels, Hubbart, Carroll, & Hudson-Barr, 2007; Ramsay, 2000; Twycross et al., 2009).

In contrast, pain can result in many adverse physical and psychological effects (Hutchison, 2007; Twycross et al., 2009). Physical side effect encompasses tachypnoea, tachycardia, increased blood pressure, increased oxygen consumption, muscle spasm, fatigue and increased stress hormones (eg: cortisol, adrenaline, catecholamines) which in turn increase the metabolic rate, delay healing and compromise immunity (Page, 2005; Twycross et al., 2009). Psychological effects include fear, anxiety, distress, sleep disturbance, reduced coping, and developmental regression (Hutchison, 2007; Twycross et al., 2009, p.2) which worsen the patient's condition, decrease quality of life and increase health care costs due to prolonged stay in hospitals (Hutchison, 2007; Innis, Bikaunieks, Petryshen, Zellermeier, & Ciccarelli, 2004). Furthermore, inadequate pain control may be associated with increased morbidity or

mortality (Katz, Jackson, Kavanagh, & Sandler, 1996; Ramsay, 2000; Sharrock, Cazan, Hargett, Williams-Russo, & Wilson, 1995).

As a general rule, any unpleasant experiences that challenge children during hospitalisation will exert an impact on any subsequent admission, and this could make children uncooperative and frightened. Therefore, addressing children's nurses' understanding and ability to undertake effective post-operative pain management should promote immediate and lasting effects on children's experience of surgery.

### **SIGNIFICANCE OF THE STUDY**

Although post-operative pain management has been researched extensively, it does not receive the same attention from children's nurses in Saudi Arabia. Furthermore, globally most research is focused on chronic pain and particularly in cancer patients, and not on acute post-operative pain. Moreover, there is a general dearth of research in this field in the Arabic region and even more scarcity of research in Saudi Arabia. Practices are not based on sound evidence, but there is a willingness among nurses to improve. This research study is designed to address the deficit and to find an effective, culturally appropriate solution specifically for Saudi children's nurses.

This study will provide decision makers in Saudi Arabia with crucial information about nurses' knowledge, attitudes, beliefs, and perceptions of post-operative pain management for children and their perceptions of barriers to optimal pain management. This new understanding should facilitate the development of new educational plans, protocols and tools for use in controlling or eliminating post-operative pain for child patients.

Another significant contribution of the study is that it will enable the use of an alternative, non-traditional method of teaching in Saudi Arabia in the form of a digital, interactive online education programme. This approach will be more convenient as the hospitals are geographically separated and shift patterns make attendance at educational events difficult.

### **THE RESEARCHER'S ENGAGEMENT WITH THE ISSUE**

I completed my associated degree in nursing in Saudi Arabia, Bachelor of Science (BSc) in Nursing in Australia, and my Master of Science (MSc) in Nursing Education in the United Kingdom. From these experiences I gained insight into alternative approaches to the issues that nurses address in the places that I visited and in which I studied. I observed both strong

protocols and competent practice in assessing, preventing, treating, and sometimes eradicating children's pain. Nurses were concerned to reduce or avoid pain, especially post-operatively, and they took pride in ensuring that they managed the issue effectively and in a timely manner. They were largely in control of the clinical issue, with the ability to make professional choices about interventions, and to insist on stronger or alternative prescriptions when needed. They enjoyed a positive professional relationship with doctors, working as a team to ensure the best care for the children.

Currently, I work in Hail region as a Nursing Director (Manager). Nursing managers have the responsibility of managing employees to the benefit of consumers, the organisation and the employees themselves. Their decisions are goal-oriented and based on logical thinking and solid evidence. This in turn will reflect on the quality of service provided to consumers. In fulfilling the requirements of my job, I observed consistently that children did not receive optimal pain management treatment post-operatively compared to their counterparts in the UK, US and Australia. My observation was based on recurrent complains of pain experienced by children as well as reports from parents that pain management was inadequate for their children. I observed that patients did not receive effective pain assessment or intervention from nurses. Nurses were hesitant to give children pharmacological treatment to treat their post-operative pain, although physicians ordered medication as needed. Yet they did not avail themselves of alternative or complementary non-pharmacological strategies, either. At the managerial level, this compromised the quality of service provided to the children and the reputation of the hospitals. I felt compelled to intervene. Saudi nurses are caring and professional, yet there were failing to act effectively in this situation, and, moreover, felt disempowered to improve the child's treatment.

After engaging in a series of discussions with nurses, I concluded that the knowledge and belief that nurses held regarding pain was inadequate or inappropriate. Furthermore, when I reviewed the hospital policies at the Ministry of Health, I found some rules and regulations had been provided, but nurses did not comply with these and, indeed, were only minimally aware of the associated policies and guidance. The hospitals were entirely lacking in consistent and continuing post-operative pain management education programmes for nursing children. This was at odds with the case in the other countries in which I had observed rigorous training schedules and willing compliance with well-written protocols. I knew that the Saudi nurses wanted to do better and that they had the capability to do so with support.

I determined to educate children's nurses about pain management, but could find no existing educational packages that were culturally sensitive to the Saudi community and to nurses' needs in Saudi hospitals. I did not find any previous study that evaluated the variables that were demonstrated in the literature to be of relevance to the problem that I had identified. A further problem that I faced was the current educational system in Ministry of Health hospitals in which grouping nurses together in a single class for postgraduate education was difficult. The nature of work patterns and the distance between hospitals posed further problems to achieving the required outcomes.

These were the origins of this study. I had recognised a clinical problem, established the lack of evidence and locally appropriate means to address the problem, but had set the goal of achieving an improvement in practice regionally which might be useful nationally, too.

## AIM AND RESEARCH QUESTIONS

### Study Aim

To test the impact of implementing an interactive online post-operative pain management education programme on children's nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal practice.

### Research Questions

1. How do nurses' knowledge and attitudes of post-operative pain management change following administration of a pain management educational programme: one month and three months later?
2. How do nurses' beliefs about pain in childhood change following administration of a pain management educational programme: one month and three months later?
3. How do nurses' perceptions of children's reports of pain change following administration of a pain management educational programme: one month and three months later?
4. How do nurses' perceptions of the barriers to optimal pain management change following administration of a pain management educational programme: one month and three months later?
5. How does nurses' self-efficacy regarding post-operative pain management change following administration of a pain management educational programme: one month and three months later?
6. Is there a significant difference between demographic subcategories in the intervention group in relation to all variables under study?

## OVERVIEW OF THE THESIS

**Chapter two** is a systematic review following established guidelines of the existing literature on post-operative pain management by children's nurses, including the study variables of knowledge, beliefs, attitudes, perceptions, self-efficacy and barriers to optimal pain management.

**Chapter three** is a report of a detailed review of the literature regarding online learning. It details the history of online learning; the driving forces for establishing online learning



packages, advantages of online learning over traditional learning methods, barriers to online learning, elements of a successful online learning package, steps in developing online learning package, and quality of online learning package.

**Chapter four** details the practical steps taken to develop the education programme and the content of the education programme. Steps considered to monitor the quality of this programme are also detailed in this chapter.

**Chapter five** details the study design adopted in this research study. A discussion of the non-equivalent groups quasi-experimental design is presented followed by the description of the sampling techniques, reliability and validity measures, data collection methods and ethical issue related to this study.

**Chapter six** presents a summary of the major findings.

**Chapter seven** provides a discussion of important aspects of the study design and the findings in the light of the existing literature. The limitations and strengths of the study are also considered.

**Chapter eight is** the final chapter of this thesis. It presents the key messages from the thesis and offers thoughts on further steps in research, nurse education, and policy to exert more impact on this and other clinical topics in the region.

## **CHAPTER TWO**

### **SYSTEMATIC REVIEW OF POST-OPERATIVE PAIN MANAGEMENT**

#### **INTRODUCTION**

This chapter is a report of the outcomes of a systematic review of the evidence about post-operative pain management by nurses of children. The chapter starts with justification of the use of systematic review methods, and then the search strategy is detailed. There follows justification of the judgements that were made in selection of the research reports for review, and details of the methods of assessing the quality of included studies are presented. The chapter concludes with a discussion of the gaps in current evidence based on the reviewed studies.

#### **THE PURPOSE OF A SYSTEMATIC REVIEW**

The aim of a systematic literature review is to identify, evaluate and summarise the results of all related individual studies in a predefined area in order to synthesise and present the outcome in an accessible format (University of York & Centre for reviews dissemination (CRD), 2009; Tacconelli, 2010). A systematic review is defined as “a review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review” (Higgins & Green, 2008). In a systematic review, the question and eligibility criteria are set beforehand, and related studies are identified through these. Careful evaluation of rigour and the level of evidence of each study is carried out before synthesising the results of the review (Higgins & Green, 2008). To do this, researchers have to adhere to meticulous, scientific, chronological steps to increase the rigour of the review, which must itself be reported in the review to minimise bias (Abalos et al., 2001).

Systematic review enables the highest quality evidence to be identified to guide best practice, answering the clinical questions of health team members, researchers, policy makers and decision makers (Elamin et al., 2009; University of York & Centre for Reviews and Dissemination, 2009). In this regards, this systematic review will help decision makers in Saudi Arabia and health care providers from improving the quality of care provided to children post operatively and reduce their level of pain.

## **SEARCH STRATEGY**

Researchers have to follow a clear, systematic search strategy to answer the review question and to identify quality evidence (Khan, Kunz, Kleijnen, & Antes, 2011). An important step before carrying out a systematic review is to set clear questions and a detailed search strategy beforehand (University of York & Centre for Reviews and Dissemination, 2009). In accordance with CRD guidelines, the search questions should follow the PICO or PICOS framework to structure the literature search (Santos, Pimenta, & Nobre, 2007). PICOS stands for population, intervention, comparators, outcomes and study design (Akobeng, 2005; Santos et al., 2007). It is a method of analysing the phenomenon under study and it works well for questions concerned with medical research (Beecroft, Booth, & Rees, 2010). It was applied in the following way in this review.

**P:** Population: refers to the sample under study to which the result of literature review will be generalised. In this review, the population was nurses who work with children post-operatively.

**I:** Intervention: refers to the main intervention used to enhance or improve certain outcomes. In this systematic review, the intervention of interest was the post-operative pain management educational programme that nurses receive.

**C:** Comparison: it is important to specify the comparison group studied alongside the experimental group in order to establish the effect of the intervention. The comparison group of relevance in this review was nurses who did not receive an educational programme.

**O:** Outcomes: This relates to the impact of the intervention on declared variables related to the population under study. In this review, the impact of a post-operative pain-management educational programme was sought on nurses' knowledge, attitudes, beliefs and perceptions of children's pain, nurses' self-efficacy and nurses' perceptions of the barriers to optimal pain management.

**S:** Study design: refers to which kind of studies should be included in literature search. In this review only experimental or quasi-experimental studies were included.

Overall, the PICOS was a means to set the review question as follows.

**What is the impact of an interactive educational programme (I) on children nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal post-operative pain management (O) in children (P) when measured over time (S) compared to the usual practice of no planned intervention (C)?**

The Centre for Reviews and Dissemination signify the importance of choosing quality studies as this will reflect on the quality of the literature review that emerges from these studies (University of York & Centre for Reviews and Dissemination, 2009). The assessment of the quality of studies is discussed later in this chapter. Limiting the review to higher quality designs (randomised controlled trials (RCT) and quasi-experimental studies) means that the number of studies included from the literature will be limited and even further reduction in the number of items from which to gain worthwhile evidence occurs as quality criteria are applied. However, the aim of this study was to test the impact of implementing an interactive online post-operative pain management education programme on certain variables related to children and therefore only experimental and quasi-experimental studies were included in this review.

There is another advantage of restricting the review to RCTs and quasi-experimental studies designs. The only two research designs that are able to establish a cause and effect relationship are experimental and quasi-experimental research designs. Focusing upon evidence from this sort of study allows researchers to establish a clear clinical evidence base about the impact of education programmes. Furthermore, the homogeneity between the selected articles with regard to their designs decreases the risk of bias and increases the reliability of data extracted from the selected articles (Higgins & Green, 2008).

## **INCLUSION AND EXCLUSION CRITERIA FOR SELECTING PAPERS**

One important practice is to develop clear, precise inclusion and exclusion criteria, adhering to these during the process of study selection. Overt inclusion and exclusion criteria facilitate future audit, which reflects on the quality of the systematic review (Morse & Richards, 2002). Inclusion and exclusion criteria were developed in order to assess which studies should be included in this systematic review and in order to ensure that only relevant papers to the topic under study were selected.

### ***Inclusion Criteria***

All items had to meet all of the inclusion criteria of being focused on at least one of the variables stated in the review question; prepared in English; reporting the outcome of experimental or quasi-experimental research; and focused on post-operative pain in children.

The restriction to items published in English was applied as the official academic and medical language in Saudi Arabia is the English language. In Saudi Arabia, researchers, and health care professionals use English as the main language of communication, and scientific medical journals choose English as the main adopted language to publish findings of research conducted in Saudi Arabia.

A number of issues were found when testing the articles against the inclusion criteria. Articles included populations that were broader than the population at issue in this study. The study population included nurses not only working with children surgical patients but in many other wards such as medical wards, intensive care unit and an oncology wards (Dowd, 2009; Habich et al., 2012; He et al., 2010; Johnston et al., 2007; Swain, 2008; Textor, 2003; Van Hulle Vincent, Wilkie, & Wang, 2010). In these studies, nurses who worked in surgical wards were included as part of whole nursing populations.

The study populations included nurses who were working in surgical wards but possibly in both children and adult surgical wards (Abdalahim, Majali, Stomberg, & Bergbom, 2011; He, Vehviläinen-Julkunen, Pietilä, & Pölkki, 2008; Smith, 2007; Swain, 2008; Textor, 2003). Finally, this study focussed on children post-operative pain management in general, but some studies focussed on only a single aspect of pain management such as non-pharmacological treatment (He et al., 2008; He et al., 2010) or relaxation technique (Lin, Chiang, Chiang, & Chen, 2008). After careful deliberation, it was decided to include these studies as they offered insights at least into part of the evidence base.

### ***Exclusion criteria***

Items which met any of the exclusion criteria were discarded. Articles published before 2000 were excluded since from this point, pain management has received considerable attention from health care providers, policy makers and decision makers as Joint Commission Accreditation Health Care Organisation (JCAHO) consider it as the fifth vital sign (Berry & Dahl, 2000; Department of Veterans affairs, 2000; Walid et al., 2008). Mixed method studies were excluded if the conduct and outcomes of the experimental element were not clearly

differentiated from other aspects of the study. If the focus was found to be on chronic pain following surgery rather than acute post-operative pain, this would result in exclusion.

## **DATABASES INTERROGATED**

For the purpose of this review, an extensive search was made of online databases: Cumulative Index of Nursing and Allied Health Literature (CINAHL), and the Database of the National Library of Medicine (MEDLINE) via (EBSCO); Ovid SP (Ovid MEDLINE(R) 1946 to present with daily update); The COCHRANE Library; ProQuest database; and Google Scholar. All these databases contain a large number of articles related to the question of this review and they have advanced search strategies and filtering tools.

CINAHL and MEDLINE were accessed since these cover a vast range of literature presented in English relating to nursing, allied health and medical subjects. A noticeable US bias has been identified, however, so additional databases were interrogated in order to overcome this weakness (Brayford, Chambers, Boath, & Rogers, 2008). The Cochrane Library allows searching of its core collection of systematic reviews and meta-analyses (Cochrane, 2015). ProQuest database was established as a microfilm publisher and has started publishing Masters and doctoral dissertations since 1939 (ProQuest, 2015a; Thistlethwaite, 2012). It also includes e-books, scholarly journals, historical and current newspapers and periodicals, and data sources in its database (ProQuest, 2015a, 2015b). OvidSP is a redesign of Ovid Gateway and it is a popular search engine that allows for searching MEDLINE outside of PubMed (FitzSimmons & Gross, 2008). It allows for searching the medical subject headings (FitzSimmons & Gross, 2008) and it covers international literature on biomedicine and information is indexed from 5,400 international journals (OvidSP, 2012). Google Scholar is a freely accessible search engine and was founded in 2004. It allows searching in any language and it has broader focus compared with other databases as the main focus is not only medical and health literature (Falagas, Pitsouni, Malietzis, & Pappas, 2008). These databases were supplemented by manual searches of library catalogues for the same search terms. The search was conducted during July and August 2014 and updated in March 2016.

## SEARCH TERMS

The following keywords were applied.

- Child, children, Adolescence+, Paediatric, Paediatrics, Pediatric, Pediatrics
- Post surgery , Post-surgery, Postoperative , Post-operative, Post operative
- Pain
- Self efficacy, Self-efficacy
- Attitude, Attitudes
- Knowledge
- Belief, Beliefs
- Perception, Perceptions
- Barrier, Barriers

In 2016 the following keywords were added to the previous search terms in accordance with reviewers' suggestions: program\*, education\*, intervention\*, teach\*.

A combination of these terms using Boolean operators "AND" "OR" were made in order to generate a comprehensive search and maximise the number of studies retrieved from databases, which related to this study (See Table 5). More details are supplied in appendices one and two.

**Table 5: Search criteria**

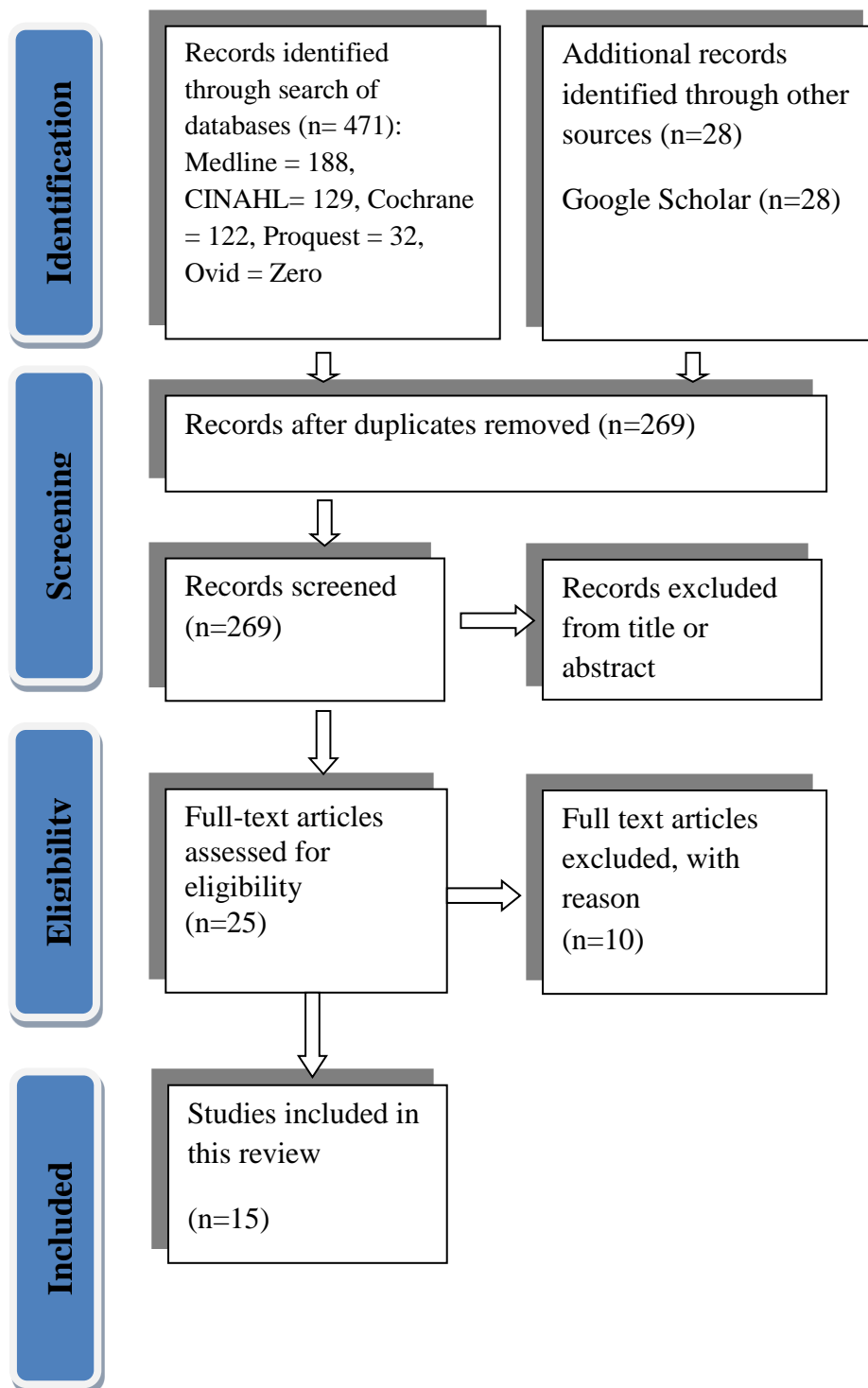
<b>Child</b>	<b>AND</b> Post surgery	<b>AND</b> Program*	<b>AND</b> Pain	<b>AND</b> Self efficacy	<b>AND</b> Attitude	<b>AND</b> Knowledge	<b>AND</b> Perception	<b>AND</b> Barrier
<b>OR</b> children	<b>OR</b> Post-surgery	<b>OR</b> Education*		<b>OR</b> Self- efficacy	<b>OR</b> Attitudes	<b>OR</b> Belief	<b>OR</b> Perceptions	<b>OR</b> Barriers
<b>OR</b> Adolescence	<b>OR</b> Postoperative	<b>or</b> Teach*:				<b>OR</b> Beliefs		
<b>OR</b> Paediatric*	<b>OR</b> Post-operative	<b>OR</b> Intervention *						
<b>OR</b> Pediatric*	<b>OR</b> Post-operative							

## RESULTS OF THE SEARCH

The database search revealed 499 papers (see Appendices 1 & 2). After scanning the articles, 230 duplicated articles were removed. The abstracts of two hundred and sixty-nine articles were reviewed against the inclusion and exclusion criteria. This process resulted in the elimination of 244 articles as their contents did not match the inclusion criteria. The full text

copies of the remaining 25 articles were reviewed and evaluated to ensure that they were appropriate to be incorporated in the review. Ten articles were excluded because they did not meet the conditions in inclusion criteria such as their research design was neither experimental nor quasi-experimental or they were studies of chronic pain rather than acute pain. Fifteen papers which were related to post-operative pain management education programmes addressing at least one of the variables of interest were retained for the review. In order to document papers for this systematic review, “Preferred Reporting Items for Systematic Reviews and Meta-Analyses” (PRISMA) was used as the internationally preferred method of reporting (Moher et al., 2009) (see Figure 3). The papers with their full references are detailed in Table 6.





**Figure 3: Flow chart of study selection process PRISMA**

**Table 6: Details of the selected studies**

1. Johnston, C. C., Gagnon, A., Rennick, J., Rosmus, C., Patenaude, H., Ellis, J., . . . Byron, J. (2007). One-on-one coaching to improve pain assessment and management practices of pediatric nurses. <i>Journal of Pediatric Nursing</i> , 22(6), 467-478.
2. Smith, C. M. (2007). <i>Comparison of Web-Based Instructional Design Strategies in a Pain Management Program for Nursing Professional Development</i> . (Doctor of Nursing Science), The State University of New York, Buffalo.
3. Abdalrahim, M. S., Majali, S. A., Stomberg, M. W., & Bergbom, I. (2011). The effect of postoperative pain management program on improving nurses' knowledge and attitudes toward pain. <i>Nurse Education in Practice</i> , 11(4), 250-255.
4. Dowd, J. (2009). <i>Impact of an Educational Program on Pediatric Nurses' Knowledge and Attitudes About Pain Management</i> . (Master of Science in Nursing), Northern Kentucky University, Kentucky. Retrieved from ProQuest database
5. Ellis, J. A., McCleary, L., Blouin, R., Dube, K., Rowley, B., MacNeil, M., & Cooke, C. (2007). Implementing best practice pain management in a pediatric hospital. <i>Journal for Specialists in Pediatric Nursing</i> , 12(4), 264-277.
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## DATA EXTRACTION

Data extraction is the activity carried out by the researcher to collect relevant information about the characteristics of the included studies (University of York & Centre for Reviews Dissemination [CRD], 2009). A data extraction sheet helps researchers in carrying out the systematic review and reducing bias (University of York & CRD, 2009; Elamin et al., 2009). A data extraction sheet was generated for this study for application to the 15 articles (See Table 7).

**Table 7: Summary of the studies**

Study	Design & Instrument	Sample	Intervention: Knowledge (K), Attitude (A), Beliefs(B), Perception(P), Self-Efficacy(SE), Barriers(Ba)	Outcomes
Zhang et al 2012. China	Quasi-experiment Nurses Knowledge and Attitude Survey (NKAS)	N=196. (Exp=106, ctrl=90) All nurses	6 hours training in use of Changhai Pain Scale <b>K &amp; A</b>	Improved knowledge and attitude (P<0.001)
Ellis et al 2007 Canada	Quasi-experiment Children and pain survey	N=366 Response rate 35% N= 120 (completed the post intervention questionnaires) All children nurses and physicians	4-hr pain education workshop <b>K, B, &amp; P</b>	No significance differences between groups
Johnston et al 2007. Canada	RCT PNKAS	N= 141 All children nurses	One to one coaching sessions (total in average 9 for each nurse) <b>K &amp; A</b>	Improved knowledge and attitude (P<0.001)
He et al 2008 China	Quasi-experiment Knowledge survey	N=359 All nurses working in surgical units	booklets and nine lectures were used <b>K</b>	Improved knowledge of nonpharmacological methods (P<0.001)
He et al 2010 Singapore	Quasi-experiment Survey consists of 3 sections	N=108 All children nurses	Educational intervention A questionnaire validated in Finland <b>Ba</b>	Heavy workload/lack of time and the child's inability to cooperate were the most commonly reported barriers at pre- and post-test.
Van Hulle Vincent et al 2010 USA	Quasi-experiment Pain belief and practice survey	N=24	2-hrs Internet-based Relieve Children's Pain (RCP) protocol <b>B</b>	Improved belief (P<0.0001)

Swain 2008 USA	Quasi-experiment NKAS	N= 482 All nurses	small group sessions discussing case scenarios and online self-learning modules <b>K &amp; A</b>	Improved knowledge and attitude (P=0.001)
Textor 2003 Columbia	Quasi-experiment NKAS	T1, N=65 T2, N = 45 T2, N= 36 All nurses	Traditional education programme <b>K &amp; A</b>	Improved knowledge and attitude (P<0.001)
Dowd 2009 USA	Quasi-experiment PNKAS	N=53 All children nurses	active pain management educational program <b>K &amp; A</b>	No significant differences between groups
Smith 2006 USA	RCT Basic knowledge assessment Tool	N= 106 All nurses	2-hrs Web-Based Instructional Design Strategies Vs constructivist learning design <b>K &amp; A</b>	No significant differences between groups
Paul 2013 India	Quasi-experiment Knowledge Questionnaire	N= 60 Children nurses working at surgical units	Planned teaching programme <b>K</b>	Improved knowledge (P<0.01)
Abdalahim et al 2011. Jordan 21 items knowledge and attitudes towards pain	Quasi-experiment 21 items knowledge and attitude survey	N= 65 All postoperative nurses	postoperative pain management program was implemented for three months <b>K &amp; A</b>	Improved knowledge and attitude (P<0.05)
Lin et al 2008 Taiwan	Quasi-experiment Knowledge and attitudinal of pain management, scale	N=81 All nurses working at surgical units	15 hrs pain management programme <b>K &amp; A</b>	Improved knowledge (P=0.001) and attitude (P=0.005)
Huth et al 2010 Mexico	Quasi-experiment PNKAS	N=106	4-hr paediatric Pain Education Program (PPEP) <b>K &amp; A</b>	Improved knowledge and attitude (P<0.0001)
Habich et al 2012. USA	Quasi-experiment PNKAS	T1, N =27 T2, N=11 T3, N=15 All children nurses	Implementing a comprehensive Pediatric Pain Assessment and Management Guidelines <b>K &amp; A</b>	No differences were found between nurses' before and after implementation the guidelines.

## ANALYSING THE QUALITY OF RESEARCH MATERIAL

Best practice should be based on high-quality research evidence whenever possible (Facchiano & Hoffman Snyder, 2012). Rigorous appraisal of research reports exposes the strength and weakness in studies, which reflect on the quality of evidence produced (Facchiano & Hoffman Snyder, 2012). Such appraisal is vital in translating research to practice (Hill & Spittlehouse, 2001). Critical appraisal is the procedure of evaluating research evidence methodically to assess its validity, rigour, and relevance to clinical practice (Hill & Spittlehouse, 2001). A part of this process is to understand the notion of levels of evidence. The following table (Table 8) shows The National Health and Medical Research Council in Australia (NHMRC) evidence hierarchy (Coleman et al., 2005).

**Table 8: NHMRC evidence Hierarchy: designations of levels of evidence according to type of research design (Coleman et al., 2005, p.15).**

Level	Intervention
I	A systematic review of level II studies
II	A randomised controlled trial
III-1	A pseudo-randomised controlled trial (ie: alternate allocation or some other method)
III-2	A comparative study with concurrent controls: <ul style="list-style-type: none"><li>▪ Non-randomised, experimental trial</li><li>▪ Cohort study</li><li>▪ Case-control study</li><li>▪ Interrupted time series with a control group</li></ul>
III-3	A comparative study without concurrent controls: <ul style="list-style-type: none"><li>▪ Historical control study</li><li>▪ Two or more single arm study</li><li>▪ Interrupted time series without a parallel control group</li></ul>
IV	Case series with either post-test or pre-test/post-test outcomes

Based on these criteria, the quality of evidence is judged partly on the research design (since even the strongest design could be poorly implemented). The strongest evidence is held to be produced through randomised controlled trials and pseudo-randomised controlled trials (or quasi-experimental studies). It is important to note that although the randomised controlled trial should produce strong evidence, not all randomised controlled trials have the same quality (University of York & CRD, 2009). The systematic review to guide this study included only research reports designated level II, III-1 and III-2: randomised controlled trials and quasi-experimental studies with a control group. This ensured that only the strongest designs were considered. No systematic review was identified, so level I was not represented.

Many instruments are available to evaluate the quality of research (Brink & Louw, 2012; Creswell, 2013; Hawker, Payne, Kerr, Hardey, & Powell, 2002; Higgins & Green, 2008). Of these, Hawker et al's Assessment Tool was selected for use in this study because it enables researchers to quantify and measure the quality of reviewed reports. Furthermore, compared with some other appraisal tools such as the rigorous Critical Appraisal Skills Programme (CASP) that has special forms for each research design (CASP UK, 2013), Hawker et al's Assessment Tool has only one format for all studies regardless of design, allowing for consistency in appraisal. Hawker et al's assessment tool entails assessment of nine categories: abstract and title, introduction and aims, methods and data, sampling, data analysis, ethics and bias, findings, transferability, implications and usefulness (Hawker et al., 2002) (See Appendix 3).

The assessment is based on a point system for each category, which ranges from 1 to 4, with 1 indicating a very poor score and 4 indicating a good score, thus allowing a maximum score of 36 points. An example of appraising an article using Hawker's Assessment Tool can be seen in Appendix 4. Each included study was awarded a total score falling into one of the following categories: very poor (0-10points), poor (11-20 points), fair (21-30 points) and good (31-36 points). Table 9 summarises the level of evidence and the quality of the included studies according to Hawker's et al Assessment Tool.

**Table 9: Level of evidence and quality of the included studies**

No.	Study	Level of evidence	quality score /36
1	Habich et al., 2012	Level III-2	32 (Good)
2	Ellis et al., 2007	Level III-2	26 (Fair)
3	Johnston et al., 2007	Level II	33 (Good)
4	He et al., 2008	Level III-2	26 (Fair)
5	He et al., 2010	Level III-2	36 (Good)
6	Van HulleVincent et al., 2010	Level III-2	34 (Good)
7	Swain, 2008	Level III-2	35 (Good)
8	Textor , 2003	Level III-2	36 (Good)
9	Dowd, 2009	Level III-2	34 (Good)
10	Smith, 2007	Level II	35 (Good)
11	Paul, 2013	Level III-2	36 (Good)
12	Abdalahim et al., 2011	Level III-2	35 (Good)
13	Lin et al., 2008	Level III-2	34 (Good)
14	Huth et al., 2010	Level III-2	31 (Good)
15	Zhang et al., 2008	Level III-2	31 (Good)

## **OVERVIEW OF THE INCLUDED STUDIES**

Of the fifteen studies included in this review, only two were randomized controlled studies (Johnston et al., 2007; Smith, 2007) and the rest were quasi-experimental studies as they lacked randomisation (Abdalahim et al., 2011; Dowd, 2009; Ellis et al., 2007; He et al., 2008; He et al., 2010; Huth, Gregg, & Lin, 2010; Johnston et al., 2007; Lin et al., 2008; Paul, 2013; Swain, 2008; Textor, 2003; Van Hulle Vincent et al., 2010). Another important issue was the sample size. Only three out of the fifteen studies reported a power calculation (Dowd, 2009; He et al., 2010; Smith, 2007). A proper sample size calculation can decrease the risk of type I and type II errors and can determine the number of participants needed to obtain significant results (Machin, Campbell, Tan, & Tan, 2011). However, power calculation depends upon the results of previous similar studies (Kim & Seo, 2013), and there had been few such studies previously.

Furthermore, the participant attrition rate was high in studies with no significant positive results (Dowd, 2009; Ellis et al., 2007; Habich et al., 2012; He et al., 2010; Smith, 2007). For example, in the study by Ellis et al., only 35% of the nurses who completed the pre-test questionnaire also completed the post-test questionnaires which may have underestimated improvement in nurses' knowledge. The number of participants was insufficient to constitute a significant test result, and may constitute an attrition bias.

Although some studies mentioned the content of their education programme (He et al., 2010; Huth et al., 2010; Lin et al., 2008; Paul, 2013; Smith, 2007; Swain, 2008; Textor, 2003; Zhang et al., 2008), some other studies merely alluded to their education programme without detailing the content of the programme to allow the reader to generate a decision about the quality of that education programme or for researchers to be able to repeat those programmes (Abdalahim et al., 2011; Dowd, 2009; Ellis et al., 2007; Habich et al., 2012; He et al., 2008; Johnston et al., 2007; Van Hulle Vincent et al., 2010). When relating this weakness to the results, it was found that same studies that did not detail their education programme did not achieve statistically significant results. There was one exception. Smith's (2007) study was experimental post-test only in design, and he compared between two educational methods. There was, therefore, no need to develop and detail an educational programme.

