Reorganising In-hospital Pain Management:

Evaluation of a Novel Nurse-Based Pain Management Programme in an Ethiopian University Medical Centre

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Norsk sammendrag av avhandlingen

Bakgrunn: Smerte er den eldste og mest utbredte kliniske tilstanden. Denne studien bidrar med kunnskap om smertebehandling for pasienter innlagt i et etiopisk sykehus. Selv om alt helsepersonell må ha tilstrekkelig kunnskap og ferdigheter om smertebehandling på sykehus, har studier avdekket at sykepleierne har en sentral rolle på dette feltet. Likevel er det avdekket at mange pasienter på etiopiske sykehus lider av smerter som ikke blir behandlet, eller at smertene deres behandles utilstrekkelig. Internasjonale studier har vist at utdanningsprogrammer om smertebehandling bidrar til å forbedre sykepleiernes kunnskap og holdninger. Også organisering etter prinsippene fra rundesystem har vist bedring av sykepleien pasientene får. Hvilken betydning det har for sykepleiernes smertelindring når man kombinerer etterutdanning om smertebehandling med rundesystem, er imidlertid ukjent. Med utgangspunkt i den eksisterende organiseringen av sykepleietjenesten ved Jimma University Medical Center i Etiopia (JUMC), utviklet og introduserte vi et nytt sykepleierbasert program med siktemål å forbedre smerteomsorgen hos innlagte pasienter.

Mål: Det overordnede målet med denne avhandlingen var å evaluere et nytt sykepleierbasert smertebehandlingsprogram bestående av de to komponentene: 1) et etterutdanningsprogram for sykepleiere etterfulgt av 2) re-organisering av sykepleietjenesten til rundesystem. Sykepleiernes smerterelaterte kunnskap og holdninger; pasientrapportert smerteintensitet og interferens med fysisk og emosjonell funksjon; og pasientenes evalueringer av smertebehandlingsprogrammet ved JUMC ble evaluert.

Metode: Et kvasi-eksperimentelt design med en pre-test/post-test-tilnærming ble brukt. Det sykepleierbaserte smertebehandlingsprogrammet ble implementert ved JUMC, i Etiopia. Datainnsamling fant sted mellom september 2016 og juni 2017. Deltakerne var sykepleiere som var ansatt ved JUMC og pasienter innlagt ved medisinske, kirurgiske, barsel- og gynekologiske avdelinger. I studie I, ble 111 (67,27%) av de 165 sykepleierne som ble invitert til å delta, inkludert i analysen. Deres kunnskaps- og holdningsskår ble evaluert før og etter at utdanningsprogrammet, ved å bruke verktøyet «Knowledge and Attitudes Survey Regarding Pain» (KASRP).

I studie II og III ble tre separate grupper med totalt 845 pasienter invitert til å delta, og 782 (92,5 %) av disse deltok i tre påfølgende datainnsamlinger. Det samme intervjuer-administrerte spørreskjema ble brukt til å samle data fra pasienter; ved baseline (Survey 1), etter

etterutdanningsprogrammet (Survey 2) og deretter etter at rundesystem var implementert (Survey 3). Data ble samlet inn av lokalt opplærte datainnsamlere. Spørsmålene til pasienter ble hentet og tilpasset fra «Brief Pain Inventory" (BPI), "American Pain Society Patient Outcome Questionnaire" (APS-POQ), "Pain Treatment Satisfaction Scale" (PTSS) og "Patient Pain Questionnaire" (PPQ). Dataene ble analysert med SPSS versjon 20.1 i studie II og III. I tillegg ble Stata versjon 17 brukt i studie III. Det ble brukt beskrivende statistikk for å beskrive utvalget og Wilcoxons test i studie I, ANOVA i studie II og robust regresjonsanalyse i studie III. Signifikante forskjeller ble definert med en *p*-verdi på 0,05 eller lavere.

Resultat: Etter deltakelse i utdanningsprogrammet økte sykepleiernes gjennomsnittsskår for kunnskap og holdninger til smertebehandling fra 17 (SD=4) til 25,8 (SD=7,2) ($p < 0,001$) av totalt 41 oppnåelig (studie I).

Pasientene rapporterte i studie II om lavere smerteintensitet og mindre smerteinterferens med fysisk og emosjonell funksjon etter at det nye to-komponent programmet ble implementert, både ved andre og tredje datainnsamling, sammenlignet med baseline-verdien ($p < 0,05$).