## **OUTCOMES OF THE REVIEW**

Although pain management practices have received considerable research attention since 2000, this extensive literature search revealed a dearth of research reports that explored the

impact of educational programmes on the ability or preparedness of children nurses to provide optimal post-operative pain management for children.

### **Knowledge about children's pain**

Thirteen studies tested the impact of an educational programme on nurses' knowledge of pharmacological and non-pharmacological techniques of pain management (Abdalrahim et al., 2011; Dowd, 2009; Ellis et al., 2007; Habich et al., 2012; He et al., 2008; Huth et al., 2010; Johnston et al., 2007; Lin et al., 2008; Paul, 2013; Smith, 2007; Swain, 2008; Textor, 2003; Zhang et al., 2008). Of these, eleven studies offered good (good) positive evidence to support the implementation of an educational programme on nurses' knowledge (Abdalrahim et al., 2011; Dowd, 2009; Habich et al., 2012; Huth et al., 2010; Johnston et al., 2007; Lin et al., 2008; Paul, 2013; Smith, 2007; Swain, 2008; Textor, 2003; Zhang et al., 2008). Another two studies were found to have a fair level of quality to support the impact of post-operative pain management education on children's knowledge (Ellis et al., 2007; He et al., 2008).

A number of studies found a significant impact of an educational programme on nurses' knowledge, of which eight demonstrated good evidence (Abdalrahim et al., 2011; Huth et al., 2010; Johnston et al., 2007; Lin et al., 2008; Paul, 2013; Swain, 2008; Textor, 2003; Zhang et al., 2008), and only one study with fair evidence (He et al., 2008). For example, a non-randomized pre-test post-test Mexican study aimed to test the impact of a pain education intervention programme on nurses' knowledge and attitudes toward children's pain (n=79). Significant improvement was measured compared with pre-test ( $p < 0.0001$ ) (Huth et al., 2010). Similar results were found across international research (Abdalrahim et al., 2011; He et al., 2008; Johnston et al., 2007; Lin et al., 2008; Paul, 2013; Swain, 2008; Textor, 2003; Zhang et al., 2008) though the He et al (2008) study findings must be treated with caution.

However, four out of twelve studies did not find any significant improvement in nurses' knowledge of pain after the education programme (Dowd, 2009; Ellis et al., 2007; Habich et al., 2012; Smith, 2007). All of the studies were of good quality except for that by Ellis et al., (2007). Education programmes in all of these studies were planned to increase children's nurses' knowledge of pain assessment and management except for Smith (2007) who targeted both adult and children's nurses. This made the programme too broad, which may have impacted negatively on nurses' level of knowledge.



The content of educational programmes was inconsistent across the studies. Only Paul (2013) established a specialised post-operative pain education programme to increase post-operative pain management among children's nurses, and He et al., (2008) sought to increase only children nurses' knowledge about the use of non-pharmacological post-operative pain managements. Other researchers chose to increase children's nurses' knowledge in the area of children's pain in general (Huth et al., 2010; Johnston et al., 2007). Other researchers also chose to provide even broader pain management education programmes as they targeted children's and adult nurses in all hospital areas using the same educational programmes (Abdalahim et al., 2011; Swain, 2008; Zhang et al., 2008). In contrast, Lin et al., (2008) hoped to increase children's and adult surgical ward nurses' knowledge solely regarding the use of relaxation therapy.

Although Abdalahim et al.,(2011); Huth et al.,(2010); Lin et al., (2008) and Zhang et al., (2008) used the same approach and recruited nurses from different ward settings, they obtained a statistically significant positive result (Abdalahim et al., 2011; Huth et al., 2010; Lin et al., 2008; Zhang et al., 2008). One possible explanation may be the high attrition rate experienced by Dowd (2009), Ellis et al., (2007) and Habich et al., (2012).

Since the majority of good studies (9 out of 12) reported a statistically significant effect from pain education programmes on nurses' knowledge, and only four did not report a significant impact, then it had to be concluded that education programmes can exert a significant impact on nurses' knowledge of pain assessment and management.

### **Attitudes towards children's pain**

Nine out of fifteen studies with good evidence reported the impact of pain assessment and management educational programmes on the attitude of nurses of children (Abdalahim et al., 2011; Dowd, 2009; Huth et al., 2010; Johnston et al., 2007; Lin et al., 2008; Smith, 2007; Swain, 2008; Textor, 2003; Zhang et al., 2008). Seven of the studies reported a positive impact on nurses' attitudes toward pain management (Abdalahim et al., 2011; Huth et al., 2010; Johnston et al., 2007; Lin et al., 2008; Swain, 2008; Textor, 2003; Zhang et al., 2008). For example, Swain (2008) conducted a study to test nurses' knowledge and attitudes toward pain management using the Knowledge and Attitudes Survey regarding pain in acute care settings. Attitudes toward pain management was significantly improved ( $p=0.0001$ ) (Swain, 2008).

Although studying attitudes toward pain management as an independent variable gave more attention to this variable, Abdalrahim et al., (2011); Dowd, (2009); Huth et al., (2010); Johnston et al., (2007); Smith, (2007); Swain, (2008); Textor, (2003); and Zhang et al., (2008) combined knowledge and attitude in the same survey. That is, attitude toward pain management was not studied as the sole independent variable. The possible explanation may be belief that greater knowledge and understanding leads to positive attitudes toward pain management. All studies that found significant improvements in knowledge also found a significant improvement on attitudes (Abdalrahim et al., 2011; Huth et al., 2010; Johnston et al., 2007; Lin et al., 2008; Swain, 2008; Textor, 2003; Zhang et al., 2008). For example, Lin et al., (2008) examined the impact of a pain management education programme on strengthening nurses' knowledge of relaxation therapy as an important pain relief technique. The pain assessment and management education programme improved nurses' knowledge significantly. As a result, the nurses' attitude toward pain management was also increased significantly ( $p=0.005$ ) after the educational programme (Lin et al., 2008).

On other hand, the remaining two studies with a good evidence level reported that the impact of pain assessment and management education programmes was not significant, and no difference was found between intervention and control groups (Dowd, 2009; Smith, 2007). Smith (2007) tested two instructional designs (text-based reading versus constructivist learning design) in a Web-based continuing education programme on pain management for registered nurses. The results showed no significant improvement in nurses' attitude in either intervention or control groups (Smith, 2007). However, this educational programme was very broad as it targeted both children's and adult nurses without giving attention to the type of pain and age of patients that were considered. Furthermore, randomisation was at the individual level and not at the health care facilities level, which increased the chance of contamination between the experimental group and control group. The study by Smith (2007) was one of the preliminary studies that attempted to integrate new teaching methods (a web-based education programme) in everyday nurse continuing education. There is a need to replicate, build and develop on this study as all new educational systems are moving toward the online and web-based educational system.

Since the majority of good studies reported a significant effect of pain education programmes on nurses' attitude toward pain management, and only two did not report a significant impact, it was concluded that education programmes can have a significant impact.

### **Beliefs and perceptions of children's pain**

Only two studies explored the impact of a pain management education programme on nurses' beliefs and perceptions toward pain management (Ellis et al., 2007; Van Hulle Vincent et al., 2010): one with good evidence level (Van Hulle Vincent et al., 2010) and the other with fair evidence level (Ellis et al., 2007).

The first one examined feasibility of the Internet-based Relieve Children's Pain protocol to improve nurses' management of children's pain (Van Hulle Vincent et al., 2010). Using a single-group, pre-test post-test design, nurses were required to complete an Internet-based Pain Beliefs and Practices Questionnaire before and after the intervention. A significant improvement in nurses' beliefs and practices scores was noticed in the post-test compared with the pre-test ( $p < 0.0001$ ).

In contrast to that study, Ellis et al. (2007) found no significant differences between intervention and control groups in beliefs and perceptions after introducing the educational programme which was designed to improve pain management practices in a children's hospital. The attrition rate was particularly high as only 35% ( $n=120$ ) of the original sample ( $n=344$ ) completed the post-test. This may explain the unexpected result of lack of impact of the educational programme. It remains unclear whether such programmes could be effective, though the current, limited evidence suggests that it is possible.

### **Nurses' self-efficacy in relation to pain management for children**

The extensive literature search did not reveal any study that examined the impact of a pain management educational programme on children's nurses' self-efficacy. This verified the need for a study to test self-efficacy in relation to post-operative children pain management.

### **Perceived barriers to optimal post-operative pain management in children**

Perceived barriers to optimal post-operative pain management in children was also an important issue that could be influenced by pain assessment and management education, but only one study with a fair evidence level reported this variable (He et al., 2010). Regardless of education programmes, nurses still rate heavy workload, lack of time, and the child's inability to cooperate as the most commonly reported barriers to optimal pain management (He et al., 2010). However, this study did not use a control group, and the pre-test examination could have affected the post-test result as nurses become more aware of barriers through the pre-test. Using a control group would have strengthened the evidence. A single study (of only

good quality) does not constitute sufficient evidence and, therefore, a further study addressing the perceived barriers to optimal post-operative pain management in children was needed.

### **LIMITATIONS OF THE REVIEW**

This review excluded studies written in languages other than English, however, the academic and research language in Saudi Arabia is English. The Saudi context, and, indeed, that of the Gulf region, was not excluded from the review. Restricting the review to experimental studies necessarily excluded qualitative evidence, but in preparation for a further experimental study this was appropriate.

### **CONCLUSION**

This review included 15 experimental studies. Of these, 13 had a good level of evidence and two had a fair level of evidence. Eleven of the studies with good evidence found a positive impact of education on nurses' knowledge, while seven of nine studies that addressed attitude toward pain management revealed positive impacts. Of the two studies that explored the impact of pain management education programme on nurses' beliefs and perceptions toward pain management, the one with good evidence found positive evidence of impact. No study was found that examined the impact of a pain management educational programme on nurses' self-efficacy. Only one study with good evidence level reported on perceived barriers to optimal post-operative pain management in children. There were no studies addressing all the previous variables together in a single study.

In conclusion, this extensive systematic review revealed a dearth of research reporting the impact of educational programmes on nurses' knowledge, attitudes, beliefs and perceptions of children's pain, nurses' self-efficacy, and perceptions of barriers to optimal post-operative pain management in children. There was a scarcity of studies in the Arabic region as only one Jordanian study was found and no studies conducted in Saudi Arabia. A major gap in knowledge was found in the study topic, demonstrating the need for the study reported here.

## **CHAPTER THREE**

### **ONLINE LEARNING: A LITERATURE REVIEW**

#### **INTRODUCTION**

This chapter is a report of a detailed review of the literature regarding online learning. It details the history of online learning; the driving forces behind establishing it, advantages of online learning packages over traditional learning methods, barriers to online learning, elements of successful online learning packages, steps in developing online learning packages, and quality control of such courses. This integrative review was conducted to establish the optimal design, structure, delivery and rigour of the intervention for this study. As an integrative review, all sources and types of evidence were included.

#### **SEARCH STRATEGY**

For the purpose of this review, a search was made of online databases: Cumulative Index of Nursing and Allied Health Literature (CINAHL), and the Database of the National Library of Medicine (MEDLINE) via EBSCO; OvidSP, ProQuest database; Education Resources Information Center (ERIC). The following keywords were searched: nursing, distance education, distance learning, computer-based learning online education and online learning. The search was limited to the last 11 years (2005-2016) because since that year computers, use of the Internet and new mobile technology became widespread in Middle Eastern countries. In 2005 the cell phone companies first provided Internet services at an affordable price, and new models of mobile phones that support surfing the Internet became available. The search was also limited to items available in full text. The database search revealed 623 papers. After scanning the articles, 337 duplicated articles were removed. The title and abstracts of 286 papers were reviewed and as a result 194 papers were excluded, leaving 92 to review. Of these, 67 were research articles, 5 were literature reviews, 5 were books, 9 were governmental reports, and 6 were theses. This number was not unexpected as broad terms were used in searching for the literature.

Based on the criteria introduced in Table 8 of chapter two, most of the included articles in this review were level III and IV quality of evidence, which means that they were either descriptive or comparative studies without control. Most of the research articles were conducted either in the UK or the USA.

## **NURSES' NEED FOR CONTINUING EDUCATION**

Health care professionals, and nurses in particular, require continuing professional education as they work in complex settings including complex technologies (Davis, Taylor, & Reyes, 2014). Continuing education can be defined as any education conducted after nurses qualify, and it can take any form in order to maximise nurses' theoretical and practical knowledge, which in turn will improve the quality of health care provided to patients (American Nurses Association, 2015). In the past, continuing nursing education was based on traditional or conventional methods which relied on gathering nurses at a set point in time in the same classroom, but these methods are no longer the best choice for delivering education. Educators move towards using online learning packages that are easy to deliver to a greater mass of learners regardless of the time and place (Zerr & Pulcher, 2008). Education has moved from conventional (based on classrooms) to online learning modes that do not always require the physical presence of the students (Bates, 2005; Broussard, 2008; Parsad & Lewis, 2008). Using online learning can offer an exceptional chance to nurses to progress in their careers, and many researchers found it to be of the most effective methods to overcome current and forthcoming shortages in nurse practitioners and academics. Online learning was found to be comparable with traditional teaching methods (Lahti, Hätönen, & Välimäki, 2014; Peterson, 2008).

## **HISTORY OF ONLINE LEARNING**

The history of online learning began in early 1880s and has gone through four stages (Moore & Kearsley, 2011). The first stage was called correspondence or home study. In the 1880s, due to the existence of a widespread postal service, pupils were, for first time, able to study in their homes. All of the interaction between students and their teachers was undertaken through letters. The second stage was broadcast radio and television. In 1921, Day Saints' University of Salt Lake City developed the first educational package using radio, and in 1934 the Stat University of Iowa presented a first television broadcast about oral hygiene (Moore & Kearsley, 2011). The third stage began when "open universities" were introduced. In 1967, the first British Open University was established. The aim was to offer education classes in their homes to students who lived far away from the main universities and who were too busy to travel. Universities provided adult learners with instructional material using the television, radio, and tape-recorded lectures (Moore & Kearsley, 2011). The last stage was the evolution of modern technology through a combination of the invention of the computers, digital media, modern software, the Internet and teleconferencing (Moore, Dickson-Deane, & Galyen, 2011). This combination created an online and live virtual environment that was able to

mimic the interpersonal and interactive nature of traditional teaching methods. Online learning is a method of acquiring a new global knowledge using computers, and culminated in the application of the technologies to convey new knowledge globally (Du et al., 2013; Loria-Castellanos, 2014; Hart, 2014). This process can take place either partially or completely through the Internet (Means, Toyama, Murphy, Bakia, & Jones, 2009).

Online learning has recently become one of the most favoured educational strategies, and has changed current educational theories (Aharony & Bronstein; 2013; European Commission, 2010). More than six million pupils, in the least ten years, in the USA took online courses which constitute 32% of all students (Allen & Seaman, 2013). Saudi Arabia is one of fastest growing countries in the globe in term of online learning. As the number of students enrolled in higher education institutions increased tremendously, universities turned to online courses to ease the pressure and increase their students' access to universities' educational resources (Al-Asmari & Rabb Khan, 2014; Al Saif, 2005; CITC, 2010). Nurses are not exempt from this as students are moving away from traditional methods to online learning. Nurses' use of computer-based classes has been traced to 1966 when Bitzer developed a programme to teach first year nursing students how to take care of patients with myocardial infarction (Lewis, Davies, Jenkins & Tait, 2005).

Over time, new terms emerged to describe the process of online learning such as computer-assisted instruction, online learning, distance learning, web-based learning, e-learning or self-directed learning packages (Walker & Harrington, 2008). One result of this is that researchers have not established a universal definition of these terms, perhaps because some of these terms are relatively new. Consequently, there are great variations between studies in what constitute online learning (Vica, 2015). At least two conditions are invariable: the learning involved the use of a computer, and students are instructed remotely rather than in traditional classes (Ruiz, Mintzer, & Leipzig, 2006). In this study the term "online learning" was accepted to refer to the use of an interactive, online education programme, with some packages depending on the Internet as a mode of education.

## **DRIVING FORCES FOR ESTABLISHING ONLINE LEARNING PACKAGES**

Several issues prompted the establishing of online learning packages. The advancement in technology itself and wide distribution of the Internet and computers are considered to be major factors (Askitas & Zimmermann, 2015). Furthermore, when a large amount of

information needs to be delivered to a large group of people in limited space and time, technology is the solution (Clark & Mayer, 2011). Another stimulus to adopt online learning programmes for nurses is that nurses are large in number compared with other health professions (US Department of Health and Human Services, 2010) and it is difficult to gather them in a single class at one time (Sweeney, Saarmann, Flagg, & Seidman, 2008). Therefore, online learning is helpful for repeated use or for reference again in the future (Clark & Mayer, 2011). Given current nursing shortages, different working shifts, and understaffing (American Association of Colleges of Nursing, 2014), online learning may serve as one of the best choices for nurses to improve their skills. The shortage of nurses and qualified teachers that are able to deliver high quality teaching experience drives health care facilities to move toward online learning (Wilkinson, 2013).

In summary, continuous improvement in patient care standards, together with tremendous expansion in nursing knowledge and new technologies create the need for continuing learning (Barnard et al., 2005). The shortage of nurses, instructors and a difficult work environment create the need for online learning. Continuing education for nurses is a crucial vehicle in order to support nurses, improving their knowledge, skills, and expertise so that safe and quality patient care is guaranteed (Durham & Alden, 2008; Marzuki, Hassan, Wichaikhum, & Nantsupawat, 2012).

## **ADVANTAGES OF ONLINE LEARNING OVER TRADITIONAL LEARNING METHODS**

There are several disadvantages to traditional classes. Limited availability of places was identified as an important reason for poor attendance (Bates, 2005; Moore & Kearsley, 2011). Furthermore, living in rural areas constitutes another barrier to attending classical face to face classes (Mancuso-Murphy, 2007; Talbert, 2009). There is a need, then, to establish new techniques that are able to overcome the weaknesses of traditional teaching classes.

One solution is online learning that takes place when the students and teacher are not in the same classroom (Parsad & Lewis, 2008; Tallent-Runnels et al., 2006). The communication may occur directly between the teacher and student through using telephone, video calling, or computer technology. Alternatively, communication can take place indirectly between the teacher and the correspondent through using DVDs, email or hard copy correspondence. The idea of online learning stands on finding a convenient time for the learner rather than for instructors and educational institutions (Jolliffe, Ritter, & Stevens, 2012; Talbert, 2009).



In this context, people who have family obligations or whose work commitments prevent their attendance or spending time in travelling to classes can be enabled to access classes at any time of day (Park & Choi, 2009). One of the major advantages of online learning is removing the limits and borders between countries. That is, students are able to attend high quality classes from any place in the world (North Carolina Education Cabinet and Office of the Governor, 2016; Summers, Waigandt, & Whittaker, 2005). Another advantage is control over the learning environment, with no interruption or distraction during the active learning (Sit, Chung, Chow, & Wong, 2005).

Several other advantages of online learning have been identified. It provides learners with reliable sources of knowledge, reduces wasted time, and contains elements that encourage and motivate learners to learn more which reflects on their level of satisfaction (Bates, 2005). A study using quantitative research methods to explore the the impact of online programme on on undergraduate nurses' level of knowledge and level of satisfaction found that students were confident in using the computers and more satisfied in using an online programme (Vogt, Schaffner, Ribar, & Chavez, 2010). Several other studies researched nurses and other health care professionals regarding their satisfaction of online learning in general, and positive feedback was received (Koch, Andrew, Salamonson, Everett, & Davidson, 2010; Liang, Wu, & Tsai, 2011; MacDonald-Hill & Warren-Forward, 2015; Yu & Yang, 2006). The relative merits of classical teaching (classroom) and online learning are detailed in Table 10 below.

To sum up, online learning has several advantages over traditional methods: accessibility (Sacchanand & Jaroenpuntaruk, 2006); flexibility; and ease of use (Sacchanand & Jaroenpuntaruk, 2006).

**Table 10: Merits of classical (classroom) teaching and online learning**

	<b>Classical teaching</b>	<b>Online learning</b>
Advantages	<p>The information can be delivered to a large group of people at the same time and in the same place.</p> <p>It allows for the attendees to receive instant feedback and for teachers to provide them with any clarification that they need.</p>	<p>The information can be delivered to an even larger group of people at any time and in different places in a more cost-effective manner compared with other methods (Cook, 2007)</p> <p>It permits the participant to become an active learner in the learning process (Shea, 2007).</p> <p>It can add an international perspective (Jolliffe et al., 2012)</p>
Disadvantage	<p>The learner may become passive. Participants come with different experiences and backgrounds which makes it difficult for the instructors to meet all of their learning needs.</p>	<p>Although developing a self-learning package consume times, as soon as it is created it allows for larger numbers of learners to use it, providing for their learning needs (Cook, 2007).</p>

**BARRIERS TO ONLINE LEARNING**

Muilenburg and Berge (2005) identify many challenges to online learning from the student’s perspectives. Prerequisite skills that students should acquire before starting their online study constitute one of the major challenges. Technical problems form another barrier. Lack of motivation to enroll, to continue and to complete the course can be additional barriers to engagement.

A USA education report identified other barriers to online learning (Allen & Seaman, 2007). The need for more self-discipline was the major barrier standing against adopting online courses (Allen & Seaman, 2007). The higher cost of developing and delivering online courses may affect the development and quality of the learning packages (Allen & Seaman, 2007; Zerr & Pulcher, 2008). Lack of acceptance of online courses by academics and employers was also a contributing factor (Allen & Seaman, 2007). Administrative issues, such as materials not being delivered on time, were identified as additional barriers to be overcome (Musa & Othman, 2012). There are many other barriers identified in previous literature. For example, lack of skill in employing new technology, poorly-designed packages, and computer anxiety (Childs, Blenkinsopp, Hall & Walton, 2005). Instructors may be unfamiliar with new technology and innovative methods, and unable to employ web-based programmes (Muilenburg & Berge, 2005).

Previous research discussed three main factors that may hinder or promote the establishing of online programme.

### **(1) Motivation**

Online programmes are designed primarily for students, who are motivated, accountable, and self-directed (O'Neil & Fisher, 2008). Motivation is the fuel that students need to continue with their learning (Castillo-Merino & Serradell-Lopez, 2014; Chua & Don, 2013; Huet et al., 2011). However, feelings of loneliness and lack of motivation are the major factors that cause students to withdraw and fail to complete online learning courses (Aragon & Johnson, 2008; Bonnel, 2008; Muilenburg & Berge, 2005).

ChanLin (2009) found that online learning is more limited in promoting students' motivation compared with traditional classroom settings regardless of the design and structure of the online education. In order to keep such students motivated, he introduced several adjustments. For example, he introduced videos and graphics to attract students. He also created a platform where students could exchange information and communicate with each other. This is in line with previous research studies that noted that the means to overcome lack of motivation is to increase communication and interaction between instructors and students, and between students as peers, through creating platforms for online and offline discussions (Bonnel, 2008; Bonnel, Ludwig, & Smith, 2007).

### **(2) Technical Support**

Online learning requires competence and skill in using a computer (Summers et al., 2005). Previous research values the importance of technical support (Tallent-Runnels et al., 2006; Wiesenmayer, Kupczynski, & Ice, 2008; Young & Norgard, 2006). A mixed method study investigated the pupils and faculty members' opinions of online courses found availability of technical support to be considered an important element in any successful online learning (Avery et al., 2008). This is not limited to nurses: physicians also consider lack of technical support to be one of the most important barriers to a successful online learning experience (Dyrbye, Cumyn, Day, & Heflin, 2009).

The inability of pupils to solve technical and technological matters, and lack of technical support or a help desk can hinder the online education experience particularly when problems are not solved in a timely manner (Haber & Mills, 2008; Githens, 2007).

Contrary to previous findings, one research study found no connection between availability of technical support and the experience of online learning. Students did not perceive technical support as a problem for them (Dobbs, Waid, & del Carmen, 2009). The possible explanation of this lack of need for technical support is that the sample was taken from non-nursing students who were already engaged on an online degree and would have had previous experience in dealing with computers and online modules. Regardless of the results of one study, the availability of technical support can enhance students' and teachers' experience of online learning.

### **(3) Gender**

Researchers found different results regarding the impact of gender on adhering to online learning. A study conducted to test barriers to online learning found that men viewed administrative/instructor-related issues to be the most important barriers. Furthermore, men were found to consider time and support as a greater barrier compared to women (Muilenburg & Berge, 2005). In general, the percentage of women who completed their online learning was greater compared to men (Aragon & Johnson, 2008; Willging & Johnson, 2009). A possible reason is the appropriateness of time and the obligations of being a mother. That is, women may have family obligations so online learning may be the ultimate solution to fulfil their educational needs. Regardless of their gender, participants reported time constraints and course design as the main reasons for not completing the programme (Aragon & Johnson, 2008).

A study conducted by Wyatt (2005) reported no significant differences between participants based on gender with regards to perceived quality of online learning courses, satisfaction with them, or motivation to complete them. Participants reported that the main reason for enrolling on this mode of learning was to save time in travelling and because of convenience to them. Convenience was the major driving force for participation and adherence to online education programmes (Wyatt, 2005). This result was supported by more recent research (Dobbs et al., 2009). Participants of either gender who undertook online learning course were also more

likely to feel able to complete and achieve higher marks in any further online course (Dobbs et al., 2009).

A study conducted by Müller (2008) to examine the barriers and incentives for enrolling in online learning courses from the female perspective found that feeling engaged in the online learning community, convenience, and friends' support were the most important factors. The participants identified several important barriers such as having many responsibilities the same time, lacking traditional class and face-to-face interaction, and inadequate technology support (Müller, 2008). It seems that male and female participants share the same concerns regarding facilitating forces and barriers to online learning courses. This observation seems valid in the light of the other studies (Aragon & Johnson, 2008; Dobbs et al., 2009; Park & Choi, 2009).

### **ELEMENTS OF SUCCESSFUL ONLINE LEARNING PACKAGE**

Any successful online learning package should meet several benchmarks: learners who are ready to learn, explicit course objectives, effective learning materials, appropriate design, feedback (either online instant interaction or delayed interaction), and assessment and evaluation activities (Moore & Kearsley, 2011). Tallent-Runnels et al. (2005) identified seven crucial benchmarks for effective online learning classes: (1) Helpful resources should be integrated with the online course. (2) Students should have control of the speed at which they move through the modules. (3) Having the opportunity to engage in discussion or to study these enriches the learning experience and reflects on participants' marks. (4) Providing feedback through email or through the chat rooms are important. (5) Technical support for online learning experience is essential. (6) Online aids and step by step presentation may not make much difference to achievement (7) Evaluation should be integral to online learning packages (Tallent-Runnels et al., 2005). These elements were also stressed in the same year by Childs, Blenkinsopp, Hall, & Walton (2005).

Other factors such as time, flexibility, familiarity of using computers, availability of evaluation methods, and quality of the online course are also crucial factors in increasing students' satisfaction (Sun, Tsai, Finger, Chen, & Yeh, 2008). A systematic review explored the factors identified in previous research that led to improved learning outcomes and increased students' satisfaction in any online classes, findings that practice exercises, repetition, interactivity and availability of feedback were important elements (Cook et al., 2010).

A more recent study aimed to explore characteristics of a successful online courses from the student's perspective (Dominici & Palumbo, 2013). Results showed that any successful online course should include user-friendly software; it should include the possibility of downloading the material so students are able to read them offline; it should include quizzes and exams so that students are able to test their own progress; flexible time so that student can access the online course at their convenience, the presence of support at any stage; and provision of a certificate of attendance at the end of the course (Dominici & Palumbo, 2013).

### **STEPS IN DEVELOPING ONLINE LEARNING PACKAGE**

Florida State University's Center for Educational Technology in 1975 created a design model composed of five step actions called the ADDIE module. After a period of further development and refinement it had become widely used (Chan & Robbins, 2006; Wang et al., 2006). These steps are analysis (A), design (D), development (D), implementation (I) and evaluation (E): summarised as ADDIE. Clark and Mayer (2011) argue that the course should start by careful analysis of customers' learning needs as the learning package should provide learners with useful knowledge and build up on their current knowledge. At this stage, and based on learners' learning needs, the developers are able to set the goals of the learning package according to their evaluation. This stage extends to evaluation and analysis of the course content to ensure that it reflects the course goals and the learners' learning needs.

The second step is to design the course. At these stage developers set clear objectives based on learners' needs and prioritise the objectives based on these. They have also to choose the best delivery methods that will be adopted to ensure the usefulness and ease of assimilation of information. They will also at this stage, and based on the level of the course objectives, choose the best method of evaluation.

At the next stage, the developers collect the learning materials, which are media, written materials, pictures, exams and games, and integrate and corporate them in the form of a learning package, producing this material in the form of DVDs or through web delivery methods.

As soon as the package is ready, the implementation stage is commenced. At this stage the learning packages are made ready and accessible to learners. Finally, the educational package

may be evaluated by the learners or experts, and issues are considered for future improvement.

### **QUALITY OF ONLINE LEARNING PACKAGES**

The quality of online learning provided to learners compared with the quality of traditional classrooms has been questioned (Campbell et al., 2008). Researchers found no difference or advantages of traditional teaching styles over online learning in term of educational outcomes. A meta-analysis study was carried out to test the effectiveness of Web-based instruction compared to classroom instruction. There were no differences in term of delivery media methods, and Web-based materials were 6% more effective compared with classrooms in term of declarative knowledge (McCutcheon, Lohan, Traynor, & Martin, 2015; Sitzmann, Kraiger, Stewart, & Wisher, 2006). This confirmed previous findings (Zhao, Lei, Yan, Lai, & Tan, 2005). Campbell et al. (2008) compared the difference between online learning and regular classrooms when teaching a research methods unit. They found that research methods courses can be conveyed to students entirely online, and the more the students engaged in online activity the more marks they achieve compared with their counterparts who attended the traditional face-to-face classes. A similar result was obtained in an introductory undergraduate statistics course (Summers et al., 2005). Several other research articles found that online learning is more effective or comparable to conventional mode of teaching (Dhamija & Kanchan, 2014; Fagbemi et al., 2007) and users have a positive experience in using it (Farrimond, Dornan, Cockcroft, & Rhodes, 2006; Mahmud et al., 2013; Nokdee, 2007).

Contrary to this, an experimental post-test only study conducted by Carcich and Rafti (2007) was intended to explore experienced nurses' level of satisfaction of online education class compared with a traditional lecture as methods of delivering information. Results showed that experienced nurses preferred the lecture. Although the quality of online learning programmes are comparable to traditional methods, the employer may still not trust graduates whose qualification or preparation is based on non-traditional modes of learning, which will affect their chances of recruitment (Passmore, 2009).

Chao, Saj and Tessier, (2006) identify six components that evaluators should consider when making decisions regarding the quality of online learning courses. Curriculum design should address course scientific content and course outcomes, and it should reflect the learner's needs and intended objectives. Instructional design requires attention to the relationships between course objective, content, and expected outcomes; the methods of delivery; media,

technology and activities used to achieve these outcomes. The quality of the Web design requires review because it is the main platform that students use to interact with each other and with the educational materials. The teaching and facilitation methods and strategies used to achieve expected outcomes and to convey the scientific content to the students in a simple and reliable way should be considered. This will reflect the teachers' level of experience and the quality of their methods. The learning experience is another important factor in determining the quality of an online course. The aim of any online course should be to ensure a positive experience for learners. Course presentation relates to the formats in which a course is presented. The course should be presented in a professional manner and follow international standards in the quality of courses.

Using these benchmarks can increase students' retention on the course and improve their outcomes significantly. One study by Dietz-Uhler, Fisher, and Han (2007) aimed to improve pupils' retention through improving the quality of their online courses. The retention rate improved by 11% at the end of six months in the courses which adhered to quality standards. In summary, quality monitoring and improvement process are required to ensure that self-learning packages are able to compete with traditional (class) learning techniques.

## **SUMMARY**

This chapter has explored the history and forms of online learning. The driving force behind establishing online learning packages in general and factors behind establishing them in nursing have been detailed. Furthermore, the advantages of online learning packages over traditional learning methods have been outlined, and the barriers to establishing online learning environments articulated. It has served to identify the elements of successful online learning courses, together with their steps of development and quality evaluation.



## **CHAPTER FOUR**

### **DEVELOPING THE INTERVENTION**

#### **INTRODUCTION**

This chapter provides details of the decision to develop online learning package. The elements that should be included in any online learning package are identified. The steps taken to develop the education programme and the means of monitoring the quality of the programme are also considered.

#### **THE DECISION TO ESTABLISH ONLINE LEARNING PACKAGE**

Several factors played a significant role in promoting the adoption of online learning package in this study. The first of these was cost-effectiveness. Academic institutions seek to deliver education classes in more efficient and cost-effective modes. Online learning package can allow for cost savings in staff salaries, hiring a venue, and renovation and maintenance (North Carolina Education Cabinet and Office of the Governor, 2016; Summers, Waigandt, & Whittaker, 2005). In this study, participants were working in different hospitals, and on varied shifts. The adoption of face-to-face classical methods, and employing many instructors to deliver the education to nurses would have been prohibitively expensive.

The availability of physical space is another variable (Bates, 2005; Moore & Kearsley, 2011; Talbert, 2009). That is, lack of classroom space in proportion to increasing numbers of students promotes the movement towards non-attendance modes of learning. In this study, more than 250 nurses were expected to participate. Even if a room was available to accommodate this number (a lecture theatre, for example) it would not allow for personal interaction with learning materials or the opportunity to go back to previous material to clarify issues before continuing from the same place again. Moreover, the practical problem of nurses working on different shifts and in hospitals that were fairly remote from each other prevented the simultaneous availability of all of the nurses.

The context, in which the study was undertaken, with rapid expansion in knowledge and availability of technology, necessitated the provision for learning in a fast and convenient manner. An online learning option was the obvious solution (Al-Asmari & Rabb Khan, 2014; Smart & Cappel, 2006). This allowed the use of the interactive teaching methods which would have been rendered impossible in a traditional classroom situation. It overcame the problem of lack of access to the class if held in attendance mode, and facilitated learning at the time best suited to each individual nurse. Online learning can create a rich platform for

learning, offering access to varied sources of information in equally varied formats (Volery & Lord, 2000). The package in this study did not rely on access to the Internet, however. Internal hyperlinks on a DVD provided the same effect of connecting resources, exercises and information to offer a similar platform to that available online on the Internet while retaining a boundary around the resource for the purpose of the study. This controlled the content of the education package and ensured that each one of the participants in the study had the same experience with the education package.

### **SELECTING THE TYPE OF EDUCATION PROGRAMME**

Considerable time was spent in exploring the best method of delivering the information to the participants. Some of the major challenges that were faced were the physical distance between the hospitals, the culture of Saudi Arabia that imposes boundaries on gathering male and female nurses together, and finding a suitable time to bring nurses together when they work on different shift patterns. Even to have a male researcher conducting the intervention with female nurses would not be acceptable, posing further problems for a traditional approach of face-to-face teaching. Employing two research assistants to undertake same-sex teaching was an option, but this would have brought with it training needs and concerns about the stability of the intervention.

Moreover, nurses in Hail Region often face technical problem with the internet connection. These factors led to the decision to develop a website focussed on a pain assessment and management programme which could then be downloaded to DVDs. This would still provide hyperlinks to Internet for some resources, but all essential information, together with exercises and self-tests, was included in the DVD and could be accessed through internal hyperlinks (as though online). Using this technique, all of the participants received the same educational package on a DVD, providing the boundary to the intervention to reduce extraneous variables.

### **BARRIERS TO ONLINE LEARNING PACKAGE**

In chapter 3, several barriers to successful use of online learning packages were identified. The first of these was lack of skill in employing new technology (Murdock, 2003). For this study a professional programmer was employed for technical aspects of constructing the package. The researcher designed the course, prepared the materials and then negotiated with the programmer how to present the package as a state of art professional website.

The second common barrier was the availability of funding as such projects can be costly. The Saudi Ministry of Health funded this project and provided approximately £10,000 towards the cost of developing the educational package.

Another challenge that the researcher needed to overcome was ensuring adequate motivation on the part of potential participants. Several strategies were employed. Certificates of completion and appreciation were provided for the nurses' portfolios to evidence that they had completed this ongoing education course (Appendix 5). A number of laminated reminder information cards on a small karabiner were also offered as a gift for completing the course (see Appendix 6). These proved to be particularly popular with the participants. The programme was designed to be interactive in order to keep participants interested and engaged with the programme. Technical difficulty was another issue that may hinder the learning experience and decrease motivation to complete the course. The nurses were given comprehensive instructions on how to use the learning package (see Appendix 7), and a dedicated mobile number and email address were included for personal support in case of technical difficulties.

## **STEPS IN DEVELOPING THE EDUCATION PACKAGE**

In order to develop the pain management education package, the "ADDIE" model steps proposed by Clark and Mayer (2011) were followed: Analysis (A); Design (D); Development (D); Implementation (I); Evaluation (E)

### **Analysis**

The work began with a review of the literature related to pain assessment and management (Chapter 2). As a result, several pain assessment and pain management topics were identified. These are summarised in Table 11 below. These learning topics were filtered, gathering together common issues and removing redundant topics. The selected topics that remained were compared to topics included in the Curriculum Outline on Pain for Nursing in order to ensure that the developed course would provide nurses with useful and appropriate information (International Association for the Study of Pain [IASP], 2014). Table 12 summarises these steps.

**Table 11: Pain education topics extracted from review of the literature without logical order**

Pain: definition and barriers
The physiology of pain
Types of pain
Gathering information: pain assessment
Pharmacological strategies
Non-pharmacological methods
The nature of pain
Pain as a subjective experience
Barriers to good pain management (postoperative pain management)
Pain scales
Facts on opioid analgesia
Definition of post-operative pain management
Causes of poor postoperative pain management
Effect of postoperative pain management
Assessment of postoperative pain

**Table 12: Summary of IASP curriculum outline on pain (IASP 2014)**

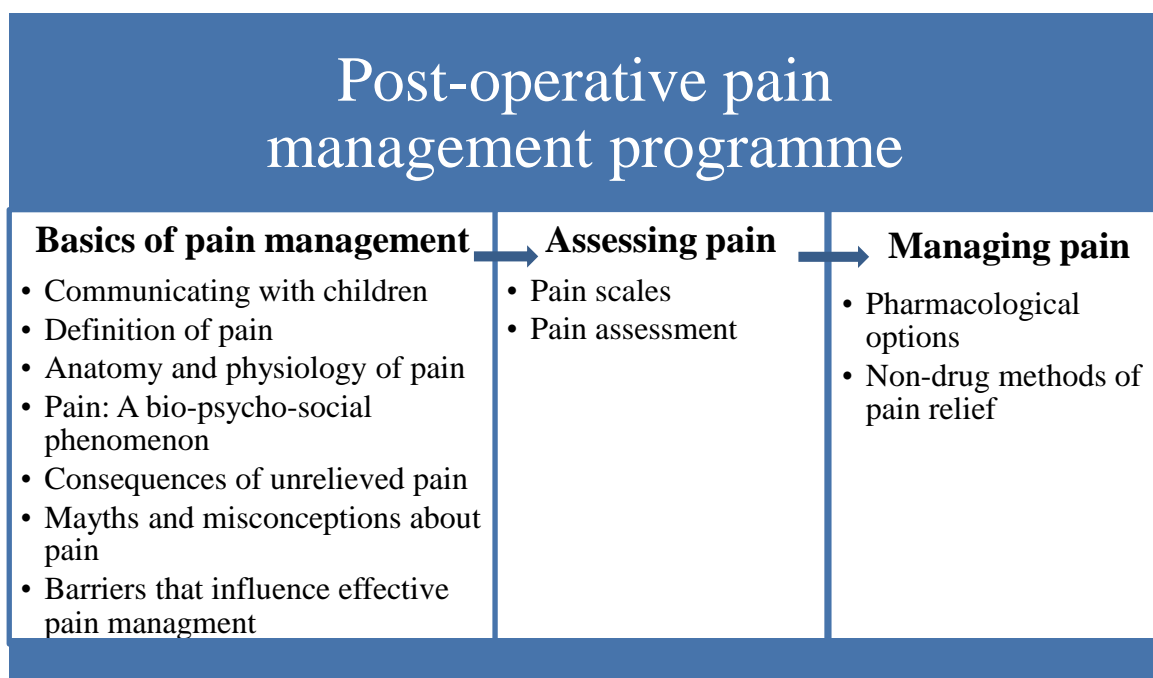
<p><b>Multidimensional Nature of Pain</b></p> <ul style="list-style-type: none"> <li>• Magnitude of the problem – epidemiology</li> <li>• Impact of unrelieved pain</li> <li>• Definitions of pain</li> <li>• Types of pain based on duration <ul style="list-style-type: none"> <li>○ Acute pain</li> <li>○ Chronic pain.</li> </ul> </li> <li>• Types of pain based on mechanism <ul style="list-style-type: none"> <li>○ Nociceptive pain (somatic, visceral)</li> <li>○ Neuropathic pain</li> </ul> </li> <li>• Multiple dimensions of Pain</li> </ul>
<p><b>Pain Assessment and Measurement</b></p> <ul style="list-style-type: none"> <li>• Evaluate the feasibility, validity, reliability, sensitivity, and clinical utility of different pain assessment methods for specific groups (eg: age groups, cognitively impaired, diagnostic groups) and clinical settings</li> <li>• Conduct an initial comprehensive pain assessment using valid and reliable comprehensive multidimensional pain assessment tools</li> <li>• Perform ongoing pain assessments using valid, reliable unidimensional measures</li> <li>• Identify patients at risk of inadequate pain assessment and management and use valid and reliable tools to assess pain in these high risk patients</li> <li>• Communicate verbally and record initial and ongoing pain assessments in the patient's health care record so that these assessments are accessible to all members of the pain management team</li> </ul>
<p><b>Management of Pain</b></p> <ul style="list-style-type: none"> <li>• Pharmacological Management</li> <li>• Non-pharmacological pain Management</li> </ul>

As a result of this comparison, the following outlines were generated without any logical order but ensuring that the content of each topic reflected the IASP recommendations and that the whole of the recommendations were addressed.

- Anatomy and physiology of pain
- Pain: a bio-psycho-social phenomenon
- Consequences of unrelieved pain
- Barriers to effective pain management
- Definitions of pain
- Communicating with children
- Pain assessment
- Pharmacologic and non-drug methods of pain relief
- Myths and misconceptions about pain

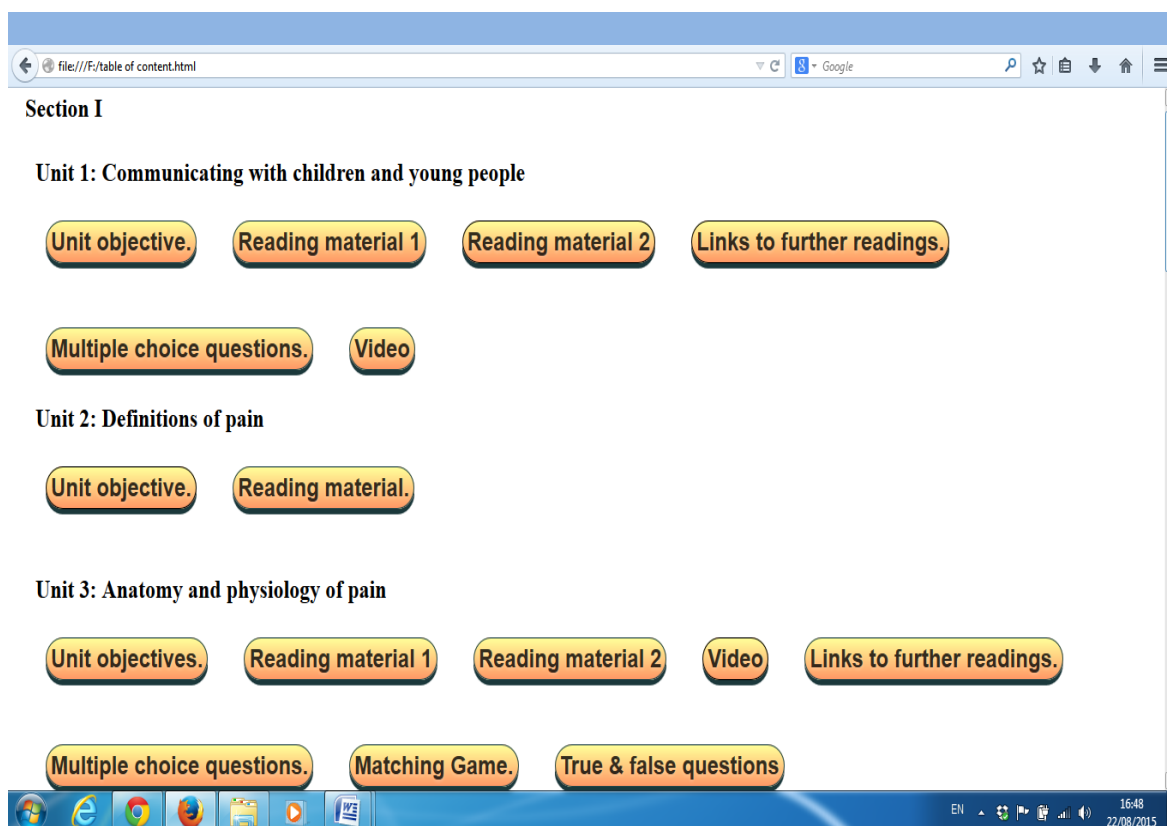
**Design**

The second step was designing the course. At this stage, a logical map was drawn to organise the topics and content of the pain management course into a meaningful chronological order so that notions of what pain is and how it presents were placed before assessment of pain, and this, in turn, was addressed before methods of treating pain (Figure 4). The limited current level of knowledge that had been observed in nursing before the study was designed was taken into account, recognising that basic information would be needed first.



**Figure 4: Logical map of the content of the education programme**

In order to simplify the learning package, it was divided into three main sections: basics of pain, pain assessment and pain management. Each section consisted of different units. An example is provided in Figure 5.



**Figure 5: An example of section one from the learning package**

Furthermore, for each unit, specific objectives were created to reflect the expected learning outcomes. Where possible, this was restricted to only a single objective for each unit in order to simplify and enhance the learning experience (Table 13).

**Table 13: Examples of unit objectives**

<p><b>Unit 1: Communicating with Children</b></p> <p>To assess the appropriate communication methods to be used with different stages of development and ages of children</p>
<p><b>Unit 2: Definitions of pain</b></p> <p>To define the concept of pain</p>

The length of course content varied according to the objectives and according to the importance of specific elements. For example, while the definition of pain took only a very

few lines with no exercises, pain assessment represented a significant part of the education package with many questions, games, videos and helpful resources.

Another issue was whether to develop the package completely online and rely on links to the Internet or to store the major parts of the package on the DVD so that Internet access was not essential. Cost and speed of Internet connection in Hail region were the deciding factors to saving approximately 80% of the material on the DVD (offline) while including hyperlinks to additional (non-essential) material on the Internet. Participants were able to access the core (essential) content offline from the DVD.

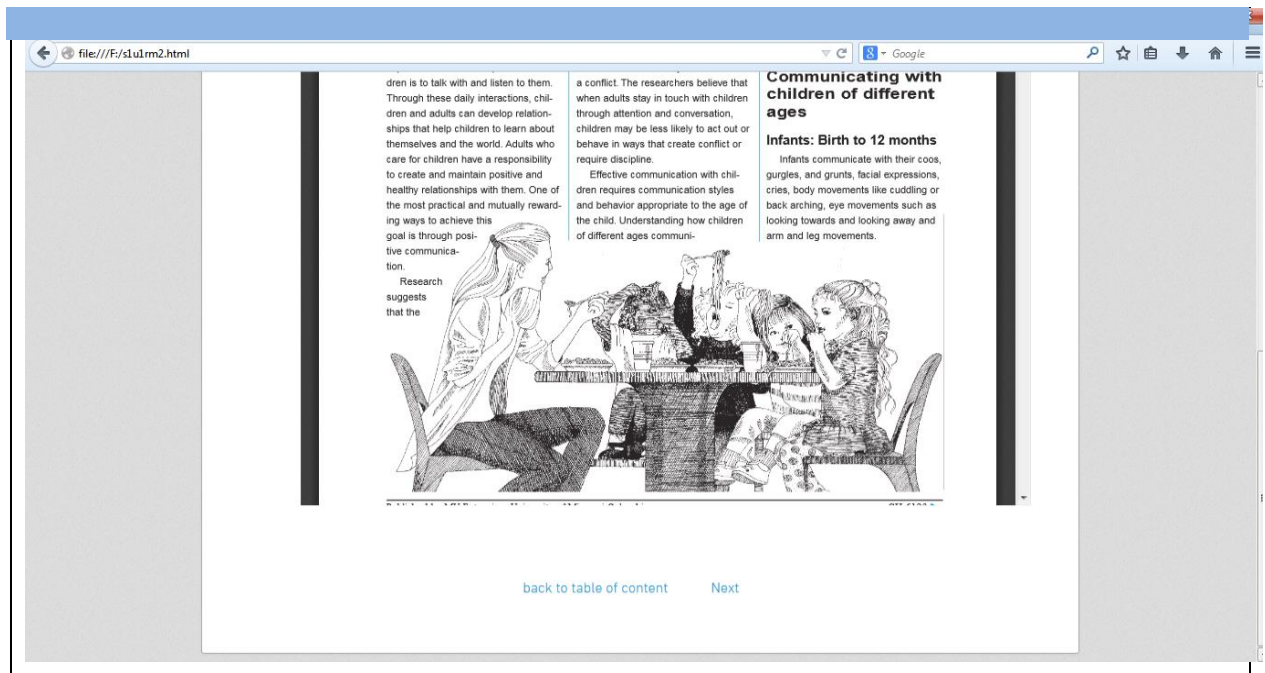
Further thought was needed regarding whether existing online resources should be adopted, with the need for permission and potential copyright problems, or to produce new material specifically for the target group and addressing all of the study variables. Ultimately, it was agreed between student and supervisors that the latter plan were preferable, allowing for tailoring of materials both to the required content and the cultural context of the study.

### **Development**

Part of the preparation of the package involved digitalising a number of chapters. Following advice from an Academic Support Librarian and the university's Head of Information Governance, I contacted the publishers to ask for permission to include the relevant chapter. Some publishers agreed to the digitalisation and inclusion of the chapter without charge, while others required a fee. Copies of communication between the researcher and publishers are in Appendix 8. Other scientific material was identified from books and other published literature. Permission was sought and gained from authors under copyright as appropriate. More materials were paraphrased and referenced in the normal manner.

High fidelity simulation facilities at the University of Salford were used to produce additional video resources. Experts in pain management from the University of Salford, and Saudi Military Hospital, King Faisal Specialist Hospital and Saad Specialist Hospital provided guidance. The Lead for Clinical Simulation Development and Innovation advised on technical and practical issues as well as supervising the completion of the scenario template to guide the filming and overseeing production. Other Saudi PhD students played roles in the scenario. The supervisors and their academic research colleagues spoke in video recorded discussions to provide additional resources. These all helped to produce high quality educational videos for the package.

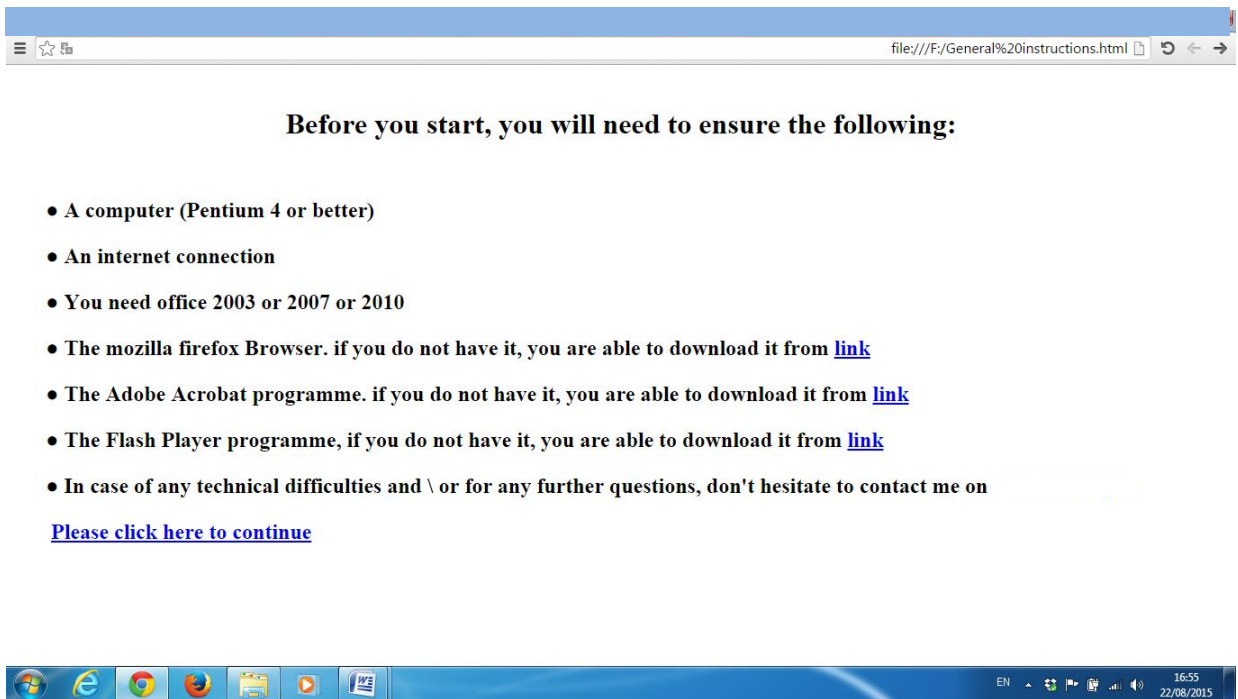
Once the scientific materials were ready, the researcher recruited a programmer to produce the games and exercises and the DVD to a professional standard. The whole package was programmed using Hypertext Mark-up Language (HTML) and took the shape of web pages in order to offer a familiar context for the learning experience. Each page provided links and hyperlinks to ease navigation between education package contents (Figure 6).



**Figure 6: Example screen shot of a web page with hyperlinks.**

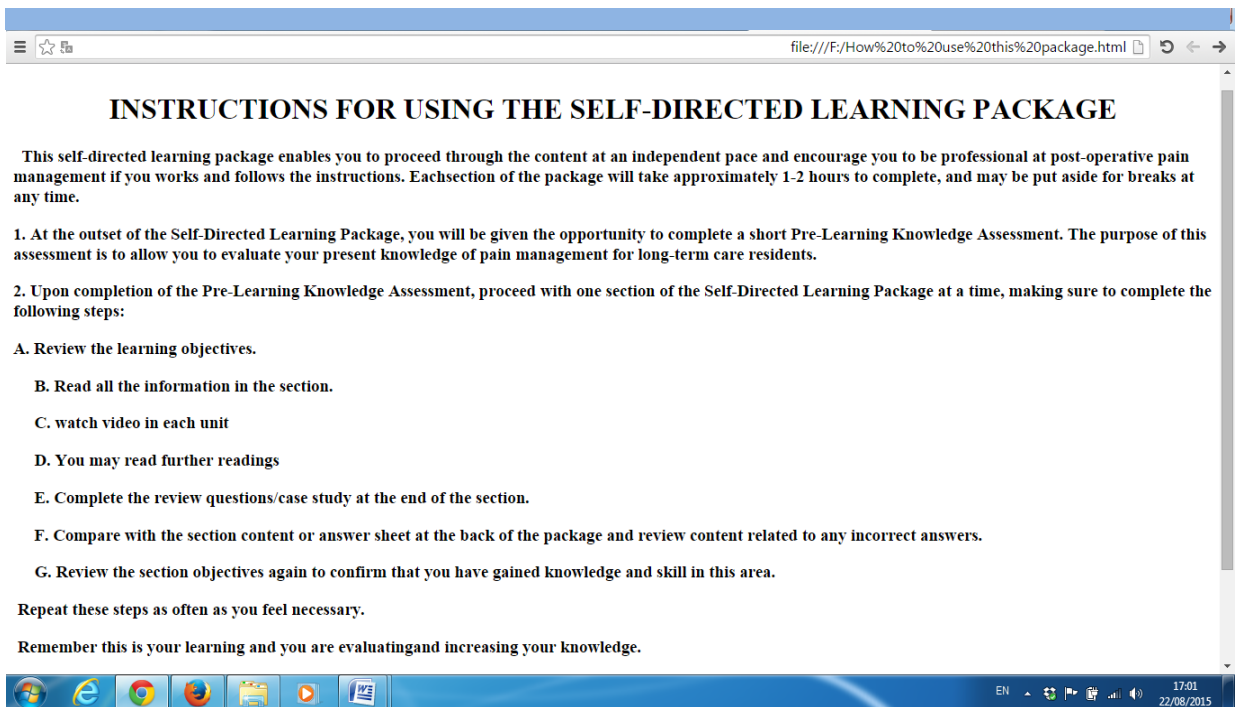
Once the package was ready, the researcher with his supervisors reviewed the DVD, making a several minor changes and improvements. The education package was then sent to nurse specialists in pain management in Saudi Arabia for further local comment on the DVD. They recommend splitting the pharmacological and non-pharmacological pain relief methods into two units instead of one. Their comments were acted upon. Furthermore, two pages were added at the beginning of the programme to show participants the basic technical requirements that should be available for use of the educational package (Figure 7).





**Figure 7: Minimum requirements for use of the education package**

The second page provided the basic instructions to be followed when using the package (Figure 8).



**Figure 8: instruction for using the education package**

## **Implementation**

This phase is about putting the education plan into action. DVDs along with outcomes measures were circulated between nurses. The consent form was completed and inclusion criteria were checked before distributing the DVDs and outcomes measures.

## **Evaluation**

Evaluation is the final step in the ADDIE model. Evaluation of the package was in two phases. The first phase was conducted at the level of each step taken during the development of education material in order to improve the quality of the content. The second phase was when the materials had been prepared and was circulated to Saudi pain nurses and nursing professors for feedback on the package. Some amendments were suggested and considered before circulating the final material. Although it was not actively requested, participants volunteered positive feedback about the education package, emphasising the high quality of the education materials (See appendix 9).

## **ENHANCING THE EDUCATION PACKAGE**

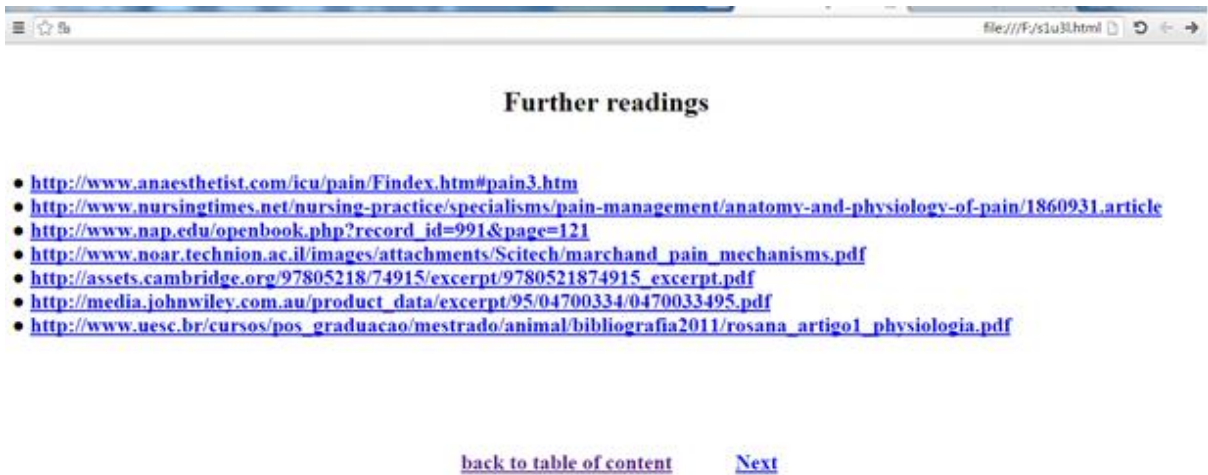
A variety of factors were identified in chapter 3 that can enhance the quality and effectiveness of online learning education packages. These factors are summarised in Table 14.

**Table 14: Summary of the elements of effective online learning package**

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- 1- Helpful resources should be integrated into online courses.
  - 2- Students should have control of the speed at which they move through the modules.
  - 3- Include discussion points to enrich the learning experience.
  - 4- Provide instant feedback.
  - 5- Technical support should be available.
  - 6- Access to online aids and step by step presentation
  - 7- Ensure that the learning modules have numerous, additional examples, replete with visual inserts and real life applications
- 

## **Additional resources**

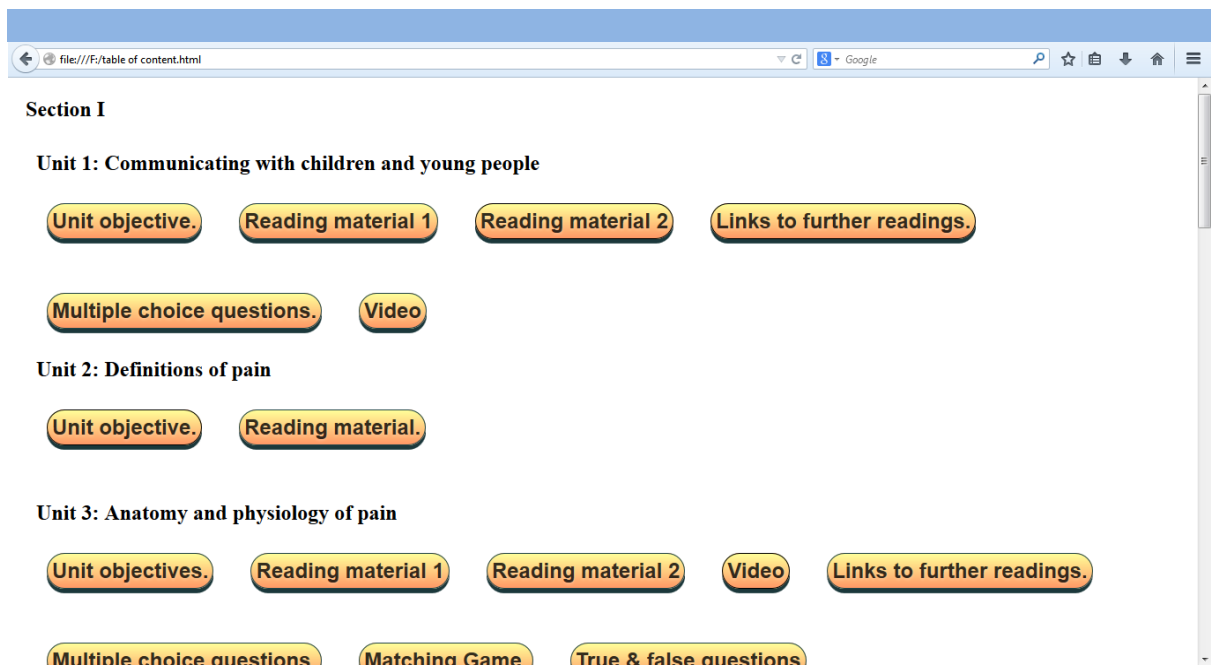
Many sources recommended the inclusion of external resources to enhance students' learning experience. This was in each module of the package, with external links to helpful web sites. Figure 9 provides an example of this.



**Figure 9: Example of page with links to helpful resources**

### Control of the speed of learning

The learning package was divided into three sections, each section with units and each unit with sub-headings in order to allow the learner to control the speed and their own rhythm of reading. This allowed for varied lengths of periods of study according to availability of time, fatigue and interruptions. The hyperlinks also allowed the participant to return to a previous point to aid memory of key issues before continuing (Figure 10).



**Figure 10: Example of organising the package material into small chunks**

### **Discussion points and feedback**

The package was interspersed with activities, different modes of presentation, and prompts to reflect on issues before continuing.

### **Provision of instant feedback**

This package provided quizzes, tests, games and exercises from which the learner could receive immediate feedback regarding their level of improvement. Based on their score, they could decide to move forward in the package or to return to some aspects to clarify or revise their knowledge.

### **Variety in modes of presentation**

The programme included videos, games, reading material, online resources, and multiple choice quizzes to retain the participants' engagement, to enhance their learning experience, and to enrich their understanding about post-operative pain. A test in a relevant format was included at the end of each unit to allow participants to monitor their progress towards achieving the unit objective.

## **QUALITY OF ONLINE LEARNING COURSES**

To ensure the quality of this learning package recommendations originated by Chao et al., (2006) and Lorenzo and Moore (2002) were adopted. Any high-quality online course should exhibit: (1) reliable information that reflects the reputation of the institution; (2) friendly platforms that present the information in a friendly manner; (3) students' satisfaction of the learning package; (4) choice of cost-effective methods of delivery; (5) availability of technical support and (6) ease of access to this package.:

### **Content**

Use of the IASP (2014) curriculum and combining this with evidence from the literature helped to ensure that the content was evidence-based, comprehensive for this level of study, and internationally valid. Review by experts from the UK and KSA confirmed its suitability.

### **Presentation**

Before use, the quality of presentation was ensured by a prolonged planning phase, review of the evidence on what is effective in online learning programmes, and then review by relevant experts. Informal pre-testing with the large body of nurses undertaking postgraduate study in the school indicated that the package was attractive and stimulating. Construction of the web

site by a professional computer programmer was an essential part of ensuring high quality presentation.

### **Learning experience**

The package was designed to be easy to navigate. A clear set of instructions was included, and technical support was made available. Since all of the required (and commonly used) programmes to use this package fully were readily available to download without charge, the package was made to run flawlessly and without irritating unavailability of different resources, sustain engagement and enhancing the learning experience. The variety of learning resources and modes of presentation further ensured this. The package included a variety of learning modes, with reading material, case studies, expert discussions, Millionaire games, matching games, sort the card games, true-false questions, and multiple choice questions.

### **Satisfaction**

Although participant feedback about satisfaction was not a part of the study, a retrospective measure of satisfaction was the number of spontaneous responses received from participants and service managers expressing appreciation for the package and confirming its importance to improving nursing practice (see appendix 9).

### **Access**

Creating the DVDs and incorporating 80% of the material into them allowed participants to have access to the material at any time with ease. This certainly overcame the problem of providing education to a large number of nurses in widely-spaced locations. It also meant that control group participants had equal access at the end of the study. The minimal specification for computers was another part of ensuring wide access.

### **Technical support**

Technical support has been identified as an issue throughout the literature on online learning. The researcher's email and contact details were provided for participants to make contact in case of any technical problems. Only two telephone calls were received from members of the intervention group, both relating to technical problems while installing a programme to open the video media. These were solved easily.

### **Cost-effectiveness**

A formal exercise to establish cost-effectiveness was not undertaken. However, the cost of producing the programme in terms of time and expert programmer hours was certainly no greater than that of a team of academics working to produce a similar module in traditional modes. Moreover, there were significant cost savings in not requiring so many nurses to be unavailable for work while undertaking the training, no need for travel to a central location, and no need to hire a venue.

### **CONCLUSION**

The success of the design, quality assurance and implementation of the package that was produced may be seen in the impact of the initiative even before the doctorate was completed. The Saudi Ministry of Health has expressed its intention to undertake roll-out of the programme to other parts of Saudi Arabia after further work to present the work in a corporate manner. The benefits from such an inexpensive programme could be seen nationally.

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## **CHAPTER FIVE**

### **STUDY DESIGN**

#### **INTRODUCTION**

This chapter details the methods that were used to decide whether an online education package was an effective intervention in changing children's nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal postoperative pain management for children. The sample, setting, ethical issues, instruments used, data collection procedure and data analysis are presented.

#### **SELECTING A STUDY DESIGN**

The aim of nursing research is to develop and extend nursing knowledge. This endeavour promotes growth of the profession and is expected to lead to better nursing care. In order to do this, nurses use research. It has been argued that researchers adopt either a quantitative paradigm or a qualitative paradigm depending on their research question and purpose (Mackey, 2005). It is sometimes argued that these approaches are incompatible, but the sustained production of evidence from mixed methods research tends to negate this notion. Each paradigm has specific uses, strengths and weaknesses, which are balanced by the strengths and weaknesses of the other, and each arises from contrasting philosophical assumptions (Creswell, 2014). The differences between these can be summarised in Table 16 below.

#### **Positivist Paradigm**

In quantitative research, researchers follow meticulous procedures to be objective. They generate criteria to control conditions in their study and to reduce bias (Grove, Gray & Burns, 2014). Broadly speaking, quantitative researchers usually adopt the assumptions of post-positivism (Phillips & Burbules, 2000). Positivism is the received view of science and arose as a refutation of medieval notions of knowledge being accepted without questions and unilaterally declared by religious authorities (Al Riyami, 2015). Researchers who adopt this philosophical assumption usually hold a belief that a single truth or reality exists about a given phenomenon which is susceptible to discovery through empirical observation (empiricism) (Broom & Willis, 2007). They accept that there are immutable laws of the universe which always apply, regardless of human interpretation (determinism) (Broom & Willis, 2007). This deterministic belief is also expressed in the search for cause and effect

relationships (Gelo, 2012; Ponterotto, 2005). A further principle is that all knowledge is refutable. That is, knowledge or facts are considered to be given to amendment, dismissal or refinement in the light of better observation or experimentation (scepticism) (Topping, 2015).