Pasientene rapporterte i studie III at personalets responstid på hvor fort de fikk smertebehandling ble bedret, det vil si at responsen fra personalet innen 30 minutter økte fra 67,8 % før oppstart til 71,1 % i undersøkelse 2 og 74,2 % i undersøkelse 3. Det var statistisk signifikante endringer i deres tilfredshet med informasjon de fikk om smertebehandlingen generelt, smertebehandlingen som ble gitt av sykepleier og medikamentregimet. På en skala fra 1 til 5 (1= sterkt misfornøyd og 5= sterkt fornøyd) var den totale gjennomsnittlige pasienttilfredsheten med smertebehandlingen økt fra 3,61 (SD = 0,80) før oppstart av programmet, til 3,81 (SD=0,86) i undersøkelse 2 og til 4,10 (SD= 0,64) i undersøkelse 3.

Konklusjon: Denne avhandlingen bidrar med kunnskap om smertebehandling på et etiopisk sykehus. Det ble funnet at bruk av et kontekstspesifikt sykepleietilpasset program bidro til å styrke sykepleiernes kunnskap og holdninger til smertebehandling. Videre viste de pasientrapporterte dataene bedring i smertenivå, at responstid for sykepleierne til å gi smertelindring ble redusert, og at tilfredsheten med smertebehandling generelt ble bedre. Funnene kan ha kliniske, pedagogiske, administrative og forskningsmessige implikasjoner innen sykepleie fordi de gir kunnskap om betydningen av kontekstilpasset program. Imidlertid gjør studiens design at det ikke kan trekkes slutninger om kausale sammenhenger. Gjentatte studier, med mer robuste metoder vil være nødvendig for å underbygge funnene i denne avhandlingen

Summary

Background: Pain is the oldest and most prevalent clinical condition. Although all health care workers should be equipped with adequate knowledge and skills for in-patient pain management, the role of nurses has showed to be particularly essential in this field. Nevertheless, studies have shown that many patients in Ethiopian hospitals suffer from pain left untreated or are inadequately managed. International studies highlight that pain management education programmes contribute to improve nurses' knowledge and attitudes. Furthermore, organising the wards based on rounding improve the nursing care. However, the impact of nurses' pain management when an in-service pain management education programme combined with rounding is unknown. Building on the existing nursing care system at the Jimma University Medical Center in Ethiopia (JUMC), we developed and introduced a novel nurse-based programme to improve in-patient pain management.

Aim: The overall aim of this thesis was to evaluate a novel nurse-based pain management programme. The programme consisted of two components: 1) an in-service nursing education programme and 2) reorganising the nurse care services to rounding. Nurses' pain-related knowledge and attitudes; patient-reported pain intensity and interference with physical and emotional function; and patients' evaluations of the pain management programme at JUMC was evaluated.

Methods: We employed a pre-test/post-test strategy in a quasi-experimental design. The implementation of the novel nurse-based pain management programme took place at JUMC, in Ethiopia. The data collection was conducted between September 2016 and June 2017. Participants included nurses working at JUMC and patients admitted to the medical, surgical, maternity and gynaecology units there. For Paper I, of the 165 nurses who were invited to participate by responding to self-administered questionnaires, 111 (67.27%) were included in the analysis. Their knowledge and attitude scores were evaluated before and after an in-service nursing educational programme was implemented by using the Knowledge and Attitudes Survey Regarding Pain (KASRP) tool. For Papers II and III, 845 patients were invited to participate, and 782 (92.5%) consented to participate in three consecutive data collections. The same interviewer-administered questionnaire was used to collect data from patients at baseline (Survey 1), six weeks after the in-service education programme (Survey 2) and then immediately after four months of rounding (Survey 3). The same data collectors collected data. The questions to the

patients were adapted from the Brief Pain Inventory (BPI), the American Pain Society Patient Outcome Questionnaire (APS-POQ), the Pain Treatment Satisfaction Scale (PTSS) and the Patient Pain Questionnaire (PPQ). The data were analysed using SPSS Version 20.1 for Windows in Papers II and III. In addition, we used Stata Version 17 in Paper III. We employed descriptive statistics to describe sample characteristics and Wilcoxons test in Paper I. ANOVA in Paper II and robust regression analysis in Paper III. Statistically significant differences were defined with a *p*-value of 0.05 or below.