Researchers avoid being influenced by or influencing their observation, and they identify and exclude extraneous variables, in order to keep bias to the minimum (control) and their conclusion objective (objectivity) (Broom & Willis, 2007). This stripping away of contextual factors to reduce the interaction being observed to that between the selected variables indicates a reductionist approach (Scotland, 2012). Data collection techniques of surveys and experiments are commonly adopted (Creswell, 2014). Research under this paradigm employs sophisticated statistics to establish relationships between variables under study in order to generalise their finding to the wider population (Gelo, 2012).

### **Qualitative Paradigm**

The qualitative paradigm is one in which the researcher explores and tries to understand the meaning of certain phenomena through the use of different strategies such as interviews and observations (Creswell, 2014). In qualitative research, the researcher is considered to be an instrument in the research as they interpret research findings and uncover hidden meanings in the human experience (Broom & Willis, 2007). Researchers do not make claims to objectivity and they do not look to generalise the findings to larger groups of people (Gelo, 2012). Inevitable subjectivity is embraced in qualitative research: conclusions depend on the researchers' interpretation which means that context, history and culture play a significant role in exploration of the meaning so that this meaning is relative (Broom & Willis, 2007; Topping, 2015).

Researchers who use qualitative research will often adopt a constructivist stance. Constructivism emerged in the 20<sup>th</sup> century as an alternative view to positivism because of deep dissatisfaction with a positivist approach particularly in social science (Gelo, 2012; Ponterotto, 2005). Constructivists hold that reality is relative and depends on individuals' views and experiences (Topping, 2015). Understanding of the world is essentially a subjective activity and is linked to culture and historical context. People play an active role in making sense of their world, and multiple, equally valid perspectives on phenomena are discovered through research (Gelo, 2012; Ponterotto, 2005).



## **THIS STUDY**

In this study, the aim was to establish a cause and effect relationship: to establish whether or not the education programme exerted a positive impact on the study variables. A deductive approach was taken, setting hypotheses and testing them. Strict conditions were applied to control the variables in the study and to exclude effects from extraneous variables. Validated questionnaires were used, and data analysis was undertaken through statistical testing. This study, then, lies within the positivist paradigm.

**Table 15: characteristics of qualitative and quantitative research (Speziale & Carpenter, 2007, p.20)**

<b>Quantitative</b>	<b>Qualitative</b>
Objectivity demanded	Subjectivity valued
One reality	Multiple realities
Reduction, control and prediction	Discovery, description, and understanding
Measuring	Interpreting
Mechanistic	Organismic
Parts equal to the whole	Whole is greater than the parts
Report statistical analysis	Report rich narrative
Researcher separated from the process	Researcher part of the research process
Subjects	Participants
Context-free	Context-dependant

## **DESIGNS THAT ARE COMMENSURATE WITH THE POSITIVIST PARADIGM**

There are many quantitative designs which share a similar purpose: to test hypotheses or to describe phenomena under study. The main three categories of quantitative designs are experimental, quasi-experimental and descriptive. Each of these methods has its own requirements and conditions for rigorous application. For example, experimental designs have a control group and manipulate the variables under study in the experimental group to extrapolate the type of relationship that exists between variables of the study (Shadish, Cook, & Campbell, 2002). Furthermore, in experimental designs, subjects are also randomised to control or experimental groups to eliminate the effect of extraneous variables and to ensure equivalence between the groups (Shadish et al., 2002). However, establishing such artificial circumstances to conduct this design requires great efforts from researchers, and creating such conditions is not always ethical or possible in cases of research that include human beings. Random allocation of people to experimental and control groups may be unethical; for example, to cause one group to smoke or to prevent another from engaging in healthy

behaviour. When these problems are present, and a true experiment is not possible, a quasi-experimental design is employed (Beanland & Schneider, 2000).

Although the randomised control trials are more rigorous compared to a quasi-experimental design, the latter may be the most rigorous approach that is possible under the natural circumstances (Reichardt, 2009). For example, in this study, randomising nurses to control and experiment groups in the same hospital would have risked contamination as nurses in the experimental group shared their experience with those in the control group. Moreover, matching nurse characteristics between groups is also difficult particularly in Saudi Arabia where the majority of nurses are expatriates from many different countries. In the absence of random allocation of individual participants, a quasi-experimental design was the best that could be managed; in particular, a non-equivalent control group pre-test- post-test design.

### **A QUASI-EXPERIMENTAL APPROACH**

This study was undertaken using a non-equivalent groups pre-test post-test design. Quasi-experimental designs were promoted by Campbell et al., (1963) in order to test the impact of intervention on certain populations. This design still allows for statistical analysis to measure any differences between experimental and control groups (Shadish et al., 2002). Although quasi-experimental design encompasses other approaches, the non-equivalent control group pre-test post-test design is the most popular (Lucasey, 2002; Polit & Beck, 2004; Shadish et al., 2002).

### **STUDY AIM**

The aim of this study was to test the impact of implementing an interactive online post-operative pain management education programme on children's nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal practice.

1. How do nurses' knowledge and attitudes of post-operative pain management change following administration of a pain management educational programme: one month and three months later?
2. How do nurses' beliefs about pain in childhood change following administration of a pain management educational programme: one month and three months later?

3. How do nurses' perceptions of children's reports of pain change following administration of a pain management educational programme: one month and three months later?
4. How do nurses' perceptions of the barriers to optimal pain management change following administration of a pain management educational programme: one month and three months later?
5. How does nurses' self-efficacy regarding post-operative pain management change following administration of a pain management educational programme: one month and three months later?
6. Is there a significant difference between demographic subcategories in the intervention group in relation to all variables under study?

## **RESEARCH VARIABLES**

There was a single independent variable, six dependent variables, and several demographic variables.

### **Independent variable**

This was constituted by an interactive pain management educational programme, delivered to nurses as a DVD

### **Dependent variables**

The six dependent variables in this study were nurses' knowledge and attitudes regarding pain; nurses' beliefs and perceptions about children in pain; nurses' self-efficacy; and nurses' perceived barriers to optimal pain management.

### **Demographic variables**

The 12 demographic variables in this study were age, gender, nationality, employment, years of nursing practice, highest level of nursing education completed, number of educational sessions on pain attended within the last year, experience of ever having suffered from severe pain, experience of any family member having suffered from severe pain, experience of any nursing education on pain management, attendance at any conferences on pain in the past year, and experience of having participated as a respondent in any pain research.

## THE STUDY LOCATION

This research took place in Hail; a city located in the Northern Region of Saudi Arabia. This study was undertaken in surgical wards of the governmental hospitals in Hail Region. All governmental hospitals that include children in their surgical wards in Hail Region were included, so nine out of twelve hospitals were selected. Five hospitals in the west were grouped and assigned to the control group. The rest (four hospitals) in the east were assigned to the intervention group (See Figure 11). The hospitals were clustered in this way to avoid contamination between the intervention and control arms.

Participants were selected from nurses working in surgical wards that receive children in the following hospitals in Hail Region: (1) King Khalid Hospital, (2) Baqa General Hospital, (3) Moqaq General Hospital, (4) Alshamali General Hospital, (5) Hail General Hospital, (6) AlShanan General Hospital, (7) Alsulami Hospital, (8) AlGazalah General Hospital, and (9) Samara General Hospital. These hospitals serve around 5500,000 persons. Figure 11 shows the location of the hospitals in Hail city, together with the boundary between the two groups of hospitals.



Figure 11: A map of intervention and control group hospitals in Hail hospitals

### **King Khalid Hospital**

King Khalid Hospital is a big referral hospital. It is located in the centre of Hail City at King Abdul-Aziz Street. It was established in 1983. The total bed capacity is 280 beds and the majority of the beds are occupied most of the time. It has 25 departments. The total number of nurses in King Khalid Hospital is 512, the majority of whom are non-Saudis. The average number of patient visiting the hospital per day is about 1000 patients.

### **Baqa General Hospital**

Baqa Hospital is located to the north of Hail City; about 90 km from the city centre. It is a small hospital and it was established in 2002 and the total bed capacity is 50 beds. It consists of eight departments and total of 58 nurses' work in them. The average attendance at the hospital is about 650 patients per month.

### **Moqaq General Hospital**

This hospital is located in the south-west of Hail Region, about 80 km from the city centre. Moqaq is considered one of the oldest towns in Hail Region and was established in 2004, though extended in 2012. The hospital consists of two floors and has seven departments. The hospital has a capacity of 50 beds and has 40 nurses. Average daily attendance is between 83 and 100 patients.

### **Alshamali General Hospital**

Alshamali hospital is located in the west of Hail, north of Medina and Khaybar, and about 170 km from Hail City. It was established in 1994 and includes 8 departments. This hospital has a capacity of 50 beds and has 44 nurses working in the different departments. The average number of patients coming to the hospital is about 160 to 250 patients per month.

### **Hail General Hospital**

Hail General Hospital is the oldest hospital in Hail Region as it was established in 1959, and it is one of the referral hospitals. It consists of 21 departments with a total bed capacity of 245. The total number of nurses working in the hospital is 330 nurses. The average admission per month is about 450.

### **Samara General Hospital**

Samara hospital is located in the south-east of Hail Region, 120 km from the city centre, and was established in 2000. It consists of 2 floors and 7 departments, with a 50 bed capacity and

40 nurses working in different area. The average number of patients visiting the hospital is about 200 patients per day.

### **Alsulami Hospital**

This hospital is some distance away from the city of Hail and was established in 1985. The capacity of the hospital is 50 beds, and there are 47 nurses working in 8 departments. The average number of patient that visit the hospital is 85 patients per day.

### **AlGazalah General Hospital**

This general hospital is located in the centre of the AlGazalah City and was established in 2010. There are 48 nurses working in 8 departments at the hospital, with a total bed capacity of 50 beds. The average number of patients is 102 per day.

### **AlShanan General Hospital**

AlShanan hospital is located in the centre of AlShanan City which is 80km distance from Hail City. The hospital was established in 2010 with a 50 bed capacity. Average patient attendance per month is 1500. The hospital has 59 nurses working in 7 departments.

## **SAMPLE**

### **Target Population**

The target population was children's nurses who worked in surgical wards in Hail Region hospitals.

### **Sampling**

A sample was selected of all nurses working in surgical wards that receive children. Randomisation was undertaken at the level of hospitals rather than with individual nurses in order to avoid contamination from the experimental group to the control group. A dividing line was drawn separating the hospitals into roughly equal proportions, each including a major referral hospital. The two areas were then assigned randomly to intervention and control group areas. The number of potential participants was 251 nurses.

### **Inclusion Criteria**

The following inclusion criteria were applied to the participants:

- (1) Nurses who worked in surgical wards that have children;
- (2) Nurses who took care of children post-operatively;

- (3) Able to read and understand English language because the majority of health care workers in Saudi Arabia are expatriates from different countries (Aboul-Enein, 2002; Tumulty, 2001);
- (4) Willing to avoid accessing any other formal post-operative pain management educational programme for the duration of the study (4 months); and
- (5) Working in Hail region.

**Exclusion criteria**

- (1) Nurses who were not able to understand written or spoken English;
- (2) Nurses who were currently engaged in pain management educational programme;
- (3) Nurses who were not registered by the Saudi Commission for Health Specialties (SCHS).

An invitation letter accompanied by an information sheet and a consent form was sent to the potential participants (See Appendices 7 & 8). Of these 251 nurses, 229 agreed to take part in the study, 17 declined to participate, and 5 did not meet the inclusion criteria. The first set of surveys was answered by 229 participants, and 221 of these answered the second set of surveys at one-month post intervention. The last set of surveys was answered by 221 at three months after the intervention (Table 16 below). The intervention group was made up of 135 participants, while there were 94 participants in the control group.

**Table 16: The number of participants in each phase of the study**

Potential participants	251
Participants who agreed to participate	229
Participants who responded to pre-test (T1)	229
Participants who responded to post-test one month later (T2)	221
Participants who responded to follow-up test three month later (T3)	221

Participants were divided into two groups according to region:

- Group 1, the intervention group which receive the education programme, encompassed 135 participants.
- Group 2, the control group, encompassed 94 participants.

## **OUTCOME MEASURES**

In addition to demographics details, and in order to measure the dependent variables, the researcher used the following instruments: Paediatric Nurses' Knowledge and Attitudes Survey Regarding Pain (PNKAS); Children and Pain Survey; Nurses Perceived Barriers to Optimal Pain Management; and Nurses' Self-Efficacy.

### **Demographics**

The first questionnaire (Appendix 10) was completed by the nurses who work with children and it took three minutes to complete. This was designed by the researcher with the help of his supervisors to identify demographic details of age, gender, nationality, employment, years of nursing practice, highest level of nursing education completed, number of educational sessions on pain attended within the last year, experience of ever having suffered from severe pain, experience of any family member having suffered from severe pain, experience of any nursing education on pain management, attendance at any conferences on pain in the past year, and experience of having participated as a respondent in any pain research.

### **Paediatric Nurses' Knowledge and Attitudes Survey Regarding Pain (PNKAS)**

The second questionnaire (Appendix 11) took 25-30 minutes to complete. The original version of this instrument was the Knowledge and Attitudes Survey Regarding Pain (NKAS), developed by McCaffery and Ferrell in 1987 to test nurses' knowledge and attitudes toward patients in pain (McCaffrey & Ferrell, 2008). The tool is available in the public domain and available for any researcher to use. It comprises of 37 items and take 25-30 minutes for nurses to complete. Content validity was ascertained using a panel of experts in this area and test re-test reliability was established ( $r=0.80$ ) by redundantly testing 60 nurses. Internal consistency was also calculated and established (Cronbach alpha= $0.70$ ) (Manworren, 2001; McCaffrey & Ferrell, 2008). Since 1997, several versions have emerged (McCaffery and Ferrell 1997, 2006, 2008), and this tool has been used extensively by American researchers (Baar, 2000; Colon, 2003; Messmer, 2009; Textor, 2003; Turner, 2012; Van Hulle Vincent, 2005; Van Hulle Vincent, 1999; Van Hulle Vincent & Denyes, 2004) and internationally (Bloch, 2012).

However, the researchers were aiming to develop a tool which would be more sensitive to child patients. In 1998, Manworren developed a new survey called the "Paediatric Nurses' Knowledge and Attitudes Survey Regarding Pain" (PNKAS) based on the original work of McCaffery and Ferrell. Manworren did three main changes to the McCaffery and Ferrell



instrument to shift the focus of the tool from adults to infants, children and adolescents (Manworren, 2001). These amendments were, first, adding procedural pain items: questions 8, 14, and 21 added to the original survey. Second, questions related to meperidine and aspirin were eliminated from the original survey because aspirin increases the risk of Reye's syndrome and is contraindicated in children's pain management protocols (Manworren, 2001). Likewise, meperidine has toxic metabolic effects and so is not recommended for use with children (Manworren, 2001). Lastly, medication dosage in the original questionnaire was adjusted to fit child patients. For example, in question number 26, morphine dosages were adjusted to fit children rather than adults.

The new survey comprised of 42 items, which were 25 true/false questions, 13 multiple choice questions and two case scenarios with a total of four items (Manworren, 2001). The PNKAS is a self-administered survey assessing nurses' knowledge and attitudes regarding pain management, pain assessment, and the use of analgesics and non-pharmacologic interventions for pain in the child population (Chin, 2006). Content validity was ascertained using a panel of experts (five nurses) in children pain management. Test re-test reliability ( $r=0.67$ ) was established and Cronbach's alpha was 0.75, with a range of 0.75 to 0.78., which displayed an acceptable level of internal consistency. This survey has been translated to many language versions in countries including China, Taiwan, Israel, Germany, Turkey, Norway, Peru, Portugal, and Italy (Manworren, 2010). Although the survey has been adopted by many hospitals across the world, few researchers used this survey in their research (Manworren, 2010). Permission to use the questionnaire was obtained by the researcher (Appendix 12).

### **Children and Pain Survey**

The third questionnaire (Appendix 13) took 15 minutes to complete. The aim of this survey was to measure the nurses' beliefs and perceptions about children in pain. The instrument items were based on the American Department of Health and Human Services (DHHS) guidelines for acute pain management of infants, children and adolescents (1992). It comprised of seventeen questions and was developed by Margolius, Hudson and Michel (1995) at the College of Nursing at the Medical University of South Carolina. This self-administered survey comprised of 17 items and took from 10 to 15 minutes to complete (Jacob & Puntillo, 1999).

There were two categories within the survey: the first ten items refer to beliefs, prejudice about children in pain and how they experience pain from the nurse's point of view.

The next seven questions refer to perceptions of nurses on how they manage children in pain (Margolius et al., 1995). Respondents were asked to rate their level of agreement or disagreement with each of the statement with (1) = Strongly Disagree to (6) = Strongly Agree. Validity was established using a team of 10 health team professionals (a paediatrician, a pharmacist, a nurse practitioner and nurse academics) who were experts in pain and child patients (Margolius et al., 1995). Internal reliability was established for each of the subscales: Cronbach's alpha was 0.70 for the Beliefs Scale (10 items) and 0.83 for the Perceptions Awareness Scale (7 items) (Margolius et al., 1995). This survey has been used previously by several researchers, including Gorney (1997 and Jacob & Puntillo (1999). Permission to use the questionnaire was obtained by the researcher (Appendix 14).

### **Nurses Perceived Barriers to Optimal Pain Management**

The fourth questionnaire (Appendix15) took 5 minutes to complete. The aim of this survey was to identify the barriers to pain management in child settings from nurses' perspective. The items of this survey were based on Agency for Health Care Policy and Research (AHCPR 1994) guidelines and studies by Ferrell et al. (1995), O'Brien, Dalton, Konsler, and Carlson (1996), and Ryan, Vortherms, and Ward (1994). Permission to conduct this study was obtained through email directly from the author.

The most important barriers reported by these studies, reported in AHCPR, or identified by the authors based on their clinical practice were included in the survey. This self-administered instrument took between five and ten minutes to complete and it comprised of 13 statements. Respondents were asked to rank listed barriers on a scale of 0 to 10 (0=not a barrier through to 10=a major barrier). The minimum possible score is zero and maximum is 130. Content validity was established by experts in child pain management (Van Hulle Vincent, 2005; Van Hulle Vincent, 1999). Internal consistency (Cronbach's alpha) was established at 0.86 (Van Hulle Vincent, 2005; Van Hulle Vincent, 1999). Permission to use the questionnaire was obtained by the researcher (Appendix16).

### **Nurses' Self-Efficacy**

The fifth questionnaire (Appendix17) was designed to test the confidence of nurses toward providing optimal pain management for children (Chiang, Chen, & Huang, 2006). This self-administered survey is comprised of six-items and took between five and ten minutes to complete. There were three categories within the survey: three statements on pain assessment, two statements on pain management, and one statement on cooperation with the health care

team. Respondents were asked to rate their level of confidence with each of the statements with (1) =Not at all to (5) =Very confident. Validity was established by using a panel of three experts in pain management (Chiang et al., 2006). Internal consistency was established and Cronbach's alpha was 0.91 which was strong. Permission to use the questionnaire was obtained by the researcher (Appendix18).

## **RELIABILITY AND VALIDITY**

The questionnaires were administered to nurses using the original English language versions. Most health care workers in Saudi Arabia are expatriates from a number of countries (Aboul-Enein, 2002; Tumulty, 2001), and English is the formal method of communication between all health team members in Saudi hospitals. Furthermore, English is the language of instruction in medicine, nursing and health sciences in Saudi Arabian universities (Suliman & Tadros, 2011). Moreover, all nurses who want to work in Saudi Arabia are required to register with the Saudi Commission for Health Specialties (SCHS). The SCHS organizes examinations in English for candidates to ensure their level of proficiency and capabilities of providing safe, state of the art nursing services (Saudi Commission for Health Specialties, 2014). Lastly, administration in hospitals in Saudi Arabia follows either American or British systems. Consequently, nurses who work in Saudi Arabia are able to speak and understand English language.

## **POTENTIAL RISKS OF USING NON-EQUIVALENT CONTROL GROUP DESIGN**

Quasi-experimental design is at risk for internal and external validity (Beanland & Schneider, 2000; Polit & Beck, 2004; Slack & Draugalis, 2001).

### **Internal validity**

Internal validity refers to confidence that the results come from the variables under study and not from other variables (Beanland & Schneider, 2000). Internal validity is concerned with designs that seek to establish a cause and effect relationships. The non-equivalent control group design is one of these. In general, eight threats to internal validity can be identified (Beanland & Schneider, 2000; Slack & Draugalis, 2001). Threats from history are more relevant to the single group design rather than the two groups design that was used in this study. Maturation relates to a normal developmental process (physical or psychological) that occurs to the participant over the time of the study (Beanland & Schneider, 2000; Slack & Draugalis, 2001). As this study tested the effect of education on study variables within a short period of time (around 6 months), the threat of maturation was minimal.

The threat of “testing” can occur when the researcher uses identical instruments at pre-test and at post-test, and the observed improvement comes about as a result of participants learning from the tests rather than from the intervention. That is, when set the same test participants learn to provide the correct answers, perhaps by investigating the issue between testing, or perhaps simply by being led to understand better (Beanland & Schneider, 2000; Slack & Draugalis, 2001). This constituted a major threat to this study. In this study, a delay between administration of the pre-test and the post-test should have reduced the ability of participants to remember the questions. Furthermore, the DVD that formed the intervention was protected by passwords and it expired within two weeks of delivering to the participants. This prevented participants revising from the intervention for their future responses, and participants could not share it with each other. Moreover, the inclusion of a control group helped to minimise the chance that the improvement in participants’ scores came from memorizing questions on the survey since the expected differential between the group mean scores would point to the effect of the intervention.

Instrumentation occurs when there is a change in experimental circumstances: perhaps because of inadequately robust procedures or because of changes in individual participants (Beanland & Schneider, 2000; Slack & Draugalis, 2001). In this study, questions about previous or planned educational programmes in this area helped to avoid any change in the study circumstances.

Regression to the mean occurs when extreme scores are seen at pre-test which tend to revert to more moderate scores on retesting (Slack & Draugalis, 2001). In this study, comprehensive analysis at pre-test established that the groups were equivalent and that there were no extreme scores.

Differential selection refers to failure to randomise to control and intervention group, which means failure to generate equal groups. Using non-equivalent control group design can lead to this bias (Fife-Schaw, 2000). Although randomisation was undertaken at the level of geographical areas (east and west) in this study, there remained a degree of risk that one group of nurses would share a characteristic that was not present in the other group by virtue of geographical site. They might have been subjected to a particular management ethos, or they could have been more motivated or qualified compared with the other group, for example.

A final threat is posed by attrition which takes place when the subjects are lost due to non-completion or withdrawal from the study (Beanland & Schneider, 2000). This can be countered partly by constraining the length of the study and also by promoting engagement. The latter was enhanced by the provision of certificates further study and tokens of gratitude in the form of small professionally-focussed reminder cards (See Appendix 5, 6).

### **External validity**

External validity is related to the ability to generalise research findings across individuals, time, and settings (Beanland & Schneider, 2000). The sample of nurses who work with children in post-operative wards at Hail Region was typical of the nursing population across the country: a combination of Saudi and non-Saudi nurses with many expatriates. Furthermore, the hospitals adhered to Saudi Ministry of Health rules and regulation which apply to all nurses in Saudi Arabia who work in Ministry of Health hospitals. This enabled generalisation from the study to all Saudi Arabia contexts.

### **DATA COLLECTION**

The time frame of the data collection was between April 2015 and October 2015. This was set up through a prior visit to the directors of nursing of the hospitals and surgical wards head nurses to explain the study to them (See Appendix 19). Nurses who were eligible for inclusion in the study were informed by posters displayed in the clinical areas and a formal, printed information sheet (see Appendices 20 & 21), and by providing the head nurses with copies of a letters to the nurses, including the participant information sheet together with the consent form. An information session was available to any nurses who show interest in participating in the study or who wanted further details. At this information session, the researcher elaborated more on the aim, importance and procedure of data collection and answered any questions that potential participants had. The researcher stressed that there are no perceived adverse consequences of participating in this study. It was pointed out that the result of this study would expand nurses' knowledge which would reflect positively on the profession and enhance the quality of care provided to children post-operatively. After that, the researcher prepared sealed envelopes containing a copy of the surveys for the intervention group and the control group. Each envelop included a study number that was not linked to any participant's identity. The researcher stressed the importance of the participants writing the code on each copy of the survey. All data were collected by the researcher personally.

Nurses assigned to the intervention group received the intervention DVD one month after the “pre-test” while those in the control group received their educational programme DVD when data collection had been completed. The DVD was protected by passwords and nurses in intervention group were given the code to access the DVD. The code was designed to be active for two weeks, after which the education material was locked. At the end of the study, both groups were given a password that would reactivate the DVD permanently. All data were collected by the researcher personally.

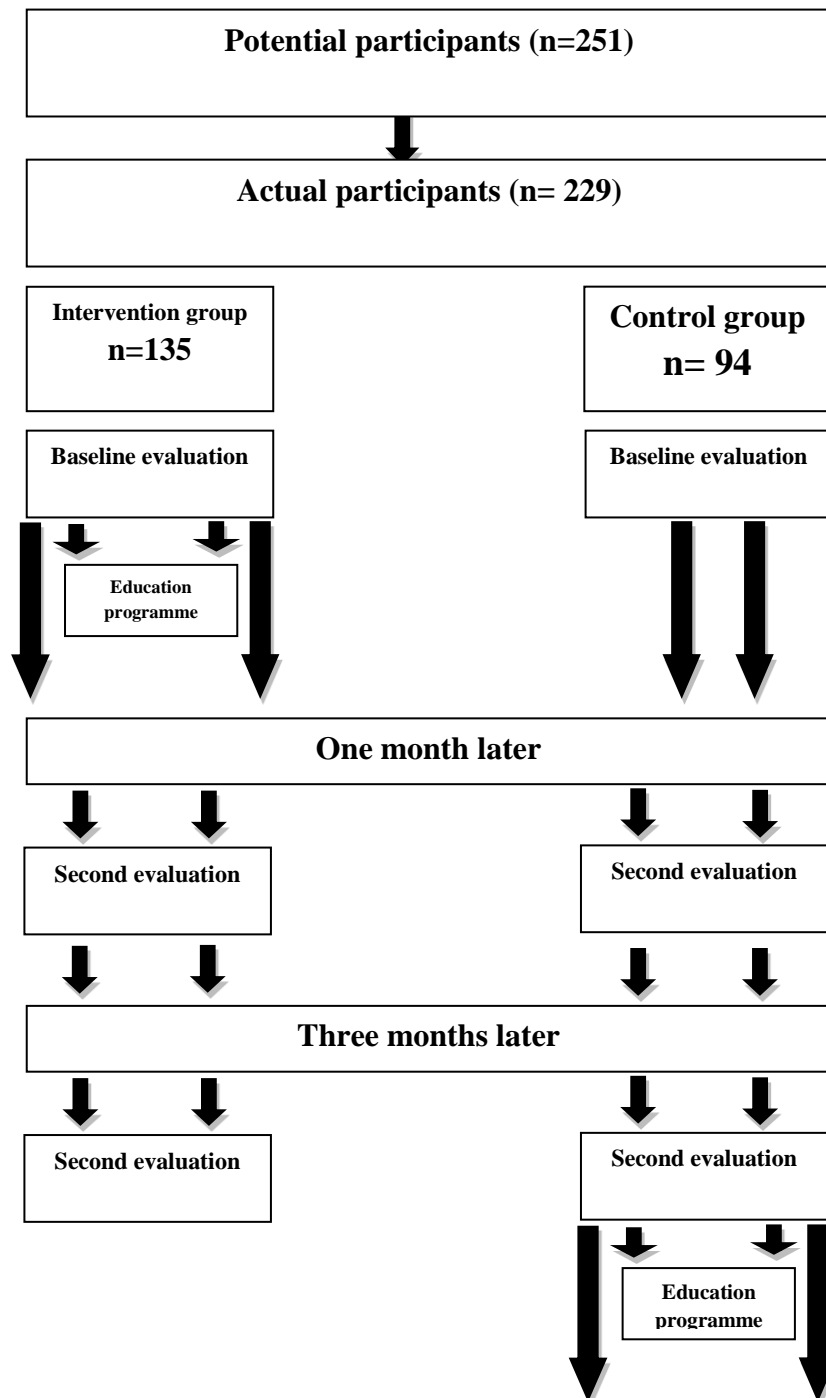
Participants completed the pre-test at the beginning of the study to determine scores for the study variables at baseline (T1), then at a post-test one month later (T2), and a follow up test (T3) three month from the day of first test (Table 17).

The reason for choosing one and three-month intervals was to ensure that nurses would not simply recall answers based on information stored in their short-term memory, and to ensure that nurses did not recall the questions from T1, as the questions were the same at T1, T2 and T3. When nurses were able to answer questions correctly one and three months later it meant that information had been stored in long-term memory. This made it more likely that the new information and understanding would become incorporated into their everyday practice (Bickman et al., 2010; Gravetter & Forzano, 2012).

**Table 17: Non-equivalent, pre-test post-test control group design**

Sample	Group	T1 Baseline	Intervention	T2 Week (4)	T3 Week 12
Nurses in East Hail	Intervention group	√	Education programme	√	√
Nurse in West Hail	Control group	√	X	√	√

For more detail see Figure 12 below



**Figure 12: Summary of the data collection procedure**

### **ETHICAL ISSUES**

This research proposal was approved by the University of Salford Research Ethics Committee on 29/01/2015 (No. HSCR14/118) (see Appendix 22). Permission was also secured from the Ministry of Health Research Health Committee on 15/9/2014 (see Appendix 23). Permission to visit the hospitals and to approach nurses for the project was gained from executive officers, head nurses and nursing directors. The study used the risk-analysis approach as discussed by Long and Johnson (2007).

### **The risk of perceived coercion**

The junior status of most nurses, and the possibility of demonstrating inadequate knowledge for effective practice meant that participants could be in a vulnerable position, yet might feel compelled to participate. In order to reassure that participation was voluntary, the researcher posted a flyer and printed information sheet explaining the study (with the researcher's contact details) on notice boards in the selected surgical wards (Appendices 7 & 8) and waited for potential participants who met the inclusion criteria to contact him. Each participant had a printed information sheet that explained the study in detail, stated what participation would involve, and emphasised the voluntary nature of participation. A formal consent form was used to ensure that there was no ambiguity about what was being undertaken by the participants (see Appendix 24). The nurses were reassured that, even if they declined to participate, their status in the hospital would not be affected in any way as the research was being conducted independently of the hospitals. They also were reassured that they were free to withdraw at any point and without needing to give a reason. It became clear during the study that nurses welcomed the opportunity to improve their competence through participating in the study, so this risk of perceived coercion had been successfully addressed.

### **The risk of breaching confidentiality**

There was the potential for nurses' lack of competence to be laid bare through the study, so the researcher had a duty to ensure that data and personal details were kept secure. Participants were assured that no personal data would be identified; their individual responses to the questionnaires would be confidential and not shared with hospitals head nurses at any stage of this research. Confidentiality was ensured at all times. Each nurse was allocated a study number and asked to write this number on all questionnaires that were returned to the researcher. These numbers were not linked to personally identifying details. No name appeared on any questionnaire. The data was stored in a secure, locked filing cabinet and on a computer protected by password at the researcher's home in Saudi Arabia. Electronic and hard copies of research documents were carried in a secure bag protected by password and moved to a locked cupboard and on computer protected by password at the University of Salford. The data will be secured at University of Salford according to its data management policy. Study data will be retained for potential further use, but any personal details of participants will be destroyed after five years.



When the data collection period finished, each participants on the study received small gifts as a token of gratitude for their participation – reminder cards (ID card size) with pain charts, drug details and other materials. The DVD was also theirs to keep.

## **DATA ANALYSIS**

Data were entered, coded and managed using IBM SPSS 18 software. Both descriptive and inferential statistics were used. At the early stage of analysis, data was checked for missing items and outliers. Where a small number of missing items was found, these missed valued were replaced with the mean of the data so that the distribution of the data would not differ after replacing these values. Outliers were checked by reviewing the original source document. Descriptive statistics were used to describe the characteristic of the sample in the study groups (control and intervention), and in study phases (pre-test, post-test I, and post-test II). This included means, standard deviation (SD), and frequency.

To examine the statistical assumptions required for the use of parametric and non-parametric statistics, distributions of all dependant variables (study variables) were assessed in each group individually. Based on the rule in which skewness and kurtosis values fall within the range of double the standard error (Kim, 2013), normality was accepted and thus, parametric statistics were used. Fortunately, all distributions were within the acceptable level to use parametric statistics. Further, Cronbach's Alpha reliability test was used to examine the internal consistency of data within each studied variable.

For testing differences among categorical variables such as demographical variables, Fishers' Exact Test was used. To identify differences between study groups in each of the study variables, independent samples t-test was used. However, One-Way Analysis of Variance (ANOVA) test was used to identify differences in means within study phases. This was also accompanied with Bonferroni Post Hoc statistics to identify the variation between each couple of groups: t value, *F* value, and degree of freedom (df). Alpha ( $\alpha$ ) was set at 0.05 for all statistical procedures.

## **THE FOLLOWING HYPOTHESES WERE TESTED:**

**H1:** Nurses' knowledge of post-operative pain management will improve after administration of a pain management educational programme: after one month and three months.

**H0:** Nurses' knowledge of post-operative pain management will not be affected by administration of a pain management educational programme: after one and three months.

**H1:** Nurses' attitudes to post-operative pain management will change positively or negatively following administration of a pain management educational programme: after one month and three months.

**H0:** Nurses' attitudes to post-operative pain management will not be affected following administration of a pain management educational programme: after one month and three months.

**H1:** Nurses' beliefs about pain in childhood will change positively or negatively following administration of a pain management educational programme: after one month and three months.

**H0:** Nurses' beliefs about pain in childhood will not be changed following administration of a pain management educational programme: after one month and three months.

**H1:** Nurses' perceptions of children's reports of pain will change positively or negatively following administration of a pain management educational programme: after one month and three months.

**H0:** Nurses' perceptions of children's reports of pain will not be changed following administration of a pain management educational programme: after one month and three months.

**H1:** Nurses' self-efficacy regarding post-operative pain management will change positively or negatively following administration of a pain management educational programme: after one month and three months.

**H0:** Nurses' self-efficacy regarding post-operative pain management will not be changed following administration of a pain management educational programme: after one month and three months.

**H1:** Nurses' perceptions of the barriers to optimal pain management will change positively or negatively following administration of a pain management educational programme: after one month and three months.

**H0:** Nurses' perceptions of the barriers to optimal pain management will not be changed following administration of a pain management educational programme: after one month and three months.