Results: After the in-service nursing education programme, the mean score of nurses' knowledge and attitudes regarding pain management increased from 17 (SD=4, range = 26) to 25.8 (SD=7.2, range =25) ($p < 0.001$) of 41 achievable (Paper I). In Paper II, the patients reported lower pain intensity and interference with physical and emotional functions after the introduction of the two-components programme, both in Surveys 2 and 3, compared to the baseline value ($p < 0.05$). In Paper III, the proportion of the patients who reported receiving medication within 30 minutes after asking for it increased from 67.8% in Survey 1 to 71.1% in Survey 2 and 74.2% in Survey 3. Likewise, the patients' satisfaction with pain management information, nurse-provided pain management and the medication regimen also improved statistically significantly. On a scale of 1 to 5 (1= strongly dissatisfied and 5= strongly satisfied), the overall mean patient satisfaction with pain management increased from 3.61 (SD = 0.80) in Survey 1, to 3.81 (SD=0.86) in Survey 2 and to 4.10 (SD= 0.64) in Survey 3. Moreover, the patients scored significantly higher on all satisfaction items in Survey 2 and Survey 3, compared to Survey 1.

Conclusion: This thesis contributes with knowledge about pain management in an Ethiopian hospital. We found that using a context-specific programme strengthened the nurses' knowledge and attitude towards pain management. Furthermore, the patient-reported data showed lower pain level, they experienced that the response time for the nurses to provide pain relief was reduced, and that their satisfaction with pain management generally improved. The findings can have clinical, educational, and administrative and research implications in nursing care because they provide knowledge about the importance of context-adapted programmes. However, the study's design means that no conclusions can be drawn about causal relationships. Further follow-up studies with more robust design and methods are recommended for validation and for the possibility of replication of the study.

Abbreviations

APS-POQ-R: Revised American Pain Society Patient Outcome Questionnaire

BPI: Brief Pain Inventory

BPS: Behavioural Pain Scale

GDP: Gross Domestic Product

HSTP: Health Sector Transformation Plan

HURH: Hawassa University Referral Hospital

IASP: International Association for the Study of Pain

IRB: Institutional Review Boards

JUIH: Jimma University Institute of Health

JUMC: Jimma University Medical Center

KASRP: Knowledge and Attitudes Survey Regarding Pain

MOH: Ministry of Health

NIEP: Nursing In-service Education Programme

NRS: Numeric Rating Scale

NSAID: Non-Steroidal Anti-Inflammatory Drugs

NSD: Norwegian Centre for Research Data

PHCU: Primary Health Care Unit

PPQ: Patient Pain Questionnaire

PTSS: Pain Treatment Satisfaction Scale

SHI: Social Health Insurance

VAS: Visual Analog Scale

VRS: Verbal Rating Scale

List of Articles

1. Germossa, G. N., Sjetne, I. S., & Hellesø, R. (2018). The impact of an in-service educational program on nurses' knowledge and attitudes regarding pain management in an Ethiopian university hospital. *Frontiers in Public Health, 6(*229):1-7.
2. Germossa, G. N., Hellesø, R., & Sjetne, I. S. (2019). Hospitalised patients' pain experience before and after the introduction of a nurse-based pain management program: A separate sample pre- and post-study. *BMC Nursing, 18*(40):1-9.
3. Germossa, G. N., Sjetne, I. S., Småstuen, M. C., & Hellesø, R. Patient satisfaction with a nurse-based pain management programme: A quasi-experimental study in Ethiopia. *Accepted on 08-Nov-2022. SAGE open Nursing*

Thesis Structure

This thesis has eight sections. Section 1 opens with the general contribution of the thesis, followed by a description of the scope and implications of inadequately managed pain, before concluding with the purpose of this research and the assumption of the study. Section 2 briefly presents the study's overall aims and its three sub-aims. Section 3 consists of five sub-sections. It starts with background information about pain, elaborates on general information regarding pain management, provides an historical perspective on the understanding of pain, introduces healthcare delivery systems in the Ethiopian context, describes the responsibilities of nurses in pain management and concludes with an account of the foundation for developing a nurse-based pain management programme (here termed 'the programme'). Section 4 describes the design and methods used in this study. It begins with the research design for the three sub-studies and continues with a description of the study setting, study samples, the programme, an account of measurements, data collection methods and data analysis. Section 4 concludes with a description of ethical approvals. Section 5 presents the summary of the main results of the three sub-studies. Section 6 takes account of the general discussion of the main findings, methodological considerations with an emphasis on design, validity, reliability, and generalizability, as well as final accounts for ethical considerations. Finally, Section 7 presents conclusions and implications of the study. Following the reference list in Section 8, the following are included in a separate section of appendices: the subject information sheet; Knowledge and Attitudes Survey Regarding Pain (KASRP); the English, Afaan Oromo and Amharic versions of the patient survey questionnaires; rounding logs; the rounding monitoring sheet; and the three original research papers.