### **Summary**

This chapter has detailed the ontological and epistemological reasons for choosing a quantitative design, and particularly a quasi-experimental design. Inclusion and exclusion criteria for participants and settings of the research were also stated. Furthermore, data collection methods, outcomes measures and all ethical issues concerning the participants were articulated. Finally, the statistical tests that were selected to draw valid conclusions were detailed.

## CHAPTER SIX

### RESULTS

#### INTRODUCTION

This chapter provides detailed description of the results from the study. The following sections are divided according to the instruments used in the data collection. Data are presented considering differences between intervention and control groups. Analysis within and between groups is presented at each of the three testing points. The chapter starts with the data distribution and a description of the sample demographics. This is followed by assessment of the results of each variable under study according to the research questions. Finally, the impact of demographic variables is presented. Positive outcomes are demonstrated by an *increase* in knowledge, attitudes, perceptions and self-efficacy scores, whereas *reduction* in beliefs and barriers scores represents positive outcomes.

#### DATA DISTRIBUTION

Prior to analysing changes in study variables in both intervention and control groups, the distribution of the data was assessed to determine whether parametric or non-parametric statistic tests were applicable. Two main techniques were used to identify the appropriate test: measurement of skewness and kurtosis, and visual assessment of data distribution using a scatter plot chart. Both skewness and kurtosis were accepted if the value of each test fell within the range of double the standard error (Kim, 2013).

While minor positively or negatively skewed distribution is not seriously threatening to the assumptions of parametric statistics, inconsistent distribution of data represented by numerous outliers is the major threat (Kim, 2013). The following figures represent data distribution of all variables under study in both control and intervention group. Based on the previous assumptions, the distribution was accepted if it met the acceptable level of skewness and kurtosis, and if the distribution appeared to show reasonable normality.

As shown in Figures 13 to Figure 17, data distributions of all variables were accepted despite some minor skewness and kurtosis values due to outliers. This result enabled acceptance of the assumptions of parametric statistics, avoiding any violation of the basic requirement of these statistical procedures.

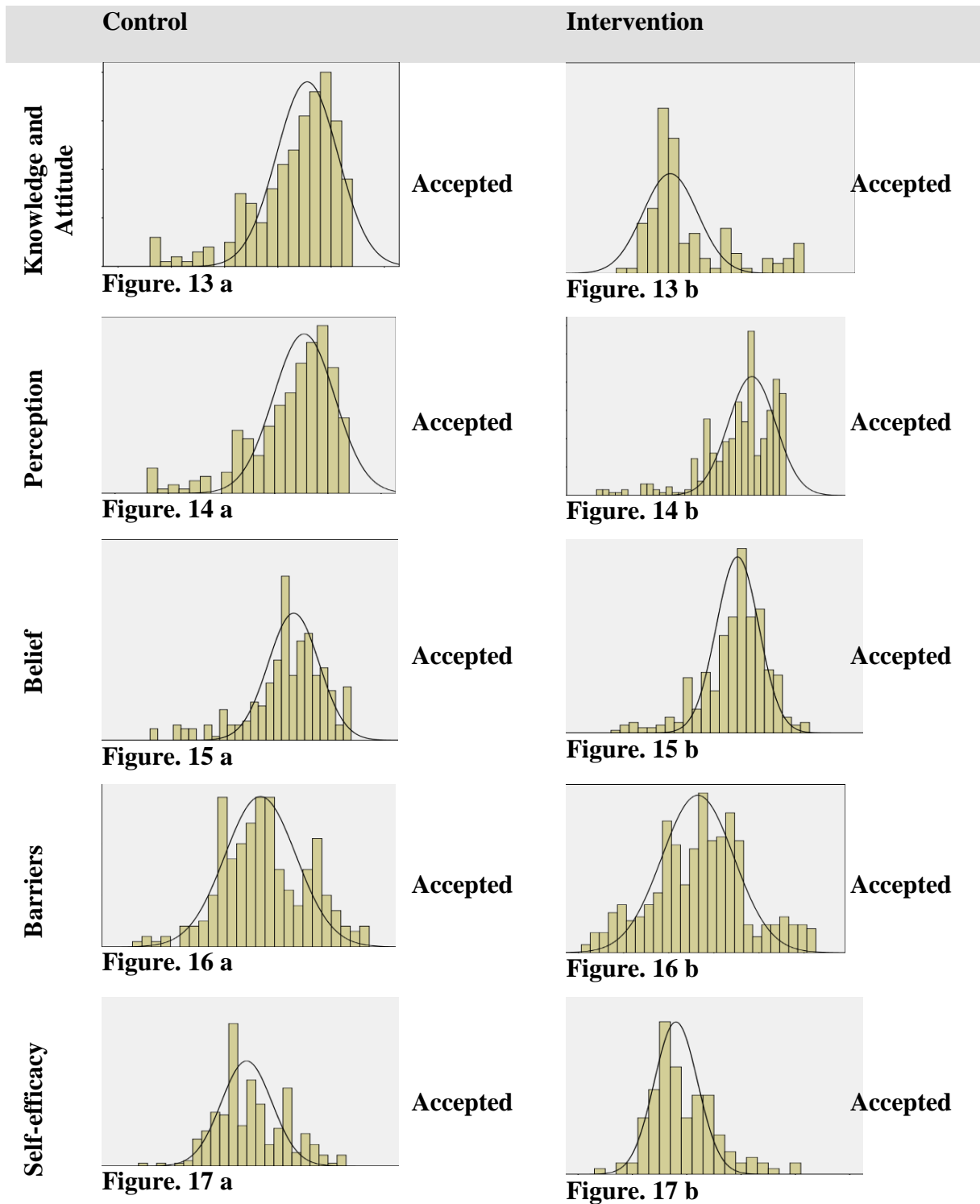


Figure 13 to Figure 17: Data distribution of variables in the intervention and control groups

## **RESEARCH QUESTIONS**

1. How do nurses' knowledge and attitudes of post-operative pain management change following administration of a pain management educational programme: after one month and three months?
2. How do nurses' beliefs about pain in childhood change following administration of a pain management educational programme: after one month and three months?
3. How do nurses' perceptions of children's reports of pain change following administration of a pain management educational programme: after one month and three months?
4. How do nurses' perceptions of the barriers to optimal pain management change following administration of a pain management educational programme: after one month and three months?
5. How does nurses' self-efficacy regarding post-operative pain management change following administration of a pain management educational programme: after one month and three months?
6. Is there a significant difference between demographic subcategories in the intervention group in relation to all variables under study?

## **DEMOGRAPHICS**

This section provides an overview of the distribution of participant demographics. The total number of participants who started the study was 229. Of those, 135 were assigned to the intervention group and 94 to the control group. However, the number of participants in the intervention group fell to 130 at post-test I whereas the control group was reduced to 91 at post-test II. There were minor attrition rates among both intervention and control groups (3.7% and 4.3%, respectively).

As shown in Table 18, the majority of participants were aged between 26 and 30 years. However, older participants ( $\geq 31$  years) were more prominent in the control group than in the intervention group. Regarding gender, the vast majority of participants were female (94.8%) with few male participants (5.2%). Similarly, the majority of participants was non-Saudi (69.4%) compared to 30.6% Saudi participants.

It was evident that the most common highest qualification held was the bachelor degree of nursing (59.0%) compared to 32.8% holding a diploma. While all participants were full-time employees, their clinical experiences were various and ranged between 3 years and more than 11 years. However, those with longer clinical experience ( $\geq 11$  years) were more likely to be in the intervention group than the control group.

More than 90% of the participants had not received any training course about pain in the past, and none of them was currently enrolled on any pain education programme (Table 18). Only 25.8% of the participants revealed that they had attended any pain conferences in the past, and none of them had participated in any pain research. The majority of participants (64.2%) from both groups claimed to have suffered from severe pain in the past. A similar proportion (63.3%) claimed that at least one of their family members had suffered from severe pain in the past (Table 18).

**Table 18: Demographic characteristics of the study sample (N=229)**

Variable	Categories	Intervention (n= 135)	Control (n= 94)	Total (N=229)	Sig.
<b>Age (years)</b>	$\leq 25$	31 (23.0%)	19 (20.2%)	<b>50 (21.8%)</b>	<b>0.027</b>
	26-30	65 (48.2%)	32 (34.1%)	<b>97 (42.4%)</b>	
	$\geq 31$	39 (28.8%)	43 (45.7%)	<b>82 (35.8%)</b>	
	<b>Total</b>	<b>135 (100%)</b>	<b>94 (100%)</b>	<b>229 (100%)</b>	
<b>Gender</b>	Male	4 (3.0%)	8 (8.5%)	<b>12 (5.2%)</b>	0.061
	Female	131 (97.0%)	86 (91.5%)	<b>217 (94.8%)</b>	
<b>Nationality</b>	Saudi	33 (24.4%)	37 (39.4%)	<b>70 (30.6%)</b>	<b>0.001</b>
	Non-Saudi	102 (75.6%)	57 (60.6%)	<b>159 (69.4%)</b>	
<b>Employment</b>	Full time	135 (100%)	94 (100%)	<b>229 (100%)</b>	.....
	Part time	0 (0.0%)	0 (0.0%)	<b>0 (0%)</b>	
<b>Experiences (years)</b>	1-2	11 (8.1%)	3 (3.2%)	<b>14 (6.1%)</b>	<b>0.047</b>
	3-5	31 (23.0%)	25 (26.5%)	<b>56 (24.5%)</b>	
	6-10	39 (28.9%)	40 (42.6%)	<b>79 (34.5%)</b>	
	$\geq 11$	54 (40.0%)	26 (27.7%)	<b>80 (34.9%)</b>	
<b>Education</b>	Diploma	40 (29.6%)	35 (37.2%)	<b>75 (32.8%)</b>	0.088
	Associate	8 (5.9%)	3 (3.2%)	<b>11 (4.8%)</b>	
	Bachelor	85 (63.0%)	50 (53.2%)	<b>135 (59.0%)</b>	
	Master	2 (1.5%)	6 (6.4%)	<b>8 (3.4%)</b>	
<b>Pain sessions attended in the last year</b>	0	118 (87.4%)	90 (95.8%)	<b>208 (90.8%)</b>	<b>0.004</b>
	1	11 (8.2%)	2 (2.1%)	<b>13 (5.7%)</b>	
	$\geq 2$	6 (4.4%)	2 (2.1%)	<b>8 (3.5%)</b>	
<b>Suffered from severe pain</b>	Yes	95 (70.4%)	52 (55.3%)	<b>147 (64.2%)</b>	<b>0.014</b>
	No	40 (29.6%)	42 (44.7%)	<b>82 (35.8%)</b>	
<b>Any of family members suffered from severe pain</b>	Yes	96 (71.1%)	49 (52.1%)	<b>145 (63.3%)</b>	<b>0.003</b>
	No	39 (28.9%)	45 (47.9%)	<b>84 (36.7%)</b>	
<b>Attended any pain conference in the last year</b>	Yes	34 (25.2%)	25 (26.6%)	<b>59 (25.8%)</b>	0.464
	No	101 (74.8%)	69 (73.4%)	<b>170 (74.2%)</b>	
<b>Participated in any</b>	Yes	0 (0.0%)	0 (0.0%)	<b>0 (0%)</b>	.....

<b>pain research</b>	No	135 (100%)	94 (100%)	<b>229 (100%)</b>	
N: Sample size, n: Number, %: Percent, Sig.: Significance level. Significance was calculated using Fishers' Exact Test for all categorical variables.					

## **KNOWLEDGE AND ATTITUDES SCORE**

### **Research question**

1. How do nurses' knowledge and attitudes of post-operative pain management change following administration of a pain-management educational programme: after one month and three months?

This section presents the results gained from the PNKAS. Table 19 shows the mean total scores of this tool in both intervention and control groups at all study phases (pre-test, post-test I, and post-test II).

### **Homogeneity at pre-test**

Assessment of knowledge and attitudes scores between the intervention and control groups at pre-test using t-test was important to ensure homogeneity of the sample. The mean scores of PNKAS for both groups at pre-test were consistent and at the medium level, showing no statistically significant difference ( $p=0.245$ ).

### **Changes in scores after intervention**

Focusing on the impact of the intervention, it was evident that the PNKAS scores increased significantly across study phases among participants in the intervention group ( $p<0.001$ ). When applying the Bonferroni Post Hoc statistic for multiple comparisons, there were statistically significant differences in PNKAS scores between pre-test and post-test I, and between pre-test and post-test II ( $p<0.001$ , and  $p<0.001$ , respectively). Regarding participants in the control group, the total PNKAS scores showed an unexplained reduction in knowledge score across study phases. Bonferroni Post Hoc statistics revealed that there was a statistically significant reduction in PNKAS mean scores between pre-test and post-test I ( $p=0.024$ ). In addition, there was a statistically significant reduction between pre-test and post-test II ( $p=0.039$ ).

Overall, the programme produced a significant improvement in participants' knowledge and attitudes towards children's pain in the intervention group, with no corresponding change in the control group.



**Table 19: Change in Knowledge and Attitude Score in Intervention and Control Groups across Pre-test and Post-tests**

Study phase	Intervention Group		Control Group		t-test: comparisons between groups		
	Obs	Mean (SD)	Obs	Mean (SD)	t	df	Sig.
	Pre-test	135	20.02 (8.20)	94	18.78 (7.29)	<b>1.165</b>	<b>227</b>
Post-test I	130	34.36 (5.83)	91	16.12 (5.97)	<b>22.56</b>	<b>219</b>	<b>&lt;0.001</b>
Post-test II	130	33.15 (9.28)	91	16.30 (6.86)	<b>15.52</b>	<b>219</b>	<b>&lt;0.001</b>
ANOVA: comparisons within group	<i>F</i>	<b>132.04</b>	<i>F</i>	<b>4.499</b>	* Cronbach's Alpha: 0.941		
	<i>df</i>	<b>2</b>	<i>df</i>	<b>2</b>			
	<i>Sig.</i>	<b>&lt;0.001</b>	<i>Sig.</i>	<b>0.012</b>			
Obs: Number of the available sample, SD: Standard Deviation, <i>F</i> : F statistic, <i>df</i> : Degree of freedom, <i>Sig.</i> : significance value (p)							

## BELIEFS AND PERCEPTIONS SCORES

### Research questions

2. How do nurses' beliefs about pain in childhood change following administration of a pain-management educational programme: after one month and three months?
3. How do nurses' perceptions of children's reports of pain change following administration of a pain-management educational programme: after one month and three months?

The Children and Pain Survey was developed to measure nurses' beliefs and perceptions of pain in children. Since the tool measures these aspects separately, each aspect is reported individually.

Table 20 shows the results of the belief alignment scale for both intervention and control groups across study phases. Although the belief scores were above the midpoint of 30, the mean total score for intervention and control groups at pre-test differed statistically, with participants in the intervention group scoring higher than participants in the control groups ( $p=0.002$ ).

### Changes in beliefs and perceptions

The total belief score among participants in the intervention group was reduced significantly from 47.28 at pre-test to 40.34 at post-test I ( $p<0.001$ ), but increased from 40.34 at post-test I

to 44.19 at post-test II ( $p < 0.001$ ), resulting in an overall reduction in scores. There was no statistically significant difference in the belief score among control participants across the study phases (Table 20). In general, the study intervention produced inconsistent changes in participants' beliefs about children's pain.

**Table 20: Change in Belief Alignment Score in Intervention and Control Groups across Pre-test and Post-tests**

Study phase	Intervention Group		Control Group		t-test: comparisons between groups		
	Obs	Mean (SD)	Obs	Mean (SD)	t	df	Sig.
	<b>Pre-test</b>	135	47.28 (5.59)	94	43.36 (11.36)	<b>3.095</b>	<b>227</b>
<b>Post-test I</b>	130	40.34 (6.81)	91	42.92 (9.92)	<b>2.146</b>	<b>219</b>	<b>0.034</b>
<b>Post-test II</b>	130	44.19 (7.60)	91	45.49 (8.80)	<b>1.145</b>	<b>219</b>	0.254
<b>ANOVA: comparisons within group</b>	<b>F</b>	<b>35.596</b>	<b>F</b>	<b>1.690</b>	* Cronbach's Alpha: 0.771		
	<b>df</b>	<b>2</b>	<b>df</b>	<b>2</b>			
	<b>Sig.</b>	<b>&lt;0.001</b>	<b>Sig.</b>	0.186			
Obs: Number of the available sample, SD: Standard Deviation, <i>F</i> : F statistics, df: Degree of freedom, Sig.: significance value (p).							

The second part of the Children and Pain Survey was developed to assess perceptions of children in pain. The results are presented in Table 21. Participants in the intervention group revealed statistically significantly higher perception scores at pre-test compared to those in the control group ( $p = 0.022$ ). In relation to the changes in perception scores across study phases, no statistically significant difference was found in the perception score in either group. This result indicates that there was no obvious association between the intervention programme and perception of children in pain.

**Table 21: Change in Perception Awareness Score in Intervention and Control Groups across Pre-test and Post-tests**

Study phase	Intervention Group		Control Group		t-test: comparisons between groups		
	Obs	Mean (SD)	Obs	Mean (SD)	t	df	Sig.
	<b>Pre-test</b>	135	35.84 (4.28)	94			
<b>Post-test I</b>	130	34.99 (6.44)	91	31.34 (8.25)	<b>3.518</b>	<b>219</b>	<b>0.001</b>
<b>Post-test II</b>	130	35.05 (6.11)	91	32.74 (6.93)	<b>2.615</b>	<b>219</b>	<b>0.010</b>
<b>ANOVA: comparisons within group</b>	<b>F</b>	<b>0.942</b>	<b>F</b>	<b>2.030</b>	* Cronbach's Alpha: 0.833		
	<b>df</b>	<b>2</b>	<b>df</b>	<b>2</b>			
	<b>Sig.</b>	0.391	<b>Sig.</b>	0.133			
Obs: Number of the available sample, SD: Standard Deviation, <i>F</i> : F statistics, df: Degree of freedom, Sig.: significance value (p).							

## PERCEIVED BARRIERS TO OPTIMAL PAIN MANAGEMENT

### Research question

4. How do nurses perceptions of the barriers to optimal pain management change following administration of a pain-management educational programme: after one month and three months?

As presented in Table 22, it is apparent that mean scores of intervention and control groups at pre-test were not statistically different ( $p=0.202$ ), meaning that the groups were homogenous with regard to perceiving barriers to optimal pain management. In the intervention group, there was a statistically significant reduction in the mean total scores ( $p<0.001$ ) from 71.69 at post-test I to 57.87 at post-test II (Table 22). Bonferroni Post Hoc statistics showed that there were significant difference between pre-test and post-test II ( $p<0.001$ ) and between post-test I and post-test II ( $p<0.001$ ). There was no statistically significant change in scores across study phases in the control group. It was concluded that the intervention programme significantly reduced the perception of barriers to effective pain management, though not one after the intervention.

**Table 22: Change in Barriers to Optimal Pain Management Score in Intervention and Control Groups across Pre-test and Post-tests**

Study phase	Intervention Group		Control Group		t-test: comparisons between groups		
	Obs	Mean (SD)	Obs	Mean (SD)	t	df	Sig.
	<b>Pre-test</b>	135	71.90 (25.96)	94	76.35 (25.72)	<b>1.280</b>	<b>227</b>
<b>Post-test I</b>	130	71.69 (21.27)	91	80.81 (22.60)	<b>3.047</b>	<b>219</b>	<b>0.003</b>
<b>Post-test II</b>	130	57.87 (30.59)	91	78.04 (20.33)	<b>5.889</b>	<b>219</b>	<b>&lt;0.001</b>
<b>ANOVA: comparisons within group</b>	<b>F</b>	<b>12.320</b>	<b>F</b>	<b>0.876</b>	*Cronbach's Alpha: 0.912		
	<b>df</b>	<b>2</b>	<b>df</b>	<b>2</b>			
	<b>Sig.</b>	<b>&lt;0.001</b>	<b>Sig.</b>	0.417			
Obs: Number of the available sample, SD: Standard Deviation, <i>F</i> : F statistics, df: Degree of freedom, Sig.: significance value (p).							

### Change in self-efficacy score

#### Research question

- How does nurses' self-efficacy towards providing optimal post-operative pain management change following administration of a pain-management educational programme: one and after 3 months?

In this last instrument used in the study, participants were asked to rate their self-efficacy in their ability to provide optimal pain management for children. Prior to the intervention, self-efficacy scores were unequal between intervention and control groups, with participants in the control group scoring higher than those in the intervention group ( $p < 0.001$ ). However, both groups scored self-efficacy above the mid-point ( $> 15$ ) which indicates an acceptable self-efficacy level (Table 23).

Table 23 shows that there was a statistically significant difference in self-efficacy over study phases ( $p < 0.001$ ). Bonferroni Post Hoc statistics for multiple comparisons indicated that differences in self-efficacy scores between all study phases in the intervention group were all significantly significant at  $p < 0.001$ . Self-efficacy increased from pre-test to post-test I, and again from post-test I to post-test II. Changes in self-efficacy in the control group revealed that there was unexplained significant reduction in mean self-efficacy scores at both post-tests. Bonferroni Post Hoc test revealed that there were statistically significant difference between pre-test and post-test I ( $p < 0.001$ ) and between post-test I and post-test II ( $p < 0.001$ ).

In conclusion, the intervention programme improved self-efficacy significantly while participants assigned to the control group exhibited an unexplained reduction in self-efficacy.

**Table 23: Change in Self-Efficacy Score in Intervention and Control Groups across Pre-test and Post-tests**

Study phase	Intervention Group		Control Group		t-test: comparisons between groups		
	Obs	Mean (SD)	Obs	Mean (SD)	t	df	Sig.
	<b>Pre-test</b>	135	19.71 (3.13)	94	21.72 (4.13)	<b>3.99</b>	<b>227</b>
<b>Post-test I</b>	130	23.45 (3.66)	91	19.64 (3.41)	<b>7.785</b>	<b>219</b>	<b>&lt;0.001</b>
<b>Post-test II</b>	130	25.77 (3.58)	91	18.62 (3.41)	<b>14.899</b>	<b>219</b>	<b>&lt;0.001</b>
<b>ANOVA: comparisons within group</b>	<b>F</b>	<b>103.589</b>	<b>F</b>	<b>17.207</b>	* Cronbach's Alpha: 0.860		
	<b>df</b>	<b>2</b>	<b>df</b>	<b>2</b>			
	<b>Sig.</b>	<b>&lt;0.001</b>	<b>Sig.</b>	<b>&lt;0.001</b>			

Obs: Number of the available sample, SD: Standard Deviation, F: F statistics, df: Degree of freedom, Sig.: significance value (p).

## THE IMPACT OF DEMOGRAPHICS ON STUDY VARIABLES

### *The Impact of Age*

#### **Research question**

6. Is there a significant relationship between any demographic variables in the intervention group and the study variables?

Comparisons were made between the three age categories and study variables in the intervention group only. There were no statistically significant differences between all age categories and beliefs or self-efficacy.

#### **Knowledge and attitudes of post-operative pain management**

It was apparent that older participants ( $\geq 31$  years) had the highest mean knowledge score compared to other age groups at pre-test, showing a statistically significant difference ( $p=0.023$ ). However, participants from the 26-30 age group increased their knowledge significantly at post-test I (higher than older participants), but decreased at post-test II compared to older participants ( $p=0.018$ , and  $p=0.029$ , respectively). Post-hoc statistics were no longer required in these comparisons because one of the age categories ( $<25$  years old) was not represented in any of the post-tests.

***Perception of children’s reports of pain***

With regard to the mean total perception scores, all age categories scored comparably at pre-test. However, participants in the 26-30 years age group had higher mean scores in both post-test I and post-test II compared to the older age category, demonstrating a statistically significant reduction in perception of children’s report of pain at both post-tests ( $p < 0.001$  and  $p = 0.003$  respectively).

***Barriers to optimal pain management***

**Table 24: Comparison between age categories of the intervention group in relation to the study variables.**

Variable	Age categories				
	≤ 25	26-30	≥ 31	ANOVA Test	
	Mean (SD)	Mean (SD)	Mean (SD)	F	Sig.
<b>Knowledge</b>					
<b>Pre-test</b>	17.58 (5.89)	19.58 (8.47)	22.92 (8.76)	<b>3.873</b>	<b>0.023</b>
<b>Post-test I</b>		35.76 (4.78)	33.32 (6.33)	<b>5.737</b>	<b>0.018</b>
<b>Post-test II</b>		31.13 (10.47)	34.69 (7.99)	<b>4.848</b>	<b>0.029</b>
<b>Beliefs</b>					
<b>Pre-test</b>	47.52 (4.80)	47.26 (5.23)	47.13 (6.77)	<b>0.042</b>	<b>0.959</b>
<b>Post-test I</b>		41.66 (5.86)	39.33 (7.36)	<b>3.785</b>	<b>0.054</b>
<b>Post-test II</b>		45.0 (8.32)	43.58 (7.0)	<b>1.112</b>	<b>0.294</b>
<b>Perception</b>					
<b>Pre-test</b>	35.52 (5.62)	35.69 (3.87)	36.36 (3.76)	<b>0.410</b>	<b>0.664</b>
<b>Post-test I</b>		38.14 (4.72)	32.61 (6.57)	<b>28.560</b>	<b>&lt;0.001</b>
<b>Post-test II</b>		36.88 (6.20)	33.66 (5.71)	<b>9.375</b>	<b>0.003</b>
<b>Barriers</b>					
<b>Pre-test</b>	65.0 (24.85)	72.60 (24.07)	76.23 (29.21)	<b>1.679</b>	<b>0.191</b>
<b>Post-test I</b>		67.18 (21.82)	75.11 (20.33)	<b>4.553</b>	<b>0.035</b>
<b>Post-test II</b>		61.21 (28.40)	55.34 (32.10)	<b>1.178</b>	<b>0.280</b>
<b>Self-Efficacy</b>					
<b>Pre-test</b>	19.48 (3.19)	19.86 (3.02)	19.64 (3.33)	<b>0.164</b>	<b>0.849</b>
<b>Post-test I</b>		23.19 (3.53)	23.64 (3.77)	<b>0.456</b>	<b>0.501</b>
<b>Post-test II</b>		25.34 (3.27)	26.09 (3.80)	<b>1.424</b>	<b>0.235</b>

SD: Standard Deviation, F: F statistics, Sig.: significance value (p).  
Blanks indicate absence in the post-tests of participants aged less than 25 years old.

Comparisons made on the mean total scores showed that there was no statistically significant difference between all age categories at pre-test. Thereafter, participants in the 26-30 years

category showed lower mean scores at post-test I than participants in the older group ( $p=0.035$ ). However, older participants showed additional reduction in the barriers scores at post-test II phase to appear statistically consistent with the 26-30 group (Table 24).

### The impact of experience

**Table 25: Comparison between lengths of experience categories in the intervention group in relation to the study variables.**

Variable	Years of Experience					ANOVA Test	
	1-2	3-5	6-10	$\geq 11$	<i>F</i>	Sig.	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)			
Knowledge Pre-test	19.0 (7.84)	17.71 (6.34)	19.44 (8.89)	22.14 (8.42)	<b>2.109</b>	<b>0.102</b>	
Post-test I		37.11 (4.14)	33.50 (6.11)	34.27 (5.89)	<b>1.778</b>	<b>0.155</b>	
Post-test II		34.72 (9.21)	32.00 (9.65)	33.76 (9.03)	<b>0.834</b>	<b>0.478</b>	
Beliefs Pre-test	46.09 (2.84)	46.94 (5.78)	47.18 (4.70)	47.80 (6.48)	<b>0.458</b>	<b>0.784</b>	
Post-test I		41.89 (7.19)	40.57 (6.57)	39.76 (6.83)	<b>0.554</b>	<b>0.646</b>	
Post-test II		45.0 (37.0)	44.88 (7.34)	43.44 (7.98)	<b>0.408</b>	<b>0.747</b>	
Perception Pre-test	35.73 (4.63)	34.74 (5.10)	36.38 (3.78)	36.11 (4.05)	<b>0.964</b>	<b>0.412</b>	
Post-test I		37.83 (4.18)	35.12 (6.49)	34.15 (6.80)	<b>1.762</b>	<b>0.158</b>	
Post-test II		38.61 (3.15)	35.20 (6.26)	33.94 (6.35)	<b>2.943</b>	<b>0.036</b>	
Barriers Pre-test	66.36 (16.63)	73.16 (21.8)	69.13 (25.71)	74.31 (29.82)	<b>0.490</b>	<b>0.690</b>	
Post-test I		67.66 (25.73)	70.84 (19.74)	74.21 (20.62)	<b>1.848</b>	<b>0.142</b>	
Post-test II		57.0 (27.09)	64.45 (28.35)	53.61 (32.52)	<b>1.852</b>	<b>0.141</b>	
Self-Efficacy Pre-test	18.82 (1.94)	19.68 (3.11)	20.26 (3.19)	19.52 (3.30)	<b>0.758</b>	<b>0.520</b>	
Post-test I		23.94 (3.44)	22.88 (3.84)	23.82 (3.55)	<b>1.222</b>	<b>0.304</b>	
Post-test II		25.77 (2.80)	24.92 (3.97)	26.45 (3.39)	<b>1.717</b>	<b>0.167</b>	

SD: Standard Deviation, *F*: F statistics, Sig.: significance value (p).  
Blanks indicate absence of participants in the post-tests who had 1-2 years of experience.

Four categories of length of experience were considered, though none of the participants in the 1-2 years' experience group completed the post-tests. Length of experience exerted no statistically significant impact on study variables of knowledge and attitudes of post-operative pain management, perception of children's reports of pain, beliefs about pain in childhood, barriers to optimal pain management, or self-efficacy regarding post-operative pain

management. The only statistically significant difference was found in the mean scores for perception of children's reports of pain which indicated that participants with 3-5 years of clinical experience had the highest mean scores at post-test II compared to participants who had longer clinical experience ( $p=0.036$ ).

### Highest educational qualification

Four levels of highest educational achievement were established for the study. None of those with a Master's degree completed the post-tests. Table 26 displays the scores recorded for each of these in the intervention group.

**Table 26: Comparison between highest educational qualifications of the intervention group in relation to the study variables.**

Variable	Highest Educational Qualification				ANOVA Test	
	Diploma Mean (SD)	Associate Mean (SD)	BSc Mean (SD)	Master Mean (SD)	F	Sig.
Knowledge Pre-test	19.56 (7.98)	23.50 (11.19)	19.90 (8.11)	20.0 (4.24)	0.520	0.669
Post-test I	35.51 (5.06)	35.67 (1.35)	33.85 (6.13)		0.846	0.471
Post-test II	37.18 (7.30)	29.0 (10.82)	31.60 (9.63)		4.071	0.008
Beliefs Pre-test	48.05 (6.23)	49.12 (3.83)	46.79 (5.44)	45.50 (2.12)	0.827	0.481
Post-test I	40.22 (5.60)	42.0 (3.60)	40.66 (7.29)		1.000	0.395
Post-test II	42.33 (5.85)	48.66 (1.15)	44.65 (8.44)		1.833	0.144
Perception Pre-test	34.55 (4.38)	35.50 (5.48)	36.39 (4.04)	40.0 (1.41)	2.394	0.071
Post-test I	33.93 (6.56)	39.0 (3.46)	35.46 (6.49)		0.957	0.415
Post-test II	34.98 (5.16)	38.67 (2.89)	34.91 (6.70)		0.371	0.774
Barriers Pre-test	79.23 (27.08)	73.13 (28.96)	68.01 (24.86)	86.0 (7.07)	1.940	0.126
Post-test I	69.97 (21.53)	68.33 (25.72)	72.59 (21.36)		0.161	0.922
Post-test II	44.80 (29.18)	73.66 (4.16)	62.84 (30.73)		3.988	0.009
Self-efficacy Pre-test	19.55 (3.43)	19.50 (2.39)	19.84 (3.02)	18.50 (6.36)	0.188	0.904
Post-test I	22.98 (3.57)	22.33 (1.53)	23.68 (3.82)		0.463	0.709
Post-test II	26.20 (3.52)	24.0 (0.30)	25.62 (3.63)		0.481	0.696

SD: Standard Deviation, F: F statistics, Sig.: significance value (p).  
Blanks indicate absence of participants in the post-tests who held a Master's degree

No statistically significant differences were found between any education category in relation to belief, perception, or self-efficacy mean scores at any study phase. However, it was observed that participants with a diploma had the highest mean score for knowledge at post-test II compared to those who held the associate or bachelor degrees ( $p=0.008$ ). The lowest



mean score for barriers at post-test II was recorded by those with a diploma compared to other education categories ( $p=0.009$ ).

### **Statistically significant findings in other demographic variables**

There was a statistically significant difference between Saudi and non-Saudi nurses in relation to knowledge and attitudes of post-operative pain management scores at post-test I, with Saudi nurses showing a higher knowledge mean score (means: 37.24, 33.93, respectively,  $t=2.214$ ,  $df=127$ ,  $p=0.029$ ).

There was a statistically significant difference between Saudi and non-Saudi nurses in relation to barriers to optimal pain management at post-test I in which Saudi nurses showed a reduced mean score (means: 61.33, 73.36, respectively,  $t=2.261$ ,  $df=128$ ,  $p=0.025$ ).

No statistically significant differences were identified at any testing point between participants who had suffered from severe pain and who had not, who had a family member who suffered from severe pain and who had not, or who had attended a pain conference and who had not.

## **CONCLUSION**

Sufficient numbers of participants were recruited to both groups at the beginning of the study. At subsequent test points, this number was not reduced significantly and this maintained the power of the analysis. It was concluded that the pain intervention programme entailed statistically significantly more positive outcomes among participants who received the intervention than for those in the control group. In particular, the intervention yielded improvement in participants' knowledge and attitudes towards children's pain. It reduced the perception of barriers towards pain management and improved self-efficacy. However, the study produced inconsistent changes in participants' beliefs about pain in childhood, and no obvious association was found between the intervention and perception of children's reports of pain.

It was found that participants in the 26-30 years group improved the most. Additionally, participants with shorter length of clinical experience (3-5 years) gained higher mean perception of children's reports of pain scores after the intervention than participants with longer clinical experience. Diploma holder participants gained higher knowledge mean scores

and lower mean scores for barriers to optimal pain management after the intervention compared to other education categories. Saudi participants scored higher knowledge and lower barriers to optimal pain management after the delivery of the intervention compared to non-Saudi participants.

## **CHAPTER SEVEN**

### **DISCUSSION**

#### **INTRODUCTION**

This discussion chapter provides a critical review of the study findings in the context of KSA and the existing global literature review. The chapter starts with detailed discussion of the limitations of the study, and then consideration of the effects of socio-demographic factors. Deeper analysis of each of the study variables will also be offered in separate sections.

#### **LIMITATIONS**

This study was limited by a number of factors. The nature of self-report data may influence the results as some participants may seek deliberately or sub-consciously to show their health care facility in a good light. Tendencies to extreme responses or to adhere to mid-point responses can also skew the results. To overcome these issues, participants were provided with sufficient time to complete the surveys. The provision of small tokens of appreciation for their time and effort in responding to the questionnaires may also have encouraged diligent completion. Furthermore, the inclusion of the control group would have helped to neutralise some degree of bias. It transpired that the nurses were highly motivated and engaged with the study, suggesting that thoughtful, deliberated responses would have been made.

Inability to allocate individuals randomly to intervention or control group risks the creation of non-equivalent groups and allows for extraneous variables to interfere with study results. The best option under the circumstances was to randomise groups at the level of regions so that contamination between groups could be avoided. Statistical analysis showed that the groups were similar in most variables at the baseline level, therefore establishing equivalence and the avoidance of selection bias.

Restricting the study to a single region of Saudi Arabia, while unavoidable for practical and logistical reasons, limited the study to that geographical location. However, Hail region may vary from some other regions in terms of local culture, but the national regulation of nurses at least in government hospitals limits heterogeneity in nursing practices, so the applicability of findings to other regions should not be restricted. The findings were, though, specific to post-operative care by paediatric nurses, which restricts generalisability clinically to nurses in this field across Saudi Arabia.

There was a risk of participants facing technical problems while surfing the electronic content on the DVD or problems with connection to the Internet when activating hyperlinks. This could have provoked differing experiences of the intervention and consequently affected responses to the surveys. However, the measures put in place through exhaustive efforts during design and construction of the materials and through immediate personal support for participants facing any technical difficulties proved to be effective. Only two participants contacted the researcher, and their problems were solved through a mobile phone call. Unprompted commendations by nurses and managers of the package, together with the lack of reported problems in its use suggest that the issues were addressed adequately to avert the potential problem.

Conducting the study over a three months' period risked participants from either group seeking more information about pain assessment and management, and this information could have influenced the results of this study by improving test scores. Both the programme (only the intervention group) or the surveys (both groups) could have encouraged some nurses to seek more information about pain assessment and management from text books or the Internet. Participants might also answer questions by returning to the DVD. However, the researcher delivered the DVD with protection by passwords, and access expired within two weeks of delivery to the participants. So participants could not depend on it for their future responses and could not share it with each other. Withholding the intervention from the control group until after the completion of data collection neutralised the possibility of these nurses' responses being contaminated.

## **DEMOGRAPHICS**

The majority of participants in this study were female as in previous studies (Dowd, 2009; Smith, 2007). This reflects the gender distribution of the Saudi nurse population. The largest group of participants in this study held a bachelor's degree in nursing, and this is similar to previous studies (Dowd, 2009; Textor, 2003) except for one in which the majority of participants held a master's degree (Smith, 2007).

In previous studies samples were heterogeneous as they recruited nurses regardless of their area of speciality: adult surgical units, children's surgical units, medical units, intensive care and oncology (Dowd, 2009; Habich et al., 2012; He et al., 2010; Johnston et al., 2007; Swain, 2008; Textor, 2003; Van Hulle Vincent, Wilkie, & Wang, 2010). Furthermore, education programmes in previous studies were broad and not focused on a specific clinical issue, which may have impacted on the findings. For example, Habich et al. (2012) and Dowd (2009) did

not find any significant improvement. However, participants in this study were all working in children's post-operative surgical units. Restricting participants to a single clinical speciality and establishing a programme to address a defined clinical problem in this study increased nurses' knowledge significantly.

## **LACK OF EDUCATION ABOUT PAIN MANAGEMENT**

Participants in this study had not attended any pain education activity; however, participants in previous studies had attended pain education sessions in the last year (Smith, 2007; Textor, 2003). In developed countries more attention is given to staff development compared with Saudi Arabia. In part, this effort to develop skills in staff through education and research activities links to the requirements for renewal of the licence to practice. However, this is not the case in Saudi Arabia. Pain assessment and management as a topic is not included in Saudi educators' agendas and does not receive much attention from policy-makers in Saudi Arabia. Considering the effect on patients, and particularly child patients, of poorly managed pain, this is a major omission. The widespread effects of failure in pain management, including increased morbidity, systemic dysfunction, prolonged convalescence as well as psychological factors affecting further experiences of health care are well-established (Kehlet & Holte, 2001; Motov & Khan, 2009). The basic human experience of being in pain ought to be sufficient stimulus for this deficit to be remedied. Indeed, it is remarkable that the ready availability of international literature and more than 25 years of research on the topic appear to have exerted little impact on Saudi nursing and medical pain management practice.

Some comfort can be gained from the finding that nurses in the study were not only willing to improve their practice but were eager to benefit from the education programme that was offered. Given that the barriers to effective postoperative pain management included aspects both of lack of preparedness and of cultural restriction, nurses were motivated to address at least the former of these. Failure to achieve change in self-efficacy may be indicative of the need for strategies other than an education package to bring about change in cultural barriers. Such strategies will be discussed after further consideration of the poor scores by Saudi nurses in knowledge of pain at the pre-test.

## **KNOWLEDGE AND ATTITUDES ABOUT CHILDREN'S PAIN**

The PNKAS scores at pre-test showed that participants in this study lacked the necessary knowledge and attitude about pain management in children as the average scores in both groups were poor. Several factors were found in previous literature to be responsible for the lack of knowledge. These factors are divided into those related directly to nursing curricula and those related to lack of appropriate continuing education in health care facilities. The structure of current nursing curricula, the level of knowledge held by academics about pain management, and the mode of teaching were the three main factors responsible for graduating nursing students having poor knowledge of pain assessment and management. For example, pain assessment and management is not fully incorporated into undergraduate nursing curricula (Al Omari, 2016). Twycross (2002) stressed that nursing programmes at the time of her study failed to include sufficient information about pain assessment and management to prepare graduate nurses with adequate knowledge. Unfortunately, 14 years later, Al Omari's (2016) research in Jordan, which is one of the leading countries in nursing education in the Arabic region, stressed that only a minute proportion of the curriculum was devoted to teaching students the basic principles of pain management, though more attention was paid to pharmacological treatment (Al Omari, 2016). The time devoted to teach pain assessment and management to undergraduate Saudi nurses needs to be re-evaluated, too, as the educational system is similar to that in Jordan.

An American study conducted to test the knowledge level of nursing students and staff regarding pain assessment and management found that even academics had inadequate knowledge (Duke, Haas, Yarbrough, & Northam, 2013). If this was the case for academics, they could not have been able to convey proper information about pain management to students.

These three factors have been found responsible for creating nursing students who lack to the necessary knowledge and attitudes about pain assessment and management for effective practice (Al Khalaileh & Al Qadire, 2013; Chiu et al., 2003; Lunsford, 2015; Plaisance & Logan, 2006; Rahimi-Madiseh, Tavakol, & Dennick, 2010). Policy-makers in nursing education need to take into accounts these three factors and find a method to ensure adequate coverage in the curriculum by knowledgeable academics employing appropriate teaching and learning strategies.

The majority of nurses in this study had not received any pain management education during their work and they had not participated in any research activity related to pain. Only a minority of them had ever attended a conference related to pain management. All of this was which reflected in their low scores at pre-test. This was in line with previous research that has shown that nurses lack the necessary knowledge and attitude toward pain assessment and management (Al Khalaileh & Al Qadire, 2013; Al Omari, 2016; Van Hulle Vincent, 2007). Keyte and Richardson (2011) encouraged a move towards more up-to-date methods such as problem-based learning and e-learning.

In this study, nurses' knowledge and attitude scores were improved significantly after implementing the new online education programme and was sustained at the follow-up point. Eight studies were found to support the implementation of an educational programme on nurses' knowledge. However, the education programme and the assessment tool used in this study were not similar to those used in previous studies, in that more interactive modes were employed, and a full range of factors were addressed in a single programme. This was the first study of its kind to be conducted in KSA. Therefore, this study needs to be replicated in future to confirm its results in the Saudi context.

As a result of improving participants' knowledge, their attitudes also improved in this study. The Institute of Medicine (2011), reported the need to change the health care provider's attitude toward pain management. Attitudes are defined as the tacit drives that guide a person's actions and reactions and are shaped in accordance with a person's knowledge and belief system (Bell, 2000). Due to the belief that greater knowledge and understanding leads to more positive attitudes toward pain management, attitude toward pain management was not usually studied as the sole independent variable. As a result, all the studies that found significant improvements in knowledge also found a significant improvement on attitudes (Abdalahim et al., 2011; Huth et al., 2010; Johnston et al., 2007; Lin et al., 2008; Swain, 2008; Textor, 2003).

To conclude, it is well-established that the knowledge and attitudes that nurses hold toward children in pain impact significantly on their decision-making processes about pain assessment and management. Not treating pain can lead to several physical and psychological problems for patients (Innis, Bikaunieks, Petryshen, Zellermeier, & Ciccarella, 2004; Tapp & Kropp, 2005; Van Hulle Vincent, 2007). It also has negative consequences in nurses themselves. Nurses in previous research who found themselves lacking in competence in pain

management were distressed when they were unable to provide patients with proper pain assessment and management options (Blondal & Halldorsdottir, 2009; Richards & Hubbert, 2007; Simons, 2002). Assessing and treating pain using the most advanced modalities can lead to patients experiencing less pain, reflects on recovery time and length of stay in hospital, and increases comfort, quality of life, and satisfaction with care. Nurses who are able to provide patients with a pain-free journey during their hospitalisation will also experience better self-esteem, self-confidence and job satisfaction.

## **BELIEFS AND PERCEPTIONS ABOUT CHILDREN'S PAIN**

A significant change in nurses beliefs was seen in this study. This was in line with findings by Van Hulle Vincent et al., (2010) when testing the implementation of the “Internet-based Relieve Children’s Pain” programme on children’s nurses. Nurses’ beliefs were changed significantly after using the programme. This programme was similar to some extent to what was used in this study, and this mode of teaching and learning has several advantages over traditional methods as discussed in chapter three.

Beliefs and perceptions of nurses are important variables in either promoting or hindering effective pain assessment and management activities (Bédard, Purden, Sauv -Larose, Certosini, & Schein, 2006; Bourbonnais, Perreault, & Bouvette, 2004; Dihle, Bj lseth, & Helseth, 2006; Klopper, Andersson, Minkkinen, Ohlsson, & Sj str m, 2006). This study (at pre-test) and previous research studies have shown that children’s nurses can hold distorted beliefs regarding the use of medication to treat children’s pain (Ellis et al., 2007; Rieman & Gordon, 2007; Van Hulle Vincent, 2005; Van Hulle Vincent & Gaddy, 2009). For example, nurses in this study and in previous studies underestimated child patients’ pain, believing that pain is an inevitable part of the patient’s journey (Manias et al., 2005). Furthermore, children’s nurses believed that children may become addicted to opioids if treated with them, and they were resistant to accepting the safety and efficacy of such methods to relieve children’s pain (Ellis et al., 2007; Rieman & Gordon, 2007; Van Hulle Vincent, 2005; Van Hulle Vincent & Denyes, 2004; Van Hulle Vincent & Gaddy, 2009). Consequently, they deliver sub-clinical doses of analgesics to children (Helgad ttir & Wilson, 2004; Simons & Moseley, 2008; Twycross, 2007; Van Hulle Vincent & Denyes, 2004).

On the whole, nurses in this study and in previous research studies did not believe in children’s self-reports about the presence and intensity of pain since the nurses perceived



children to be unable to express verbally the amount of pain that they experienced. The nurses thought themselves more capable to assess this based on the patient's facial expressions and physiological measurements and they preferred to observe patients' behaviour before deciding whether or not to give treatment (Richards & Hubbert, 2007; Van Hulle Vincent, 2007; Van Hulle Vincent et al., 2010; Van Hulle Vincent & Denyes, 2004; Van Hulle Vincent & Gaddy, 2009). However, previous research has found that in the case of children's pain there is a mismatch between children self-reporting and their behaviour (Brahmbhatt et al., 2012). There is clear evidence that self-reporting is the primary indicator for the existence and magnitude of pain regardless of any other available indicator (Van Hulle Vincent et al., 2010).

A qualitative study conducted to investigate nurses' perceptions regarding managing acute pain in hospitals found that nurses learn to trust patients' self-reporting during their study at university and from the culture of the ward in which they worked (Richards & Hubbert, 2007). This means that negative perceptions can be overcome, and educating nurses about proper pain assessment techniques (including children's self-reporting) is crucial to assess and manage pain in post-operative children effectively. The solution is continuing education and the influence of positive role models in senior nurses. The intervention in this study addressed perceptions of children's reports of pain as well as beliefs about pain, and the senior clinical nurses were enthusiastic about the education package. Yet while beliefs about pain were subject to positive amendment, perceptions of children's reports of pain remained stubbornly resistant to change.

There is a gap between what nurses believe that they should do and what they actually do in practice. For example, Dihle, Bjølseth and Helseth (2006) found that although participants reported that they should assess and treat pain regularly based on factual knowledge, in practice they did not provide patients with sufficient treatment as they failed to assess pain regularly and they did not treat it systematically. To some extent a similar phenomenon was observed in the nurses in this study as although their negative beliefs about pain were changed, and knowledge and attitude improved significantly, their perceptions of children's reports of post-operative pain did not change.

In this study, nurses' beliefs began to revert to their original level at post-test II after significant improvement at post-test I. It seems that the online educational package changed the participants' beliefs temporarily as a result of increasing their knowledge, but increasing

participants' knowledge is not the sole variable that influences their beliefs. Work environment and policies are important factors, too, as will be discussed in next section.

No statistically significant difference was found in nurses' perception score in either control or intervention groups. One explanation for this phenomenon may be related to the type of theoretical knowledge that was imparted to the nurses. The method of delivering the knowledge may have contributed to this phenomenon, too. The method of teaching did not deliver theoretical information in a mode that allowed nurses to internalise it and apply it in clinical settings so that the process of changing beliefs and then perception could progress over time. Several researchers found that although nurses had theoretical knowledge they did not apply it in clinical settings (McCluskey & Lovarini, 2005; Nash et al., 1999; Reyes, 2003). An interventional study conducted to test the impact of a 2-day workshop on the knowledge and behaviour of allied health professionals showed that although participants' theoretical knowledge about pain increased significantly, their perceptions of children's reports of pain did not improve significantly (McCluskey & Lovarini, 2005).

This means that policy-makers need to find creative methods to consolidate the improvement in nurses' beliefs and perceptions that result from education programmes. The culture of hospitals may play a role in preserving nurses' perceptions. Nurses usually follow the tradition that already exists in their place of work rather than reflecting on their own experience and knowledge (Frankel, 2008). Although nurses may be convinced about new knowledge, they still tend to mimic the most senior nurses' practices in the ward. It may be that participants in this study changed their beliefs during the study, under the pressure of ward culture they started to regain their previous beliefs and perceptions. To initiate a positive change in future, the culture of the wards and of the profession as a whole need to be addressed.

Another possible explanation for not obtaining a change in nurses' perceptions may be that this education programme did not cover change in perception extensively and did not use sufficient interactive games, videos, exercise and case studies to relate the new knowledge to practice in a meaningful manner. Furthermore, nurses may not have known how to integrate this knowledge into practice as clinical skills develop over time and this education programme did not support the practice part of the experience. This education programme requires further development to establish a clinical aspect to allow nurses to practice what they learn in the clinical field.

## **PERCEIVED BARRIERS TO OPTIMAL CHILDREN PAIN MANAGEMENT**

The barriers scores dropped significantly in the intervention group from post-test I to post-test II, indicating a positive response. Nurses in this study and in previous studies identified several barriers that prevented them from providing patients with proper pain assessment and management options. Staff shortages, heavy workload, and inadequate medication prescriptions were identified in previous literature as the main barriers to achieving this (Schafheutle, Cantrill, & Noyce, 2001). A recent studies found that attending medical rounds and the frequent interruption in nurses' daily work such as answering the phone, supporting new graduate nurses and leaving the wards looking for something were further major barriers to effective pain assessment and management (Manias, Botti, & Bucknall, 2002; Manias et al., 2005). Attending to these things and fulfilment of other tasks that need to be completed before the end of their shifts consume most of nurses' time and leave them unable to provide patients with proper assessment and management of their pain. Another factor was the lack of appropriate communication between nurses and patients which was responsible for failure to treat pain effectively for 88% of patients (Manias et al., 2005). Communication is important to determine patients' needs. A more recent interventional study found that nurses continue to rate heavy workload, lack of time and the child's inability to cooperate as the most commonly reported barriers to optimal pain management (He et al., 2010).

In this study, after implementing the education programme, nurses did not report such barriers. A large part of the programme enabled nurses to deal with these barriers. For example, one unit in the programme taught nurses how to communicate with parents and their children. Communicating with children effectively may shorten the time devoted to certain tasks and lead to more understanding of patients' physical and psychological condition, which in turn reflects on the ability of nurses to provide children with proper assessment and management of pain (Arnold & Boggs, 2015). One method to overcome communication problem and to save more time for nurses is adopting the family-centred care approach in Saudi hospitals. Although the family-centred care approach emerged in second half of the 20<sup>th</sup> Century, it is not adopted widely in Saudi hospitals. This provision of care has been adopted widely in western countries, based on exchanging information between families and health team members, and on respecting and supporting patients' and their families' decisions regarding health care issues (Gance-Cleveland, 2006; Society of Pediatric Nurses & American Nurses Association, 2003).

The family-centred care approach is based on the premise that families of patients are important pillars of patient care as this approach to planning care around the patients and their families considers them to be a single entity (with due respect to personal differences) (Shields, 2010; Shields, Pratt, & Hunter, 2006). The continuous support of family members plays a significant role in improving patients' wellbeing and could shorten the illness journey (Society of Pediatric Nurses & American Nurses Association, 2003). Several advantages of a family-centred care approach emerged. Patients' and their families' satisfaction with health care services provided to them increased, level of stress decreased, medical errors decreased, and length of stay in hospitals decreased, too (Committee on Hospital Care & American Academy of Paediatrics, 2003). In order to maximise the positive health outcomes, multidisciplinary collaboration between health team members, patients, and their families is required (Ferrari, 2010). Adopting a family-centred care approach in children's wards in Saudi hospitals would reflect positively on patients' pain assessment and management as parents and family members are aware of the normal behaviour of their children when in pain and are able to participate actively in evaluating pain. There is a need for health care providers and policy-makers in Saudi Arabia to re-evaluate the current approaches to care in Saudi hospitals and to adopt new policies and practices that ensure the delivery of a family-centred care approach.

## **SUPPORTING THE IMPACT OF EDUCATIONAL INTERVENTIONS**

### **A MOH Learning Portal and CPD Structure**

It is clear that something must be done to encourage access to continuing educational opportunities, particularly with a view to enhancing nursing practice, but also to enhance the implementation of competent practice that results from the learning. Nurses need to be able to effect change in practice rather than simply to hold greater knowledge. This will require central policy changes and strategic intervention.

The creation of a central MOH portal for professional learning through which learning materials would be appraised and approved, made available and advertised to clinicians would be a step forward. This would lend support to the quality and desirability of learning packages, all within a strategy of evidence production, knowledge transfer, and dissemination of best practice. Standardisation of terminology and of technical requirements for use could be incorporated through this. A MOH seal of approval would offer assurance of the quality

and currency of content. The adoption by the Saudi MOH of the educational package produced for this study for further professional production and branding as a national resource suggests that this proposal may meet with a sympathetic Ministry.

### **CPD Accreditation**

As part of the MOH portal, a formal system of MOH CPD accreditation could be introduced, providing the Department of Nursing at the Ministry with a means to audit uptake of CPD by region, recognising packages that are well-used, and identifying clinical issues that are relatively neglected. Nationally recognised accreditation would be helpful to service providers to manage skill mix and CPD requirements in specific geographical or clinical areas. This is an important issue since cultural variation across regions of KSA, together with regional variation in health issues and treatment facilities, requires consideration of local need and matching of tailored products for some clinical topics. Others, such as post-operative pain management, may be more nationally homogeneous clinical applications. Regardless, a centrally-operated means of identifying need, providing quality-stamped resources, and monitoring uptake could be a means for the ongoing development of nursing practice to be pursued and recognised.

### **Policy Creation and Update Strategy**

In this study it was found that there were some policies, but that these were sometimes outdated. Those that were available were not used or enforced, and there was no national strategy to enhance evidence-based practice through policies and protocols. Other clinical issues are not guided by policy or guidelines at all. Establishing the evidence base is necessary first before policy, guidelines and resources can be devised. Regular review and updating are essential to prevent the lapse into outdated practice, and older policies should be withdrawn as they are replaced by updated versions. Such activity might make policies more noticeable and given to use by nurses. This is also part of the work to change nursing culture. A strategy to produce, review, amend or withdraw policies and guidelines for clinical practice would be advantageous. A programme of work to address this would need to be a national initiative. Identification of additional clinical problems for which a better evidence base is needed, or for which standardised policy or protocol should be devised would need to be part of this work. A range of stakeholders might be engaged to pursue this, including nurses, other health professionals according to the clinical issue and in order to ensure an effective multi-disciplinary response, and, though unusual in Saudi Arabia, service users. There is much literature to be accessed on how to involve service users in service development together

with the benefits to be reaped from this activity (Crawford et al, 2001; NHS England, 2013). This may require to be modified for the Saudi culture, but the effort would be worthwhile.

## **NURSES' SELF-EFFICACY**

Self-efficacy is defined as an individual's decisions or judgments about their own capability or confidence to finish, complete and achieve goals (Bandura, 1977, 1997). Self-efficacy is varying and depends on the type of task that individuals seek to tackle (Zimmerman, 2000). Self-efficacy depends on three basic attributes which are that an individual should have knowledge and skills related to the task or issue, must believe in their ability to complete the task; and must have faith in their capability to complete or the task in the specific situation (Marks, 2001; Marks, Allegrante, & Lorig, 2005). Self-efficacy motivates individuals to accept challenges and to tackle tasks regardless of difficulty (Moritz, Feltz, Fahrback, & Mack, 2000). In this study, nurses' self-efficacy improved significantly from post-test I to follow-up at post-test II. The participants were provided with knowledge to assess and manage children's pain effectively. Furthermore, the online education programme included interactive games, exercises and tests to consolidate what was learnt from the package, and by successfully completing the tests that were set to nurses they were able to gain more self-confidence and belief in their abilities to perform pain assessment and management tasks more competently. This may explain why participants' self-efficacy increased.

In this context, increasing self-efficacy will reflect positively on children as nurses will use new knowledge in order to reduce children's pain (Ammentorp, Sabroe, Kofoed, & Mainz, 2007). However, low self-efficacy could inhibit nurses' change in behaviour toward children in pain regardless of the knowledge gained or attitudes that have been amended. The significant increases in other study domains are explained partly by the significant increase in participants' self-efficacy.

## **REFLECTIONS ON USING THE ONLINE LEARNING PACKAGE**

### **Crucial Elements for Success**

In this study, the online educational package exerted a positive impact on all of the study variables except for perception of children's pain. Previous research has stressed that for any online programme three elements should be addressed: (1) students' confidence in using computers; (2) high quality material content checked by experts in the field; and (3) reliable self-evaluation methods (Kala, Isaramalai, & Pohthong, 2010). This education package

included all of the three elements as nurses in Saudi Arabia are confident in using computers, and the education package included high quality materials developed by specialists in pain assessment and management from Saudi Arabia and the UK. The test was validated by those experts in the field, too, and were commended by clinical colleagues. The presentation and content might also be held to be central to the success of the package and the low attrition rate in this study, together with the efforts to make the package attractive to the current generation of nurses (generally technically competent with mobile devices and Internet-based resources). Recognition and addressing of the practical problems of attending classes and bringing together large numbers of geographically dispersed participants was also crucial to success. The mode of presentation of the interactive package, designed for individual and remote learning, was essential.

### **Cost-effectiveness**

This success requires investment of time in a preparatory phase. Normally, developing high quality programmes of this nature requires money, time and infrastructure (Lewis et al., 2005; Smith, 2007). For example, in this study a considerable amount of time was devoted to researching the content and relevant evidence base, creating the multimedia content, developing interactive games, recording high quality videos with experts in pain management and generally integrating the package. This is normally a collaborative effort. Additional funding was obtained from the Saudi Government to purchase necessary materials, obtain copyright permission for use of other materials, and to pay a programmer to undertake the final production of the package on DVD. Despite this, the costs were minimal compared to those associated with commercially available products, the latter not being tailored to the particular needs of the specific population. Achievement of the aims was possible in a cost-effective manner, particularly if the costs of undertaking the same educational effort in face-to-face classes with the number of nurses involved is considered. In a way, the project has provided proof of concept for the initiative. The Saudi Ministry of Health has expressed a desire to improve the product to a higher level of professional presentation and corporate identity before application across the country. This will contribute to a standardized level of competence and practice in the field of postoperative pain management for children.

The disappointing result from this study was the failure to change perceptions through the education programme, and while some suggestions have been made earlier, further evaluation is required to understand why this was the case. For now, a number of solutions might be

considered. First, the education programme may need to be supplemented by clinical sessions supervised by trained nurses in each hospital in order to help nurses to apply their learning to practice. The second issue is to provide nurses in wards with proper equipment and documents to use as they have seen while undertaking the online education package so that they can practice what they have learned. Another strategy is to provide clinical supervision for nurses in practice to support transference of learning into practice. These measures could help to freeze the new perceptions so that nurses will not regress to previous practices. Clearly, this requires a change in professional outlook towards the issue in the professional as a whole, and this is a major task.



## CHAPTER EIGHT

### CONCLUSION AND RECOMMENDATIONS

#### SUMMARY OF THE STUDY

The aim of this study was to test the impact of implementing an interactive online post-operative pain management education programme for enhancing children's nurses' knowledge, attitudes, beliefs and perceptions of children's pain, their self-efficacy, and perceptions of barriers to optimal practice.

The study findings support the notion that an interactive online post-operative pain management education programme will support and equip nurses with necessary skills and knowledge to manage children's pain post-operatively in a Saudi Arabian context. The study found a significant improvement in the knowledge and attitudes of nurses towards children's pain, a reduction in the perceived barriers to optimal pain management, and improved self-efficacy. There was improvement regarding nurse's beliefs about children pain, but no improvement was found in nurses' perceptions about children's pain.

#### KEY MESSAGES

##### 1) USE OF AN ONLINE INTERACTIVE EDUCATION PROGRAMME

**This is the first study conducted in Saudi Arabia into post-operative pain-management, and one of few studies in the field internationally using an interactive or online education programme.** Designing and implementing this successfully was a major achievement, and establishing the feasibility and effectiveness of this approach in Saudi Arabia indicates its **usefulness throughout the Gulf region.**

##### 2) COST-EFFECTIVENESS AND WIDESPREAD POPULATIONS

**The time and effort involved in producing the package was substantial,** and while funding was provided by the Saudi authorities, the whole package was designed and **produced by a single researcher far more cheaply than commercially available packages.** The latter are not tailored to the particular clinical problem or the needs of the specific population. Upgrading the package to a professional level of production by the Ministry of Health will enable its implementation throughout Saudi Arabia. **This should encourage others to emulate the initiative in further areas of clinical need.**

### **3) MULTIPLE VARIABLES IN A PAIN-MANAGEMENT EDUCATION PROGRAMME**

**This is the first study in the world to address the six study variables of knowledge, attitude, perception, beliefs, self-efficacy and perceived barriers in a single study.** Maintaining this level of complexity of the topic was vital to ensuring a comprehensive intervention and testing regime. Understanding something of the relationship between these variables has contributed to the evidence base on pain-management by children's nurses.

### **4) SELF-EFFICACY IN PAIN-MANAGEMENT**

**This is the first study to discover how self-efficacy regarding post-operative pain management for children is affected by educational intervention.** Self-efficacy is itself reliant on some of the other study variables. While claims in this regard must be tentative from this study, insights into these complex relationships have been offered to be pursued in further research.

## **IMPLICATIONS FOR FURTHER RESEARCH**

### **Replication of the study**

As a doctoral endeavour, this study was limited in resources and expertise. Replication of this study using the same educational material and methods but recruiting more nurses from all regions in Saudi Arabia is indicated to test the validity and increase the generalizability of the findings. While there is no evidence of nursing practices varying substantially between regions, there are cultural differences geographically so wider testing is advisable. In the absence of previous studies on which to base the assumptions, no power calculation was possible. A retrospective power calculation was considered to assist in further studies, but statistical advice rejected this because of the multiple variables.

### **Establishing the impact on children's quality of life**

This study was, of necessity, limited to testing the impact of the programme on children's nurses. The obvious next step is to test the impact on children as patients and consumers of the nursing practice that this study was expected to change. Effectively, this study was focused on the process of improving nurses' pain management practices, but the outcome that needs to be measured for the ultimate effect is the impact on patients.

### **Establishing further nursing research priorities**

There are many more clinical issues that require a better evidence-base in Saudi Arabia. Consultation to establish a list of topics identified by nurses for further research is needed. The commitment shown by nurses and their managers in this study suggests that this could be achieved through mass surveys of practitioners and then refined through Delphi surveys with key stakeholders from the MOH, nursing service managers and educators to establish a list of priority topics. Unfortunately, service-user consultation is not common in Saudi Arabia, but this should also be considered. This shortlist could then be pursued in a series of joint research and practice-development initiatives.

### **Establishing best evidence-based practice in technology-based learning**

There is little research evidence on the best ways to develop, produce and present e-learning. The rapid pace of development can be overwhelming, but the increasing availability of free apps offers huge potential for embracing alternative means of teaching and learning and facilitating remote access to learning in preferred modes by nurses. Research is needed to experiment with new technologies and to test the efficacy of varied strategies to delivering learning materials in novel ways.

## **IMPLICATIONS FOR NURSE EDUCATION**

### **Improving technical competence**

The potential for educational programmes such as this one can only be exploited if academics are competent to produce them and clinicians are competent to access them. Further work is needed to enthuse and familiarise academics with new learning technologies in order to produce user-friendly, effective packages. Similarly, an initiative is needed to encourage and enable nurses to develop further technological prowess so that they can take advantage of a wider range of educational materials. Motivation seems not to be a problem, and the use of mobile devices is almost universal.

### **Provision of IT support**

One of the factors that discourages uptake of new technological solutions by academics and practitioners is the lack of technical support when problems occur. In this study, the researcher offered this support, but it was fortunate that the few issues that arose were simple to rectify. Serious consideration is needed of the provision of formal technical support for

teachers and learners, including beyond normal working hours since learning may well be undertaken after work and during these periods.

### **Addressing poor knowledge of pain management and communication skills**

The poor level of knowledge shown at pre-test in this study together with concerns about inadequate communication skills expressed by nurses indicates the urgent need to redress such deficits through education both before and after registration. This is an issue to be taken up by nurse teachers and those responsible for curriculum development. This study has shown that these issues can be addressed successfully (even remotely), but that follow-up of the learning is needed. Returning to the topic at later points in the curriculum is required to reinforce the knowledge that was gained.

### **Education-clinical liaison**

Part of the solution to loss of knowledge is to reinforce the link between education and clinical practice so that new knowledge and altered attitudes are reinforced. The introduction of system of formal links between named lecturers and selected clinical areas would help to cement the relationship between universities and hospitals, providing support to students and also to staff in clinical practice for continuing professional education. Enhancing qualified nurses' knowledge and attitudes is beneficial to both patients and students.

## **POLICY IMPLICATIONS**

### **Addressing nursing culture**

The existing, sometimes reactionary, culture in hospital wards in Saudi Arabia was identified as one of the reasons for failure of change in perceptions of children's pain. Although new knowledge and understanding were gained, perceptions remained unchanged. Addressing the prevailing culture of nursing is a matter for national policy. Culture change is a complex and time-consuming activity and is likely to meet with significant passive resistance. However, a national drive to enhance the professional status and culture within nursing in Saudi Arabia is essential. The institution of the MOH Portal, CPD structures and accreditation, and policy-creation programme as discussed in the previous chapter should be part of this. Within a medically-dominated health care system, it is vital for nurses to be clear of their identity, the role of nursing, and the need for continual updating of skills and knowledge.

### **Family-centred care**

Nurses' preference for their own opinion about patients' clinical need, regardless of patients' or families' perspectives was found in this study. While family-centred care has been criticised for taking the focus away from the child as a patient, in general its adoption would be a major improvement in Saudi nursing. There is a wealth of literature on the topic, but a version of this which is culturally adapted would be of use across the Gulf region. A working party to investigate this would be ideal.

### **Pain management teams**

In many countries, pain management specialists or teams develop policy, educate staff, provide specialist advice, and monitor practice. This was found repeatedly while researching material for the education programme that was the intervention in this study. The lack of such entities restricts the ability to push the intervention through into the practice arena. The institution of such teams or specialists in Saudi hospitals would be a good idea. Such a team might also address children's expectations of pain management during pre-operative visits, starting the process of familiarity with pain intensity scales, and helping parents to understand how to communicate their perceptions of their child's pain. The provision of local "champions" to promote the development of practices and sustenance of change is a common strategy used in change management and might be suitable in Saudi hospitals.

## **CONCLUSION**

Within the limitations expressed, this study was successful in developing a novel intervention through which to improve nurses' knowledge, attitudes and beliefs about children's pain, and their self-efficacy, and to reduce their perceptions of barriers to optimal pain management practice. This was the first study to investigate postoperative pain management in Saudi Arabia, and to address all six variables in a single study. It was one of the first studies in the world to produce and employ an interactive education programme to do this – a novel approach in Saudi Arabia and the region. This approach offers the promise of a means to overcome the large distances between hospitals and the associated difficulty of bringing nurses together to attend an educational event. The study has added to the national and

international understanding of the topic, and provided the evidence to advice change in policy and practice in the country.

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# APPENDICES



### Appendix 1: Results of Search strategies

CINAHL			
Search ID	Search terms	Results	Notes
S1	MH “child+”	296959	
S2	MH “Adolescence+”	204377	
S3	Paediatric*	8309	
S4	Pediatric	65296	
S5	Post surgery	1202	
S6	Post-surgery	478	
S7	Postoperative	50191	
S8	Post-operative	0	
S9	Post operative	2562	
S10	TI pain	49992	
S11	Self-efficacy	11483	
S12	Self efficacy	11785	
S13	S11 or S12	11785	
S14	Knowledge	92476	
S15	Attitude*	152243	
S16	Belief*	24835	
S17	Perception*	61514	
S18	Barrier*	31436	
S19	S1 or S2 or S3 or S4	429520	
S20	S5 or S6 or S7 or S8 or S9	52011	
S21	S10 and S19 and S20	785	
S22	S21 and S14	43	2 – thesis 3 – in different language 9 – I was unable to have a full text 30- exist in full text
S23	S21 and S15	75	52 - exists in full text 2 - thesis 3- in different language 16 - I was unable to have a full text
S24	S21 and S16	13	8 - full text
S25	S21 and S13	zero	
S26	S21 and 17	59	40 - full text 5- different language 4- thesis 10- I was unable to have full text
S27	S21 and S18	7	4- full text 1- Thesis 1- different language 1- unable to have full text

## The Cochrane Library

Search ID	Search terms	Results
#1	Pain:ti,ab,kw (Word variations have been searched)	68102
#2	child or children:ti,ab,kw (Word variations have been searched)	72412
#3	Adolescent*:ti,ab,kw (Word variations have been searched)	89910
#4	teen or "teen ager*":ti,ab,kw (Word variations have been searched)	389
#5	Paediatric* or Pediatric*:ti,ab,kw (Word variations have been searched)	12358
#6	#2 or #3 or #4 or #5	136335
#7	"Post surgery" or Post-surgery or Postoperative or Post-operative or "Post operative":ti,ab,kw (Word variations have been searched)	56057
#8	#1 and #6 and #7	3991
#9	Self-efficacy or "Self efficacy":ti,ab,kw (Word variations have been searched)	3247
#10	Knowledge:ti,ab,kw (Word variations have been searched)	12843
#11	Attitude*:ti,ab,kw (Word variations have been searched)	12422
#12	Belief*:ti,ab,kw (Word variations have been searched)	2628
#13	Perception*:ti,ab,kw (Word variations have been searched)	13226
#14	Barrier*:ti,ab,kw (Word variations have been searched)	4742
#15	#8 and #9	1
#16	#8 and #10	19
#17	#8 and #11	18
#18	#8 and #12	6
#19	#8 and #13	55
#20	#8 and #14	14

## MEDLINE

Search ID	Search terms	Results	Notes
S1	MH "child+"	1,528,966	
S2	MH "Adolescence+"	373	
S3	Paediatric*	88227	
S4	Pediatric	261861	
S5	Post surgery	11609	
S6	Post-surgery	4826	
S7	Postoperative	583165	
S8	Post-operative	38443	
S9	Post operative	38906	
S10	TI pain	126651	
S11	Self-efficacy	19,737	
S12	Self efficacy	21,039	
S13	S11 or S12	21,039	
S14	Knowledge	458,171	
S15	Attitude*	309,894	
S16	Belief*	52,919	
S17	Perception*	298,702	
S18	Barrier*	181,706	
S19	S1 or S2 or S3 or S4	1,673,746	
S20	S5 or S6 or S7 or S8 or S9	612,979	
S21	S10 and S19 and S20	1,313	
S22	S21 and S14	80	
S23	S21 and S15	72	
S24	S21 and S16	14	
S25	S21 and S13	1	
S26	S21 and 17	61	
S27	S21 and S18	11	

## Google Scholar

Articles related to " <a href="#"><u>Nurses' knowledge, attitudes, and practices: regarding children's pain</u></a> "	<b>101</b>	
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**Appendix 2: Total number of articles extracted from all databases**

	<b>Data-base name</b>	<b>Total Number of articles</b>
	<b>CINHAL</b>	<b>129</b>
	<b>Cochrane</b>	<b>122</b>
	<b>MedLine</b>	<b>188</b>
	<b>Ovid</b>	<b>zero</b>
	<b>Proquest</b>	<b>32</b>
	<b>Google Scholar</b>	<b>28</b>
	<b>Total</b>	<b>499</b>
	<b>Total number of duplicated articles</b>	<b>230</b>
	<b>Total Number of articles post duplicated articles removal</b>	<b>269</b>
	<b>Total Number of articles post 1999</b>	<b>29</b>
	<b>Total Number of articles post 1999 removal</b>	<b>240</b>
	<b>Total number of articles post reviewing titles and abstract of articles and excluding any qualitative and mixed method studies and review articles</b>	<b>215</b>
	<b>Net number of articles</b>	<b>25</b>

### Appendix 3: Hawker's Assessment Tool

Author & title:					
Date:	Score				
	4 Good	3 Fair	2 Poor	1 Very Poor	Comments
1. Abstract and title					
2. Introduction and aims					
3. Method and data					
4. Sampling					
5. Data analysis					
6. Ethics and bias					
7. Findings/results					
8. Transferability/generalizability					
9. Implications and usefulness					
Total score					

#### 1. Abstract and title: Did they provide a clear description of the study?

**Good**            Structured abstract with full information and clear title.

**Fair**             Abstract with most of the information.

**Poor**             Inadequate abstract.

**VeryPoor**      No abstract.

#### 2. Introduction and aims: Was there a good background and clear statement of the aims of the research?

**Good**            Full but concise background to discussion/study containing up-to-date literature review and highlighting gaps in knowledge.

Clear statement of aim AND objectives including research questions.

**Fair**             Some background and literature review.

Research questions outlined.

**Poor**             Some background but no aim/objectives/questions, OR

Aims/objectives but inadequate background.

**VeryPoor**        No mention of aims/objectives.

No background or literature review.

#### 3. Method and data: Is the method appropriate and clearly explained?

**Good**            Method is appropriate and described clearly (e.g., questionnaires

	included).
	Clear details of the data collection and recording.
<b>Fair</b>	Method appropriate, description could be better. Data described.
<b>Poor</b>	Questionable whether method is appropriate. Method described inadequately. Little description of data.
<b>Very Poor</b>	No mention of method, AND/OR Method inappropriate, AND/OR No details of data.

**4. Sampling: Was the sampling strategy appropriate to address the aims?**

<b>Good</b>	Details (age/gender/race/context) of who was studied and how they were recruited. Why this group was targeted. The sample size was justified for the study. Response rates shown and explained.
<b>Fair</b>	Sample size justified. Most information given, but some missing.
<b>Poor</b>	Sampling mentioned but few descriptive details.
<b>VeryPoor</b>	No details of sample.

**5. Data analysis: Was the description of the data analysis sufficiently rigorous?**

<b>Good</b>	Clear description of how analysis was done. Qualitative studies: Description of how themes derived/ respondent validation or triangulation. Quantitative studies: Reasons for tests selected hypothesis driven/ numbers add up/statistical significance discussed.
<b>Fair</b>	Qualitative: Descriptive discussion of analysis. Quantitative.
<b>Poor</b>	Minimal details about analysis.
<b>VeryPoor</b>	No discussion of analysis.

**6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?**

<b>GoodEthics</b>	Where necessary issues of confidentiality, sensitivity, and
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consent were addressed.

Bias: Researcher was reflexive and/or aware of own bias.

**Fair** Lip service was paid to above (i.e., these issues were acknowledged).

**Poor** Brief mention of issues.

**VeryPoor** No mention of issues.

**7. Results: Is there a clear statement of the findings?**

**Good** Findings explicit, easy to understand, and in logical progression.

Tables, if present, are explained in text.

Results relate directly to aims.

Sufficient data are presented to support findings.

**Fair** Findings mentioned but more explanation could be given.

Data presented relate directly to results.

**Poor** Findings presented haphazardly, not explained, and do not progress logically from results.

**VeryPoor** Findings not mentioned or do not relate to aims.

**8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?**

**Good** Context and setting of the study is described sufficiently to allow comparison with other contexts and settings, **PLUS** high score in Question 4 (sampling).

**Fair** Some context and setting described, but more needed to replicate or compare the study with others, **PLUS** fair score or higher in Question 4.

**Poor** Minimal description of context/setting.

**Very Poor** No description of context/setting.

**9. Implications and usefulness: How important are these findings to policy and practice?**

**Good** Contributes something new and/or different in terms of understanding/insight or perspective.

Suggests ideas for further research.

Suggests implications for policy and/or practice.

**Fair** Two of the above (state what is missing in comments).

**Poor** Only one of the above.

**Very Poor** None of the above

#### Appendix 4: Examples of appraising articles using Hawker's Assessment Tool

<b>Author &amp; title:</b> Johnston, C. C., Gagnon, A., Rennick, J., Rosmus, C., Patenaude, H., Ellis, J., . . . Byron, J. (2007). One-on-one coaching to improve pain assessment and management practices of pediatric nurses. <i>Journal of pediatric nursing</i> , 22(6), 467-478.					
Date:	Score				
	4 Good	3 Fair	2 Poor	1 Very Poor	Comments
1. Abstract and title		3			
2. Introduction and aims		3			
3. Method and data	4				
4. Sampling	4				
5. Data analysis	4				
6. Ethics and bias	4				
7. Findings/results	4				
8. Transferability/generalizability		3			
9. Implications and usefulness	4				
Total score	33				

<b>Author &amp; title:</b> He, H.-G., Vehviläinen-Julkunen, K., Pietilä, A.-M., & Pölkki, T. (2008). Increasing nurses' knowledge and behavior changes in nonpharmacological pain management for children in China. <i>Journal of nursing care quality</i> , 23(2), 170-176.					
Date:	Score				
	4 Good	3 Fair	2 Poor	1 Very Poor	Comments
1. Abstract and title		3			
2. Introduction and aims	4				
3. Method and data		3			
4. Sampling		3			
5. Data analysis	4				
6. Ethics and bias				1	
7. Findings/results		3			
8. Transferability/generalizability		3			
9. Implications and usefulness			2		
Total score	26				
<b>Author &amp; title:</b> Vincent, C. V. H., Wilkie, D. J., & Wang, E. (2010). Pediatric nurses' beliefs and pain management practices: An intervention pilot. <i>Western journal of nursing research</i> , 0193945910391681.					
Date:	Score				
	4 Good	3 Fair	2 Poor	1 Very Poor	Comments
1. Abstract and title		3			
2. Introduction and aims	4				



3. Method and data	4				
4. Sampling	4				
5. Data analysis	4				
6. Ethics and bias	4				
7. Findings/results	4				
8. Transferability/generalizability	4				
9. Implications and usefulness		3			
Total score	34				

**Author & title:** Swain, M. R. (2008). *The Effect of Education About Pain Management on the Knowledge and Attitudes of Nurses*. (Master of Science in Nursing), California State University, Long Beach.

Date:	Score				Comments
	4 Good	3 Fair	2 Poor	1 Very Poor	
1. Abstract and title		3			
2. Introduction and aims	4				
3. Method and data	4				
4. Sampling	4				
5. Data analysis	4				
6. Ethics and bias	4				
7. Findings/results	4				
8. Transferability/generalizability	4				
9. Implications and usefulness	4				
Total score	35				

**Author & title:** Textor, L. H. (2003). *Pain Management Knowledge of Nurses Practicing In A Rural Midwest Retirement Community*. (Master's of Science), University of Missouri-Columbia, ProQuest.

Date:	Score				Comments
	4 Good	3 Fair	2 Poor	1 Very Poor	
1. Abstract and title	4				
2. Introduction and aims	4				
3. Method and data	4				
4. Sampling	4				
5. Data analysis	4				
6. Ethics and bias	4				
7. Findings/results	4				
8. Transferability/generalizability	4				
9. Implications and usefulness	4				

Total score	36	
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<b>Author &amp; title:</b> Dowd, J. (2009). <i>Impact of an Educational Program on Pediatric Nurses' Knowledge and Attitudes About Pain Management</i> . (Master of Science in Nursing), Northern Kentucky University, Kentucky.					
Date:	Score				
	4 Good	3 Fair	2 Poor	1 Very Poor	Comments
1. Abstract and title			2		
2. Introduction and aims	4				
3. Method and data	4				
4. Sampling	4				
5. Data analysis	4				
6. Ethics and bias	4				
7. Findings/results	4				
8. Transferability/generalizability	4				
9. Implications and usefulness	4				
Total score	34				


## Appendix 5: Certificates of participants



## Appendix 6: Pain Assessment Card



وزارة الصحة  
Ministry of Health




University of  
**Salford**  
MANCHESTER

### Post - Operative Pain Management Research

Which Face shows how much pain you have now!


Wong-Baker FACES® Pain Rating Scale  
( Age 3 and Upwards )



**10**

وجه (١٠)  
أسوأ ألم ممكن.


Hurts Worst



**8**

وجه (٨)  
يؤلم كثيراً جداً.


Hurts Whole Lot



**6**

وجه (٦)  
يؤلم كثيراً.


Hurts Even More



**4**

وجه (٤)  
يؤلم أكثر بقليل.


Hurts Little More



**2**

وجه (٢)  
يؤلم قليلاً.

Hurts Little Bit




**0**

وجه (٠)  
لا يؤلم على الإطلاق.


No Hurt

أي وجه تراه يعبر عن ألمك الآن ؟

Ref: Wong and Baker 1988 - 1996



وزارة الصحة  
Ministry of Health



University of  
**Salford**  
MANCHESTER

### NEONATAL PAIN SCALE

#### CRIES

Each indicator is rated on a 3- point scale (0 , 1 , 2) that result in a total score ranging from 0 to 10

Any score above 4 indicates pain and infant should receive pain management intervention

	0	1	2
Crying	No	High Pitched	Inconsolable
Requires O <sub>2</sub> for Sat >95	No	<30%	>30%
Increased vital signs	HR and BP + or < Preop values	HR or BP increased <20% of Preop values	HR or BP increased >20% of Preop values
Expression	None	Grimace	Grimace/Grunt
Sleepless	No	Wakes at frequent intervals	Constantly awake

CRIES Interpretation Ref:Krechet and Bildner , 1995

0 - 3 = No pain	4 - 6 = Moderate pain	7 - 10 = Severe pain
-----------------	-----------------------	----------------------

**PREMATURE INFANT PAIN PROFILE**

Process	Indicator	0	1	2	3	Total Score
Chart	Gestational Age	36 weeks or more	32-35 weeks, 6 days	28-31 weeks, 6 days	Less than 28 weeks	
Observe infant for 15 seconds	Behavioural State	Active, awake, eyes open, facial movement	Quiet awake, eyes open, no facial movements	Active sleep, eyes closed, facial movements	Quiet sleep, eyes closed, no facial movements	
Observe baseline heart rate & oxygen saturations for 30 seconds	Heart Rate Maximum	0 - beats per minute increase	5 - 15 beats per minute increase	15 - 24 beats per minute increase	25 beats per minute increase	
	Oxygen saturation minimum	92-100 %	89-91 %	88-85 %	< 85 %	
Observe infant's facial actions for 30 seconds	Brow Bulge	None	Minimum	Moderate	Maximum	
	Eye Squeeze	None	Minimum	Moderate	Maximum	
	Naso-labial furrow	None	Minimum	Moderate	Maximum	

**PAIN SCORE FLOW CHART**

Score 0 - 6 \ No Action

Score 7-12 \ Non pharmacological Intervention Eg positioning, Containment, Swaddling, Non-nutritive sucking

REASSESS IN 30 MINUTES for effectiveness of intervention

Score > 12 \ Pharmacological Intervention Eg. Narcotics

REASSESS IN 15-30 MINUTES for effectiveness of intervention

Ref:Stevens et al, 1996

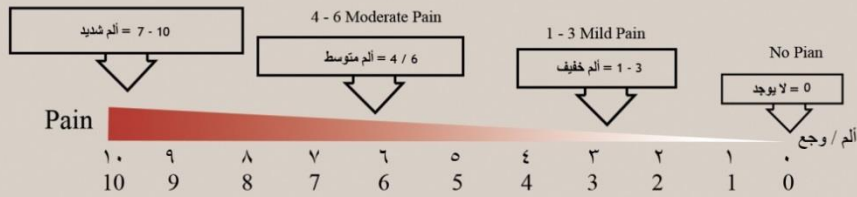
**COMMUNICATIVE PAIN SCALE**

**مقياس شدة الألم**

فضلاً : حددوا درجة شعوركم ( الآن ) بالألم :

Please determine the score that describes your pain at this moment

7 - 10 Severe Pain



**FLACC PAIN SCALE**

FLACC Scale <sup>7</sup>	0	1	2
<b>1 Face</b>	No particular expression or smile.	Occasional grimace or frown, withdrawn, disinterested.	Frequent to constant frown, clenched jaw, quivering chin.
<b>2 Legs</b>	Normal position or relaxed.	Uneasy, restless, tense.	Kicking, or legs drawn up.
<b>3 Activity</b>	Lying quietly, normal position, moves easily.	Squirming, shifting back and forth, tense.	Arched, rigid or jerking.
<b>4 Cry</b>	No crying (awake or asleep).	Moans or whimpers; occasional complaint.	Crying steadily, screams or sobs, frequent complaints.
<b>5 Consolability</b>	Content, relaxed.	Reassured by occasional touching, hugging or being talked to, distractible.	Difficult to console or comfort.

**Interpreting the Behavioral Score**

Each category is scored on the 0-2 scale, which results in a total score of 0-10.

0 = Relaxed and comfortable

4-6 = Moderate pain

1-3 = Mild discomfort

7-10 = Severe discomfort or pain or both

Ref: Merkel et al, 1997

**NON-COMMUNICATIVE PAIN SCALE**

Each of the five categories are scored from 0 - 2, which gives a total score between 0 - 10. Document total score by adding numbers from each of the 5 categories. score of 0 - 2 indicate no pain, 3 - 6 moderate pain, 7 - 10 severe pain

Categories	0	1	2
Face	No particular expression or smile	Occasional grimace, tearing, frowning, wrinkled forehead	Frequent grimace, tearing, frowning, wrinkled forehead
Activity (movement)	Lying quietly, normal position	Seeking attention through movement or slow, cautious movement	Restless, excessive activity and/or withdrawal reflexes
Guarding	Lying quietly, no positioning of hands over areas of body	Splinting areas of the body, tense	Rigid, stiff
Physiology (vital signs)	Stable vital signs	Change in any of the following: * SBP >20 mm Hg * HR >20/min	Change in any of the following: * SBP >30 mm Hg * HR >25/min
Respiratory	Baseline RR/SpO <sub>2</sub> Compliant with ventilator	RR >10 above baseline, or 5% ↓ SpO <sub>2</sub> mild asynchrony with ventilator	RR >20 above baseline, or 10% ↓ SpO <sub>2</sub> severe asynchrony with ventilator

Ref: Wegman, 2005

## **Appendix 7: Instruction on how to use the learning package (CD)**

Insert the CD to your computer

Recommended to use Firefox

Open it

Open the “Pro” folder.

Look for a page called “start” and double click on it.

A new main page will open

At the end of the page click on the “continue”

Computer will ask you to insert your username and password

Username will be your name and password will be the word “nahar”.

As soon as you enter the information, a popup window will appear. This window includes the main instructions and recommended software to run this education programme. Please read them carefully and ensure that you download them to your machine.

Press on the “next” and outline page will appear you can navigate and choose lessons that suit you.

In case the above instruction does not work, please do the following

Create a new folder in your desktop.

Copy the file called “Pro.zip” to your computer in new folder.

Extract the file.

Continue from step 4 above

If you face any technical problems in running this CD, do not hesitate to contact me on 0599994485 or email me [n.m.alreshidi2@edu.salford.ac.uk](mailto:n.m.alreshidi2@edu.salford.ac.uk)

Best wishes and good luck

**Appendix 8: A copy of communication between the researcher and companies to solve copy rights issues.**

PERMISSION QUOTE

Date: 25th FEBRUARY 2015

Contract No: 100593

Requested Content:

Managing Pain in Children - A Clinical Guide / Twycross / 9781405168946

pages 17-28 (12 pages)

Thank you for your request.

Permission will be granted subject to the usual acknowledgements and a fee of GBP 390.00 plus any applicable VAT.

If you accept this fee and wish to proceed, please let me know by return e-mail quoting the contract number above. I will then arrange for the permission contract and the corresponding invoice to be sent to you. With your acceptance of this quote, you must also provide the address of the company in whose behalf you are making this request.

The permission contract will provide full details of the request and outline the terms given. Full payment details will also be provided with the invoice.

This quote is only valid for 90 days from the date of this letter. If we have not heard from you by this time, your request will be discarded and you will need to re-apply for permission.

Please note that we do not supply any material. Journal articles can be purchased from our Website: <http://onlinelibrary.wiley.com>.

I look forward to hearing from you shortly

Best wishes,

Duncan James

Associate Permissions Manager



Dear Nahar,

Thank you for your acceptance of this quote.

Please find the previous correspondence for this request attached, along with the documents for contract 8350450.

Please read through the invoice and contract carefully and let me know if you have any questions.

Please note that should you be required to withhold tax from the payment that you make to us we will need you to confirm in writing on your official stationery the invoice number, invoice amount, percentage applied and amount withheld at the time that you make payment of this invoice.

Should you require withholding tax documentation from us or a certificate of our residency status in order to reduce or negate the need to withhold tax, please contact me by return.

Kind Regards

Brian Collins

Permissions Assistant

Wiley

The Atrium, Southern Gate

Chichester PO19 8SQ

UK

[www.wiley.com](http://www.wiley.com)

PERMISSION QUOTE

Date: 25th FEBRUARY 2015

Contract No: 100593

Requested Content:

Managing Pain in Children - A Clinical Guide / Twycross / 9781405168946

pages 17-28 (12 pages)

Thank you for your request.

Permission will be granted subject to the usual acknowledgements and a fee of GBP 390.00 plus any applicable VAT.

If you accept this fee and wish to proceed, please let me know by return e-mail quoting the contract number above. I will then arrange for the permission contract and the corresponding invoice to be sent to you. With your acceptance of this quote, you must also provide the address of the company in whose behalf you are making this request.

The permission contract will provide full details of the request and outline the terms given.

Full payment details will also be provided with the invoice.

This quote is only valid for 90 days from the date of this letter. If we have not heard from you by this time, your request will be discarded and you will need to re-apply for permission.

Please note that we do not supply any material. Journal articles can be purchased from our Website: <http://onlinelibrary.wiley.com>.

I look forward to hearing from you shortly

Best wishes,

Duncan James

Associate Permissions Manager

Dear Nahar,

Thank you for your enquiry. You have our permission to use the OUP Material you list in your email below in your phd at the University of Salford.

If at some future date your phd is published, it will be necessary to re-clear this permission.

Please also note that if the material to be used is acknowledged to any other source, you will need to clear permission with the rights holder.

Best wishes,

Ben Kennedy  
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Academic Rights & Journals  
Permissions  
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Great Clarendon Street  
Oxford  
OX2 6DP  
Direct tel. +44 (0)1865 354728  
Direct fax +44 (0)1865 353429  
e mail: ben.kennedy@oup.com

## Appendix 9: Feedback on the education programme



Sulaymi County Hospital  
Hail, Kingdom of Saudi Arabia  
Continuing Nursing Education

From: Michelle L. Madrazo

CNE Supervisor

Sulaymi Hospital

October 20, 2015

To: Mr. Nahar AlReshidi BSN,MSN

PhD candidate

University of Salford, Manchester

RE: Appreciation of your kind support

In behalf of my nursing colleagues who have participated on the recent research you have conducted on "The Post-operative Pain Management in Children, it's my pleasure and honour to esteem you highly for the support and allowing us to further enhance our skills for the efficiency in delivering quality nursing care to our patients. With these, we have received outstanding knowledge and it appeared that in general, nurses had a positive view on it. I recognized your effort in handing us out useful Medias e.g. cards and a CD for references. You made us realized that we also have areas that require attention that provided us the opportunity to take a closer look on all aspects.

We appreciate your time and effort to create a positive change to develop strategies and build upon our reputation as competent nurses.

Sincerely Yours,

Michelle Madrazo

CNE Supervisor

Sulaymi County Hospital

الرقم:.....  
التاريخ:...../...../.....هـ ١٤  
المشروعات:.....



المملكة العربية السعودية  
وزارة الصحة  
المديرية العامة للشؤون الصحية بمنطقة حائل

Appreciation letter

To Mr. NaharAlReshidi

Thank you for your good efforts and hard work, the Pain Management DVDs was really useful and informative, supportive to the nursing staff dealing with pediatric patients. These DVDs was selected in professional way and it was beneficial for the staffs working with pediatric patients. These DVDs allow nurses to expand their knowledge in topic of pain management as it updates them with new information.

In general, I would like to stress that the contents itself are very useful and must be utilized in clinical practice and should be given to the nursing staffs in Saudi Arabia as I have seen it very useful . One good virtue of this DVD is that it can be used any time by nurses, and they can recall information from it at any time.

Wish you very successful in your PhD study, and thanks again for providing us with very useful and updates information.

Regards,

Director of Nursing  
Hatam Alsarour

حائل - المجمع الحكومي - سنترال: ٠٦/٥٢٢٦٦٠٠ - فاكس: ٠٦/٥٢٢٤٧٢٤



MAWQAQ GENERAL HOSPITAL  
HAIL, KINGDOM OF SAUDI ARABIA

November 2, 2015

Mr. Nahar Rashidi  
Researcher

Dear Sir Nahar,

I would like to take a moment to express our sincere appreciation for taking us your respondents in your research.

We, the Mawqaq General Hospital nurses are most impressed with the CD provided and the cards communicative pain scale, non-communicative pain scale, Wong-Baker faces, neonatal pain scale, flacc pain scale, and premature infant profile with additional educational background in pain management with regards to pediatric patients.

The CD content was very useful to all nurses as refreshment since long time some of them were not involved in adult care. The totality very informative and enlightening.

We, sincerely hope your future research paper will be successful and will be a great contribution to the nurses in taking care of pediatric patients.

Thanks and Kind Regards,

**MS. NERESA IBRAHIM LADJA R.N. M.A.N.**  
Professional Regulation Commission License Number 0321068  
Saudi Council for Health Specialist License Number 12HN0051120  
Nursing Directress  
Mawqaq General Hospital  
Hail, K.S.A.  
Tel# +966 16 5384511 / 5384513 Ext. 107  
Mobile # +966 50 547 0042  
E-mail: nerladja@yahoo.com

**Nurse 1:**

This CD about pain management is informative and beneficial, I was able to learn more about pain and its management. I can use this information in my daily care of my patients. It is of great help to me, and has added to my knowledge.

**Nurse 2:**

The CD on pain management used was instructive and helpful in answering questionnaire. When mistake in answering the questions, it has prompted then guided me what is the right answer.

I was able to understand more about managing pain. This tool can be used in my dealing with patients and even to myself or family when in pain.

**Nurse 3:**

I was able to open the CD and I did all the questioners:

It is beneficial

Knowledgeable

Updated with new information

Videos provided was useful

**Nurse 4:**

The pain management CD was at first not working but after following some procedures it was opened and was used to understand more about pain. This has helped me to be guided in answering the questionnaire as its contained useful and important information. I learn more about pain management.

## Appendix 10: Demographics



Research study: Post-operative pain management for children

### Demographic information

Please provide an answer to each question. Tick the box or write in the space.

- 
1. Age: \_\_\_\_\_ years
  2. Gender: Male  Female
  3. Nationality: Saudi  Non-Saudi (Please specify) \_\_\_\_\_
  4. Employment: Full time  Part time
  5. Years of nursing practice: \_\_\_\_\_
  6. Highest level of nursing education completed:
    - Diploma
    - Associate Degree
    - Baccalaureate in Nursing
    - Masters in Nursing
    - Doctorate in Nursing
    - Other (please describe) \_\_\_\_\_
  7. How many educational sessions on pain have you attended within the last year? \_\_\_\_\_
  8. Have you ever suffered from severe pain? Yes  No
  9. Has any member of your family suffered from severe pain? Yes  No
  10. Have you had any nursing education on pain management? Yes  No
  11. Have you attended any conferences on pain in the past year? Yes  No
  12. Have you participated as a respondent in any pain research? Yes  No



## Appendix 11: Paediatric Nurses' Knowledge and Attitudes Survey Regarding Pain (PNKAS)

True/False - Circle the correct answer.

- |   |   |     |   |
|---|---|-----|---|
| T | F | 1.  | Observable changes in vital signs must be relied upon to verify a child's/ adolescent's statement that he has severe pain.  |
| T | F | 2.  | Because of an underdeveloped neurological system, children under 2 years of age have decreased pain sensitivity and limited memory of painful experiences.  |
| T | F | 3.  | If the infant/ child/ adolescent can be distracted from his pain this usually means that he is not experiencing a high level of pain.   |
| T | F | 4.  | Infants/ children/ adolescents may sleep in spite of severe pain.   |
| T | F | 5.  | Comparable stimuli in different people produce the same intensity of pain.  |
| T | F | 6.  | Ibuprofen and other nonsteroidal anti-inflammatory agents are NOT effective analgesics for bone pain caused by metastases.  |
| T | F | 7.  | Non-drug interventions (e.g. heat, music, imagery, etc.) are very effective for mild-moderate pain control but are rarely helpful for more severe pain.   |
| T | F | 8.  | Children who will require repeated painful procedures (ie. daily blood draws), should receive maximum treatment for the pain and anxiety of the first procedure to minimize the development of anticipatory anxiety before subsequent procedures. |
| T | F | 9.  | Respiratory depression rarely occurs in children/ adolescents who have been receiving opioids over a period of months.  |
| T | F | 10. | Acetaminophen 650 mg PO is approximately equal in analgesic effect to codeine 32 mg PO.   |
| T | F | 11. | The World Health Organization (WHO) pain ladder suggests using single analgesic agents rather than combining classes of drugs (e.g. combining an opioid with a non-steroidal agent).  |
| T | F | 12. | The usual duration of analgesia of Morphine IV is 4-5 hours.  |
| T | F | 13. | Research shows that promethazine (Phenergan) is a reliable potentiator of opioid analgesics.  |

Code # \_\_\_\_\_

2 of 7

- |   |   |     |   |
|---|---|-----|---|
| T | F | 14. | Parents should not be present during painful procedures.  |
| T | F | 15. | Adolescents with a history of substance abuse should not be given opioids for pain because they are at high risk for repeated addiction.                        |
| T | F | 16. | Beyond a certain dosage of morphine increases in dosage will NOT provide increased pain relief.   |
| T | F | 17. | Young infants, less than 6 months of age, cannot tolerate opioids for pain relief.  |
| T | F | 18. | The child/ adolescent with pain should be encouraged to endure as much pain as possible before resorting to a pain relief measure.                              |
| T | F | 19. | Children less than 8 years cannot reliably report pain intensity and therefore, the nurse should rely on the parents' assessment of the child's pain intensity. |
| T | F | 20. | Based on one's religious beliefs a child/ adolescent may think that pain and suffering is necessary.  |
| T | F | 21. | Anxiolytics, sedatives, and barbituates are appropriate medications for the relief of pain during painful procedures.   |
| T | F | 22. | After the initial recommended dose of opioid analgesic, subsequent doses should be adjusted in accordance with the individual patient's response.               |
| T | F | 23. | The child/ adolescent should be advised to use non-drug techniques alone rather than concurrently with pain medications.  |
| T | F | 24. | Giving children/ adolescents sterile water by injection (placebo) is often a useful test to determine if the pain is real.                                      |
| T | F | 25. | In order to be effective, heat and cold should be applied directly to the painful area.   |

**Multiple Choice - Place a check by the correct answer.**

26. The recommended route of administration of opioid analgesics to children with prolonged cancer-related pain is

- a. intravenous
- b. intramuscular
- c. subcutaneous
- d. oral
- e. rectal
- f. I don't know

27. The recommended route of administration of opioid analgesics to children with brief, severe pain of sudden onset, e.g. trauma or postoperative pain, is

- a. intravenous
- b. intramuscular
- c. subcutaneous
- d. oral
- e. rectal
- f. I don't know

28. Which of the following analgesic medications is considered the drug of choice for the treatment of prolonged moderate to severe pain for children with cancer?

- a. Brompton's cocktail
- b. codeine
- c. morphine
- d. meperidine (Demerol)
- e. methadone
- f. I don't know

Which of the following IV doses of morphine administered would be equivalent to 15 mg of oral morphine.

- a. Morphine 3 mg IV
- b. Morphine 5 mg IV
- c. Morphine 10 mg IV
- d. Morphine 15 mg IV

30. Analgesics for post-operative pain should initially be given

- \_\_\_\_\_ a. around the clock on a fixed schedule
- \_\_\_\_\_ b. only when the child/ adolescent asks for the medication
- \_\_\_\_\_ c. only when the nurse determines that the child/ adolescent has moderate or greater discomfort

31. A child with chronic cancer pain has been receiving daily opioid analgesics for 2 months. The doses increased during this time period. Yesterday the child was receiving morphine 20 mg/hour intravenously. Today he has been receiving 25 mg/hour intravenously for 3 hours. The likelihood of the child developing clinically significant respiratory depression is

- \_\_\_\_\_ a. less than 1%
- \_\_\_\_\_ b. 1-10%
- \_\_\_\_\_ c. 11-20%
- \_\_\_\_\_ d. 21-40%
- \_\_\_\_\_ e. > 41%

32. Analgesia for chronic cancer pain should be given

- \_\_\_\_\_ a. around the clock on a fixed schedule
- \_\_\_\_\_ b. only when the child asks for the medication
- \_\_\_\_\_ c. only when the nurse determines that the child has moderate or greater discomfort

33. The most likely explanation for why a child/ adolescent with pain would request increased doses of pain medication is

- \_\_\_\_\_ a. The child/ adolescent is experiencing increased pain.
- \_\_\_\_\_ b. The child/ adolescent is experiencing increased anxiety or depression.
- \_\_\_\_\_ c. The child/ adolescent is requesting more staff attention.
- \_\_\_\_\_ d. The child's/ adolescent's requests are related to addiction.

34. Which of the following drugs are useful for treatment of cancer pain?

- \_\_\_\_\_ a. Ibuprophen (Motrin)
- \_\_\_\_\_ b. Hydromorphone (Dilaudid)
- \_\_\_\_\_ c. Amitriptyline (Elavil)
- \_\_\_\_\_ d. All of the above

35. The most accurate judge of the intensity of the child's/ adolescent's pain is

- a. the treating physician
- b. the child's/ adolescent's primary nurse
- c. the child/ adolescent
- d. the pharmacist
- e. the child's/ adolescent's parent

36. Which of the following describes the best approach for cultural considerations in caring for child/ adolescent in pain:

- a. Because of the diverse and mixed cultures in the United States, there are no longer cultural influences on the pain experience.
- b. Nurses should use knowledge that has defined clearly the influence of pain on culture (e.g. Asians are generally stoic, Hispanics are expressive and exaggerate their pain, etc.)
- c. Children/ adolescents should be individually assessed to determine cultural influences on pain.

37. What do you think is the percentage of patients who over report the amount of pain they have? Circle the correct answer.

0      10      20      30      40      50      60      70      80      90      100%

38. Narcotic/opioid addiction is defined as psychological dependence accompanied by overwhelming concern with obtaining and using narcotics for psychic effect, not for medical reasons. It may occur with or without the physiological changes of tolerance to analgesia and physical dependence (withdrawal).

Using this definition, how likely is it that opioid addiction will occur as a result of treating pain with opioid analgesics? Circle the number closest to what you consider the correct answer.

< 1%      5%      25%      50%      75%      100%

**Case Studies**

Two patient case studies are presented. For each patient you are asked to make decisions about pain and medication.

**Directions: Please select one answer for each question.**

39. Patient A: Andrew is 15 years old and this is his first day following abdominal surgery. As you enter his room, he smiles at you and continues talking and joking with his visitor. Your assessment reveals the following information: BP = 120/80; HR = 80; R = 18; on a scale of 0 to 10 (0 = no pain/discomfort, 10 = worst pain/discomfort), he rates his pain as 8.

A. On the patient's record you must mark his pain on the scale below. Circle the number that represents your assessment of Andrew's pain.

0	1	2	3	4	5	6	7	8	9	10
No pain/ discomfort								Worst		
pain/discomfort										

B. Your assessment, above, is made two hours after he received morphine 2 mg IV. After he received the morphine, his pain ratings every half hour ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2 as an acceptable level of pain relief. His physician's order for analgesia is "morphine IV 1-3 mg q1h PRN pain relief." Check the action you will take at this time:

- \_\_\_\_\_ 1) Administer no morphine at this time.
- \_\_\_\_\_ 2) Administer morphine 1 mg IV now.
- \_\_\_\_\_ 3) Administer morphine 2 mg IV now.
- \_\_\_\_\_ 4) Administer morphine 3 mg IV now.

40. Patient B: Robert is 15 years old and this is his first day following abdominal surgery. As you enter his room, he is lying quietly in bed and grimaces as he turns in bed. Your assessment reveals the following information: BP = 120/80; HR = 80; R = 18; on a scale of 0 to 10 (0 = no pain/discomfort, 10 = worst pain/discomfort) he rates his pain as 8.

A. On the patient's record you must mark his pain on the scale below. Circle the number that represents your assessment of Robert's pain:

0      1      2      3      4      5      6      7      8      9      10

---

No pain/ discomfort      Worst  
pain/discomfort

B. Your assessment, above, is made two hours after he received morphine 2 mg IV. After he received the morphine, his pain ratings every half hour ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2 as an acceptable level of pain relief. His physician's order for analgesia is "morphine IV 1-3 mg q1h PRN pain relief." Check the action you will take at this time:

- \_\_\_\_\_ 1) Administer no morphine at this time.
- \_\_\_\_\_ 2) Administer morphine 1 mg IV now.
- \_\_\_\_\_ 3) Administer morphine 2 mg IV now.
- \_\_\_\_\_ 4) Administer morphine 3 mg IV now.

**Appendix 12: Permission for using the Pediatric Nurses Knowledge and Attitude Survey Regarding Pain (PNKAS)**

Manworren, Renee  
To : nahar\_mohd mohd  
15 Jul 2014

Thank you for your recent request regarding the use of the Pediatric Nurses' Knowledge and Attitude Survey Regarding Pain. This e-mail serves as permission to use and duplicate the survey for clinical, educational, and research purposes. There is no fee, but I do ask that you forward results and statistical analysis to me so I can further refine the tool.

The Pediatric Nurses' Knowledge and Attitude Survey Regarding Pain (PNKAS) is a modification of Ferrell and McCaffrey's Nurses' Knowledge and Attitude Survey Regarding Pain (NKAS). The survey was modified for use with pediatric nurses. Following these modifications, five national content experts in pain management rated the relevance of the items to establish content validity. Test-retest reliability of the tool using data from 12 subjects was found to be  $r = 0.67$ , indicating acceptable level of stability. The Cronbach's alpha was 0.72 from the responses of 247 pediatric nurses working in a large children's hospital and 0.77 using the responses from 88 members of a pediatric nursing specialty organization, indicating an acceptable level of internal consistency. In addition to your request, permission for use of this tool has been granted in over a hundred organizations in the United States, as well as institutions in the United Kingdom, Ireland, Australia, South Africa, Canada, & New Zealand. The tool has also been translated by researchers in China, Taiwan, Israel, Qatar, Switzerland, Indonesia, Malaysia, Mongolia, Korea, Norway, Peru, Portugal, and Italy for use with healthcare professionals in these countries.

The tool was further modified for use at pediatric facilities that do not care for pediatric patients with cancer. This modification is labeled as the Shriner's version and is also attached for your use. Please do not hesitate to contact me at this e-mail address or my mail address and phone below so I can further assist in your efforts. We are in the process of moving the survey online, but anticipate it will not be available until early 2015. You will need to make some changes to the survey since you will be using it in the UK. I would greatly appreciate your sending your changes and method of validating the changes so we can add it to the online version for future researchers in the UK. If you do not anticipate using the tool until January of 2015 - we will be happy to work with you on the validation of the changes.

Renee  
Renee C.B. Manworren, PhD, APRN, BC, PCNS-BC, FAAN  
Nurse Scientist,  
Division of Pain and Palliative Care Medicine  
Connecticut Children's Medical Center  
282 Washington St.  
Hartford, CT 06106  
[RManworren@connecticutchildrens.org](mailto:RManworren@connecticutchildrens.org)



### Appendix 13: CHILDREN AND PAIN SURVEY

Pick a value from the scale below that best represents your response to each statement and write that value in the space provided.

1. Strongly Disagree
2. Moderately Disagree
3. Somewhat Disagree
4. Somewhat Agree
5. Moderately Agree
6. Strongly Agree

1. Paediatric nurses assess pain appropriate to the development level of the infant/child.
2. Paediatric nurses accurately assess the intensity of a child's pain.
3. Paediatric nurses adequately prepare children for painful procedures.
4. Paediatric nurses adequately prepare parents when their child is having a painful procedure.
5. Paediatric nurses use a consistent approach in assessing a child's pain.
6. Paediatric nurses document effectiveness of pain management.
7. Paediatric nurses choose a pain management tool according to a child's age and development.
8. In assessing pain in infants, crying is the only way to know if they're experiencing pain.
9. Because of their immature nervous system, children do not need analgesics as often as adults do.
10. Children become addicted to narcotics more easily than adults.
11. Most likely a child is pain-free if he/she is able to sleep after a painful experience.
12. Accurate documentation of pain assessment leads to more effective pain management.
13. Children differ widely in their response to painful procedures.
14. A child's perception of pain can be influenced by how a paediatric nurse approaches the child.
15. Pain assessment is the essential first step to alleviate pain in a child.
16. Paediatric nurses can make a difference in how children cope with painful events.
17. Paediatric nurses can have a powerful influence on the management of children in pain.

## **Appendix 14: Permission for using Children and Pain Survey**

From: Margolius, Francine  
To nahar\_mohd mohd  
15 Jul 2014

Dear Nahar, i did respond to you previously but not sure you received? You are very welcome to use the tool. I'd be delighted. Are you able to print it from the article since currently I am unable to access it. If not, I will look further. So excited you are interested in pain management. Such a crucial area of interest.

Dr. Francine R. Margolius  
Professor Emerita  
Medical University of South Carolina



## **Appendix 16: Permission for using Nurses Perceived Barriers to Optimal Pain Management**

From: Vincent, Catherine  
To nahar\_mohd mohd

Hello

Thank you for providing me with the additional information about where you were completing your doctoral study, always interesting to know.

Thank you for your inquiry.

I am sending you a copy of the barrier instrument that I used for the study. It is attached. Calculation of the ordered analgesics is described in the attached article.

The Oucher scale can be obtained at [www.oucher.org](http://www.oucher.org)

Good wishes with you dissertation!

If I can be of any further assistance to you, please do not hesitate to contact me.

Catherine Vincent, RN, PhD  
Associate Professor  
Department of Women, Children, and Family Health Science (MC 802)  
College of Nursing  
University of Illinois at Chicago  
845 South Damen Ave, Room 854  
Chicago IL 60612-7350  
(312) 355-3283  
(312) 996-8871 FAX  
[vincentc@uic.edu](mailto:vincentc@uic.edu)

### Appendix 17: Nurses' self-efficacy

Item	Very confident	Many confident	Fair confident	Little confident	Not at all
1. How confident are you that you could assess children's pain across developmental stages?					
2. How confident are you that you could choose appropriate pain assessment methods?					
3. How confident are you that you could use the paediatric pain assessment tool for your patients?					
4. How confident are you of your ability to give the correct pain controller to patients?					
5. How confident are you of your ability to provide non-pharmacological pain management to children?					
6. How confident are you of your ability to cooperate with the medical team to relieve children's pain?					

## Appendix 18: Permission for using Nurses Self-efficacy

**From:** Li-Chi Chiang <[lichichiang@gmail.com](mailto:lichichiang@gmail.com)>  
**Sent:** Thursday, February 26, 2015 10:54 AM  
**To:** Alreshidi, Nahar Mohammad (PG)  
**Subject:** Re: Fw: permission to use self-efficacy survey

Dear Mohammad:

I agree you to use self-efficacy for pediatric pain assessment and management in your study. Please sign the agreement letter and sent it back to me. The attached file is the questionnaire and the agreement letter.

Many thanks

### **蔣立琦**

國防醫學院護理學系教授  
台北市民權東路六段161號四樓  
台灣護理學會副理事長  
台灣實證護理學會常務理事  
台灣實證醫學會常務理事  
國際護理榮譽學會中華民國分會常務監事  
*Li-Chi Chiang*

Professor, School of Nursing  
National Defense Medical Center  
114 No.161, Sec. 6, Minquan E. Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)  
TEL : 886-2-87923100  
Cellphone:0921365899  
Email: [lichichiang@gmail.com](mailto:lichichiang@gmail.com)  
LINE: lichichiang  
[Google Scholar Linkage](#)  
Vice President of Taiwan Nurses Association (TWNA)  
Standing Director, Taiwan Evidence-Based Nursing Association (TEBNA)  
Standing Director, Taiwan Evidence-Based Medical Association (TEBMA)  
Supervising Director, Sigma Theta Tau International, Lambda Beta Chapter at Large (STTI)

## **Appendix 19: Letter to Ethics Committee at Saudi Hospitals (Hail Region)**

### **Re: permission to conduct research in Hospitals**

**Dear Sir,**

My name is Nahar AlReshidi. I am a PhD candidate at Salford University. The aim of my study is to compare the influence of “post-operative pain education program” with ordinary care on several health outcomes over a four -month period. The results of this study are expected to enhance nurses’ knowledge on area of post-operative pain management and results will participated on developing a new protocols and guidelines to children post-operative pain management. To achieve the aim of the study, data will be collected through structured questionnaires. The time fill of all questionnaires will be around 30 minute. Participants will be nurses who work with surgical units that have children at hospitals in Hail region.

I would like to inform you that, this study has been approved by Salford University Ethics Committee (Approval number HSCR14/118), a signed consent form will be collected from the participants prior they actively take part in the study. The researcher will explain to the participants the aim of the study. Information from the participants will be handled confidentially. No names will appear in any place in the study. Participants will be assured that the information they provide will be managed in a private and confidential way. After completing data collection, all data will be stored in a secure, locked cupboard and the researcher’s office computer protected by password. All data will be kept for a period of five years from the date of publication, following which the data will be destroyed. All data contained on the USB drive will be erased; files on the computer will be deleted. Furthermore, Questionnaires contained on paper material will be shredded. If there are any further questions regarding this study, could you contact me on +966599994485 or at n.m.alreshidi2@edu.salford.ac.uk, alternatively, you can contact my supervisors Professor Tony Long at t.long@salford.ac.uk. Or my co-supervisor Dr. Angela Darvill at a.darvill@salford.ac.uk. You may contact the Secretary of the Salford University Human Research Ethics Committee on +618 9266 2784. contact the Nursing Research Administrator Louise Brown at

nmswresearch@salford.ac.uk

Regards.

Nahar AlReshidi

## Appendix 20: PARTICIPANT INFORMATION SHEET



### **PARTICIPANT INFORMATION SHEET (Intervention Group) (Version 2, 18 January 2015)**

**The impact of an interactive educational programme on Saudi paediatric nurses' knowledge and attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal post-operative pain management in children.**

#### **Who are you?**

My name is Nahar AlReshidi and I am currently completing a research study for my PhD at the University of Salford.

#### **How do you know me?**

The Chief Nurse and the Head Nurse have provided me with your name and contact details. I have been given permission to contact you by the Ministry of Health.

#### **What is the purpose of the study?**

The aim of the study is to establish the impact of a post-operative pain management education programme for nurses caring for child patients.

#### **Why have I been asked to be involved?**

You have been asked because you are a nurse working with children in a surgical unit.

#### **Do I have to take part?**

No, you do not have to take part. Participation in this research is on a voluntary basis.

#### **What will happen to me if I take part?**

You will be provided with a DVD containing the pain management educational material at the beginning of the study. You will be invited to complete questionnaires at three set points: at the beginning of the study, one month later and three months later.

#### **What will happen to me if I do not take part?**

Nothing will happen to you. Participation in this research is entirely voluntary. This research is being done independently of the hospitals. If you decline to participate, your status in the hospital will not be affected in any way. If you agree to take part and then change your mind, you have the right to withdraw at any time without any negative consequences.

#### **What might be good about taking part?**

The results of this study are expected to enhance nurses' knowledge of post-operative pain management and therefore their ability to care for child patients even more effectively. The outcomes will also inform the development of new protocols and guidelines for paediatric post-operative pain management.



**Will anyone know who I am or what I have said?**

The information that you provide will be confidential. Your identity and personal contact details will be known only to the researcher. The researcher will not use your name or any information that could reveal your identity in this study or in any reports or publications. To guarantee confidentiality, all data will be stored in a secure, locked cupboard and computer protected by password at the researcher's office during the study and for a period of five years following the date of publication. After this, details of who participated will be destroyed securely, though the anonymised data itself will be retained in case we can learn more from it in future.

**Who has reviewed the acceptability of the study?**

This research has been reviewed and approved by your hospital and The University of Salford Research Ethics Committee (Approval number HSCR14/118).

**What if I'm not sure?**

Take your time. Talk to your colleague about it. If you want to, you can talk to me. My telephone number is here, but if you prefer you can email me. If you want to meet me, just let me know. If you want to participate please complete the questionnaire inside the envelope, seal it and return it to me via the Head Nurse.

**What if I want to make a complaint?**

You may do this in one of the following methods. Either you can do this via me as the principle investigator, or through my supervisor. My contact detail and my supervisor's contact details are provided at the end of this information sheet. As always, you can also speak to your Head Nurse.

**Contact Details**

If there are any further questions regarding this study, you can contact me on +966599994485 or at n.m.alreshidi2@edu.salford.ac.uk. Alternatively, you can contact my supervisor Professor Tony Long t.long@salford.ac.uk. You may contact the Secretary of the University of Salford Research Ethics Committee on +44161 92662784

Thank you for giving your valuable time in reading this letter.  
Regards.

Nahar AlReshidi  
PhD Candidate  
School of Nursing, Midwifery, Social Work & Social Sciences  
University of Salford

## Participants Information Sheet (Control Group)



### **PARTICIPANT INFORMATION SHEET (Control Group)** (Version 2, 18 January 2015)

**The impact of an interactive educational programme on paediatric nurses' knowledge and attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal post-operative pain management in children.**

#### **Who are you?**

My name is Nahar AlReshidi and I am currently completing a research study for my PhD at the University of Salford.

#### **How do you know me?**

The Chief Nurse and the Head Nurse have provided me with your name and contact details. I have been given permission to contact you by the Ministry of Health.

#### **What is the purpose of the study?**

The aim of the study is to establish the impact of a post-operative pain management education programme for nurses caring for child patients.

#### **Why have I been asked to be involved?**

You have been asked because you are a nurse working with children in a surgical unit.

#### **Do I have to take part?**

No, you do not have to take part. Participation in this research is on a voluntary basis.

#### **What will happen to me if I take part?**

You will be invited to complete questionnaires at three set points: at the beginning of the study, one month later and three months later. At the end of the study you will be provided with a DVD containing pain management educational material.

#### **What will happen to me if I do not take part?**

Nothing will happen to you. Participation in this research is entirely voluntary. This research is being done independently of the hospitals. If you decline to participate, your status in the hospital will not be affected in any way. If you agree to take part and then change your mind, you have the right to withdraw at any time without any negative consequences.

#### **What might be good about taking part?**

The results of this study are expected to enhance nurses' knowledge of post-operative pain management and therefore their ability to care for child patients even more effectively.

The outcomes will also inform the development of new protocols and guidelines for paediatric post-operative pain management.

**Will anyone know who I am or what I have said?**

The information that you provide will be confidential. Your identity and personal contact details will be known only to the researcher. The researcher will not use your name or any information that could reveal your identity in this study or in any reports or publications. To guarantee confidentiality, all data will be stored in a secure, locked cupboard and computer protected by password at the researcher's office during the study and for a period of five years following the date of publication. After this, details of who participated will be destroyed securely, though the anonymised data itself will be retained in case we can learn more from it in future.

**Who has reviewed the acceptability of the study?**

This research has been reviewed and approved by your hospital (Approval number 11) and The University of Salford Research Ethics Committee (Approval number 14/118).

**What if I'm not sure?**

Take your time. Talk to your colleague about it. If you want to, you can talk to me. My telephone number is here, but if you prefer you can email me. If you want to meet me, just let me know. If you want to participate please complete the questionnaire inside the envelope, seal it and return it to me via the Head Nurse.

**What if I want to make a complaint?**

You may do this in one of the following methods. Either you can do this via me as the principle investigator, or through my supervisor. My contact detail and my supervisor's contact details are provided at the end of this information sheet. As always, you can also speak to your Head Nurse.

**Contact Details**

If there are any further questions regarding this study, you can contact me on +966599994485 or at n.m.alreshidi2@edu.salford.ac.uk. Alternatively, you can contact my supervisor Professor Tony Long t.long@salford.ac.uk. You may contact the Secretary of the University of Salford Research Ethics Committee on +44161 92662784

Thank you for giving your valuable time in reading this letter.

Regards.

Nahar AlReshidi

PhD Candidate

School of Nursing, Midwifery, Social Work & Social Sciences

University of Salford

## Appendix 21: Flyer

University of  
**Salford**  
MANCHESTER

Learning Opportunity for Nurses

### The impact of an interactive educational programme on pain management

This new research study is designed to enhance nurses' knowledge of post-operative pain management for children. Each participating nurse will receive a free pain management educational package including video and interactive learning materials on a DVD. I would ask you to complete confidential questionnaires at the start, one month, and three month later.



If you would like to participate in this study contact me on **Mobile Phone**: +966 599994485, or  
Email: [n.m.alreshidi2@edu.salford.ac.uk](mailto:n.m.alreshidi2@edu.salford.ac.uk)

Thank you

**Nahar AlReshidi** PhD student, University of Salford

## Appendix 22: University of Salford Ethical Committee Approval



Research, Innovation and Academic  
Engagement Ethical Approval Panel

College of Health & Social Care  
AD 101 Allerton Building  
University of Salford  
M6 6PU

T +44(0)161 295 7016  
r.shuttleworth@salford.ac.uk

[www.salford.ac.uk/](http://www.salford.ac.uk/)

29 January 2015

Dear Nahar,

**RE: ETHICS APPLICATION HSCR14/118 – The impact of an interactive educational programme on Saudi paediatric nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self-efficacy, and experiences of barriers to optimal post-operative pain management in children**

Based on the information you provided, I am pleased to inform you that application HSCR14/118 has been approved.

If there are any changes to the project and/ or its methodology, please inform the Panel as soon as possible.

Yours sincerely,

*Rachel Shuttleworth*

Rachel Shuttleworth  
College Support Officer (R&I)

Appendix 23: Permission from Ministry of Health Committee in Hail Region

<p>Kingdom of Saudi Arabia Ministry of Health General Directorate of Health Affairs in Hail Hospitals Administration</p>	 <p>وزارة الصحة Ministry of Health</p>	<p>المملكة العربية السعودية وزارة الصحة المديرية العامة للشؤون الصحية بمنطقة حائل إدارة المستشفيات</p>
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Re: Ethical Approval  
Date: 15<sup>th</sup> September, 2014  
Dear, Mr. Nahar AlReshidi

Regarding your application to distribute surveys and give an interactive educational programme to nursing staff of Hail Region. We are happy to let you know that your application has been approved in order to collect you data from the hospitals in the region and access to any necessary data which may support your study. The hospital managers will be informed in supporting and facilitating your study.

We wish you good luck with your study

Assistant General Director of Planning and Training  
*Dhahi Khalaf Alskaibi*



الرقم: ..... التاريخ: / / ١٤٣٥ هـ المرفقات: .....

حائزل - المجمع الحكومي - هاتف: ٠١٦/٥٢٢٠٨٢٢ - فاكس: ٠١٦/٥٢٢٥٥٦١

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## Appendix 24: Participants Consent Form

**The impact of an interactive educational programme on Saudi paediatric nurses knowledge and attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceptions of barriers to optimal post-operative pain management in children.**

**Please  
Initial**

### TO BE COMPLETED BY THE PARTICIPANT

1. I confirm that I have read and understand the information sheet (Version 2, 18 January 2015) 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 any time, without giving any reason, and without my employment being affected
3. I understand that I do not have to answer all of the questions
4. I understand that the researcher will write a report of the study from information that provide and that the findings will be presented in publications and conference presentations in anonymised form. Nothing that could identify me will be included.
5. I agree to take part in the study.

\_\_\_\_\_  
Name of Nurse

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

Nahar AlReshidi  
\_\_\_\_\_  
Name of Researcher

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

**This form should be completed and returned in a sealed envelope to the Head Nurse at the unit.**

## Appendix 25: Conference attendance

University of  
**Salford**  
MANCHESTER

**ACCN**  
THE ASSOCIATION OF  
CHIEF CHILDREN'S NURSES

UNIVERSITY OF  
**Southampton**

UK Association of Chief Children's Nurses  
(ACCN)  
Children's and Young People's Nursing  
International Conference

This is to certify that

**Nahar Alreshidi**

Attended the Association of Chief Children's Nurses  
International Conference

'Building the evidence base for practice'

At Jersey General Hospital,  
St Helier, Jersey, Channel Islands  
4<sup>th</sup> – 5<sup>th</sup> September 2014

Signed:



Professor Tony Long  
University of Salford

Signed:



Professor Alan Gasper  
University of Southampton





## Simulation Future Direction in Saudi Arabia

# Certificate of Attendance

This Certificate is awarded to

**Nahar Mohammad AlReshidi**

**For attending the**

## **Saudi Health Simulation Conference 2015**

Held on 9-11 June 2015

Al Faisaliah Hotel, Riyadh, K.S.A

This Activity has been accredited by Saudi Commission for Health Specialties

With Accreditation No. (51004/2015) for (24) CME/PD Accredited Hour.

***Dr. Mansour Saleh Alyami***

General Director of Training and Scholarship, MOH  
Chairman of Organizing Committee

Accredited by



Endorsed by



# Certificate of Participation



*Awarded to*

**Nahar Alreshidi**

*acknowledging the valuable participation in  
the 8<sup>th</sup> Saudi Students' Conference  
that was held at Queen Elizabeth II Conference Centre  
London, 31<sup>st</sup> Jan – 1<sup>st</sup> Feb 2015*

**Faisal M. Almohanna Abaalkhail**

*Saudi Arabian Cultural Attaché in the UK*

**Imperial College  
London**



الجمعية العلمية للطلاب السعوديين في بريطانيا  
SCSSE - SOCIETY FOR SAUDI STUDENTS IN THE UK



وزارة التعليم العالي  
MINISTRY OF HIGHER EDUCATION  
المندوبية الثقافية السعودية في لندن  
SAUDI ARABIAN CULTURAL BUREAU IN LONDON



# ***EBP Conference Poster Presentation***

***Nahar Mohammed Alreshidi  
Dr. Angela Darvill  
Professor Tony Long***

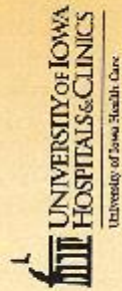
The University of Iowa Hospitals and Clinics  
Department of Nursing Services and Patient Care  
presents this certificate for your poster presentation at the

23rd National  
Evidence-Based Practice Conference  
April 28-29, 2016

*Sharon Tucker*

Sharon J. Tucker  
PhD, RN, PM-CNS-BC, FAAN  
Director

Nursing Research, Evidence-Based Practice, and Quality



# Certificate of Attendance

This is to certify that

*Nahar Abreshidi*

attended the

School of Health Postgraduate Student Conference 2015

on

Monday 26<sup>th</sup> January 2015



14 March 2016

Dear Sir/Madam,

I am writing to confirm that Nahar AlRashidi attended the AYPH national conference – “A new look at young people’s health” in Manchester on the 25<sup>th</sup> of February 2016 and presented a poster entitled – “The impact of an interactive educational programme on Saudi children’s nurses knowledge, attitudes, beliefs and perceptions of children’s pain, self-efficacy and perceived barriers to optimal post-operative pain management in children.” (AlRashidi N, Long T, Darvill A.)

If you require any further information, please do not hesitate to contact me.

Yours Sincerely



Vicky Robinson  
Membership & Administrative Officer



This is to certify that

**Nahar Alreshidi**

attended this conference

Organised by the Association for Young People's Health and sponsored by the Young People's Health Special Interest Group of RCPCH, the Royal College of Physicians' Young Adults Steering Group and the Royal College of GPs' Adolescent Health Group

**'A New Look at Young People's Health'**

25 February 2016, King's House Conference Centre, Manchester

RCPCH has approved this activity for up to 5 CPD credits, in accordance with the current RCPCH CPD Guidelines.

Signed, Emma Rigby, Chief Executive, Association for Young People's Health



Royal College of  
General Practitioners



Royal College  
of Physicians



Supported by:

MANCHESTER  
1824

The University  
of Manchester

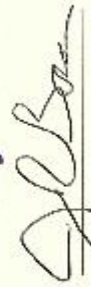
This certificate is presented to:

**Nahar Al Reshidi**

For successful completion of:

MANCHESTER GRADSCHOOL 2016

**The Developing Researcher:  
From Surviving to Thriving**  
10 May – 13 May 2016



Course Director



*World Nursing 2016*  
*Young Researchers Forum*

Prof/Dr/Mr/Ms. **Nahar AlReshidi**

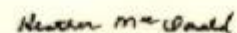
University of Salford, UK

for presenting the oral entitled

*The impact of an interactive educational programme on Saudi paediatric nurses' knowledge, attitudes, beliefs, and perceived barriers to optimal post-operative pain management*

at the "6<sup>th</sup> World Nursing and Healthcare Conference"  
held during August 15-17, 2016 in London, UK

The award has been attributed in recognition of research paper quality, novelty and significance.



Heather Macdonald  
University of New Brunswick, Canada



# 6<sup>th</sup> World Nursing and Healthcare Conference

August 15-17, 2016 London, U

## The impact of an interactive educational programme on Saudi paediatric nurses' knowledge, attitudes, beliefs, and perceived barriers to optimal post-operative pain management

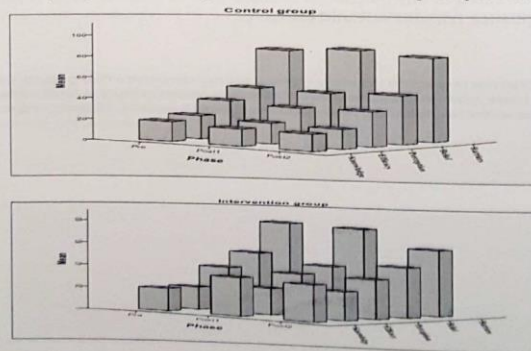
Nahar AlReshidi, Tony Long and Angela Darvill  
University of Salford  
Professor of Child & Family Health  
Senior Lecturer in Children's Nursing, University of Huddersfield

**Background:** Post-operative pain management has been researched extensively, but it fails to receive the same attention from paediatric nurses in Saudi Arabia. Practices are not evidence-based, but there is a willingness to improve. The factors to be addressed in this study had not been considered together in any study, and each in turn is supported by only minimal evidence of variable quality. No work of significance had been undertaken in the context of Saudi Arabia or other Gulf nations.

**Aims:** To test the impact of an interactive postoperative pain management education programme for paediatric nurses

**Study Design:** A non-equivalent groups, pre-test post-test design was used. A sample of 229 paediatric nurses working in surgical units in Hail region hospitals was recruited and completed four questionnaires on three occasions, before the intervention, and at 1 and 3 months after. The intervention was an interactive educational programme on DVD with explanations, exercises, video presentations and self-check games.

**Results:** There was significant improvement in participants' knowledge and attitudes. Perception of barriers to effective pain management reduced, while self-efficacy improved. No improvement was found in perception about children's pain.



**Conclusion:** This study will improve pain management for children following surgery. It will prompt the use of an alternative, digital, interactive education programme in Saudi Arabia.

### Biography

Nahar AlReshidi is a doctoral research student in the School of Nursing, Midwifery & Social Work in the University of Salford. He is the Director of Nursing in King Khalid hospital- Hail Region of the Kingdom of Saudi Arabia, with a Diploma in Nursing from KSA, a BSc in Nursing from the University of Technology Sydney in Australia, and a MSc in Nursing Education from University of Salford in UK.

n.m.alreshidi2@edu.salford.ac.uk



# 9<sup>th</sup> Euro Nursing and Medicare Summit

October 17-19, 2016 Rome, Italy

**Date: 10<sup>th</sup> November, 2015**

## Letter of Acceptance

To  
**Nahar AlReshidi**  
University of Salford, Nursing School,  
United Kingdom.

OMICS Group cordially invites you to attend the annual 9<sup>th</sup> Euro Nursing and Medicare Summit which will be held from October 17-19, 2016 at Rome, Italy on the theme "*Exploring latest innovations in Nursing and Healthcare*". On behalf of the Organizing Committee, we would like to bring to your notice that your abstract "**The impact of an interactive educational programme on Saudi children nurses' knowledge, attitudes, beliefs and perceptions of children's pain, self-efficacy, and perceived barriers to optimal post-operative pain management in children**" has been accepted for Oral Presentation at "Euro Nursing 2016". We are pleased to welcome you on behalf of our organizing committee at our conference.

The **9<sup>th</sup> Euro Nursing and Medicare Summit** initiated by Editors – Journal of Nursing & Care, Health Care: Current Reviews, Primary Health Care: Open Access will offer you an unforgettable experience in exploring new opportunities.

We look forward to seeing you at Rome, Italy

**For more details about Conference:**

<http://nursing.conferenceseries.com/europe/>

A handwritten signature in blue ink, appearing to read "Sudhakar AkulYakkanti".

**Dr. Sudhakar AkulYakkanti,**  
Scientific Committee Operator  
**Euro Nursing 2016**  
OMICS Group Conference  
5716 Corsa Ave., Suite 110  
Westlake, Los Angeles  
CA 91362-7354, USA  
Ph: +1-650-268-9744  
Toll Free: +1-800-216-6499.  
E: [euronursing@nursingconference.com](mailto:euronursing@nursingconference.com)

**Letter of Invitation**

**Date: April 25<sup>th</sup>, 2016**

To,

**Mr. Nahar AlReshidi,**  
University of Salford,  
UK.

OMICS International cordially invites you to attend "6<sup>th</sup> World Nursing and Healthcare Conference" which is going to be held during August 15-17, 2016 Heathrow Stockley Road, Crowne Plaza, London, UK.

We welcome you to join us and share your knowledge and views by rendering your Presentation entitled, "The impact of an interactive educational programme on Saudi paediatric nurses' knowledge, attitudes, beliefs, and perceived barriers to optimal post-operative pain management" we found suitable for the theme of the conference.

We are very much aware of your quality of research and reputation. In this regard, on behalf of the Organizing Committee, we are pleased to welcome you to join us and give Oral Presentation on the track of your interest in our scientific session.

6<sup>th</sup> World Nursing and Healthcare Conference initiated by Editors Journal of Nursing & Care, Health Care: Current Reviews, Primary Health Care: Open Access will definitely offer you an unforgettable experience in exploring new opportunities.

For more details about World Nursing-2016, PS: <http://www.worldnursingconference.com/>

*We look forward to see you at London, UK.*

With Thanks,



**Dr. Sudhakar AkulYakkanti,** Scientific Committee Operator  
**World Nursing-2016 Organizing Committee**  
OMICS International Conferences  
Heathrow Stockley Park Lakeside House  
1 Furzeground Way  
Heathrow  
UB11 1BD, UK  
Toll Free: +1-800-216-6499.

**Disclaimer: This invitation is to attend World Nursing-2016 only.**

# Nursing World Conference

NWC-2016

October 24-26, 2016 Dubai UAE

Date: May-13-2016

## Letter of Invitation

Dear Dr. Nahar Alreshidi

Magnus Group cordially invites you to attend the "Nursing World Conference" during October 24-26, 2016 at Dubai, UAE.

We welcome you to join us and share your knowledge and views on the theme "*In Pursuit of Excellence in Nursing Education*". We feel glad to have your presence as an *Invited Speaker* and have your talk suits to the theme of the conference at NWC 2016 at Dubai.

Nursing world conference (NWC) is initiated by Editors- *Journal of Immunology, Infection & Inflammatory Diseases* will offer you an unforgettable experience in exploring new opportunities.

### Organizing Committee for NWC 2016

**Dr. Rose E. Constantino**  
University of Pittsburgh, USA

**Dr. Mzwandile A Mabhala**  
University of Chester, UK

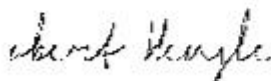
**Dr. Charles Boicey**  
American Nursing Informatics Association, USA

**Dr. Johanna Mathibe-Neke**  
University of South Africa, SA

For more details about NWC 2016, PS [http: http://nursingworldconference.com](http://nursingworldconference.com)

We look forward to seeing you in Dubai.

With Thanks,



**Mr. Robert Hensley**  
Conference Manager  
On Behalf of Organizing Committee  
NWC 2016  
Magnus Group Conferences  
Email: [nursing@magnussciigroup.com](mailto:nursing@magnussciigroup.com)

*Disclaimer: This invitation is to attend NWC 2016 only*

NWC 2016

10<sup>th</sup> International Symposium on Pediatric Pain

May 31 – June 4, 2015  
Seattle, Washington USA



Certificate of Participation  
ISPP 2015

June 1-4, 2015

*Awarded to*

**Nahar Alreshidi**

*acknowledging Nahar's valuable participation as a presenter  
in concurrent session 702 entitled "Pediatric Healthcare Providers' Knowledge  
and Attitudes Regarding Pain: International Perspective.2  
Thursday, June 4, 2015, at ISPP 2015, Seattle, Washington*

Kathie Kohorn, ISPP Organizing Committee

*Kathie Kohorn*