1. Introduction

This thesis contributes to knowledge concerning nurses' pain management of hospitalised patients at an Ethiopian medical centre. Pain and pain management have been a concern for decades worldwide (1, 2), and several hospital-based studies worldwide have indicated the magnitude of pain reported among hospitalised patients. For example, of those hospitalised, 34–41% of adult patients in Italy's hospitals experienced pain (3). This was also true for 38–84% of the adult patients in the UK (4); 50% of adult patients both in a German teaching hospital (5) and a Swedish hospital emergency department (6); 68.38% of adult patients in a Turkish hospital (7); 80.5% of patients five years and older in a western Kenyan hospital (8); 70% of patients in a tertiary referral medical centre in central Taiwan (9); 63.36% in a western China hospital (10); and 43.4% of patients in a hospital in Colombia (11). Two studies of hospitalised patients in Ethiopia showed that 78–91.4% of post-operative patients experienced pain (12, 13).

There are many reasons why patients experience pain during hospitalisation. For example, it can be caused by trauma (14), childbirth (15), surgery (16), underlying illnesses such as cancer (17), HIV/AIDS (18) and acute abdominal conditions (19), or by different medical procedures, including vascular punctures, patient mobilisation, catheterisation (20) and wound care (21).

Although significant advancements in pain knowledge have been made (1), inadequate pain management remains a major issue in developing countries (22). If not adequately treated, pain negatively affects patients' physical and psycho-social functioning (23). According to the 2011 Human Rights Watch World report, there is a sizable unmet need for pain management in Sub-Saharan African countries where the use of opioid analgesics is at its lowest (24). For instance, in Ethiopia, the Ministry of Health (MOH) estimates that nearly 60,000 people die annually with untreated moderate or severe pain from HIV or cancer (25).

Research in pain management shows that knowledge deficits and unfavourable attitudes towards pain among nurses, healthcare system-related barriers and patient-related factors are associated with inadequate pain management (26). Studies on knowledge and attitudes regarding pain show a widespread deficit among nurses working in different hospitals in Ethiopia. For example, 33% of nurses at the University of Gondar Comprehensive Specialized Hospital (27), 65.9% of nurses in hospitals in Addis Ababa (28) and 59.4 % of nurses in Amhara referral

hospitals (29) had insufficient pain-related knowledge. Similar findings have also been reported in other African countries; in Ghana, for instance, one study showed that most nurses (72.5%) had moderate knowledge of, and 89.6% had a negative attitude towards pain management (30). Knowledge deficits and undesirable attitudes regarding pain could be related to inadequate preparation during nurses' pre-service training, or the pre-service curricula might place less emphasis on pain management (25, 31-34).

Another barrier to providing adequate pain treatment is the lack of a system that ensures adequate pain control during hospitalisation. Although Ethiopia's Ministry of Health (MOH) published national pain management guidelines in 2007 (31), established a steering pain management team in 2014 and partnered with the American Cancer Society to launch a pain-free hospital initiative (25), pain management practices are unstandardised in the country's hospitals. As a result, adequate pain management is squeezed at the nursing front line, due to a lack of knowledge and acceptable pain management attitude; at the mid-tier through the absence of an organised workflow process; and from the top down due to a lack of supportive leadership atmosphere (28, 35-39). Further, barriers on the part of the patient include factors such as a fear of distracting healthcare providers from reaching a diagnosis, medication side effects, the desire not to be labelled as a 'contrary' patient or the belief that pain is not harmful (39-41).

Education is one of the most frequently suggested interventions for positively influencing nurses' knowledge and attitudes towards pain (42), enhancing their pain management practices and improving patient outcomes (42, 43). However, even if they have the necessary knowledge and attitude, there is no guarantee they will apply it uniformly. This cannot happen unless there is an organised workflow that ensures nurses are present around the patient, so they may respond in a timely manner to requests for pain control (44). Evidence shows that rounding (an elaboration will be given in Section 3.5) is an appropriate practice intervention to enhance staff responsiveness (45). Hence, adequate pain management requires staff capacity development and an effective organisation that leverages available knowledge and care delivery systems to enhance regular pain assessment and the proper use of existing pain treatment approaches (46). Research conducted prior to and following this study has concentrated on factors related to patient satisfaction with, and the quality of post-operative pain management in Ethiopia (12, 13, 36, 47-49), while the other studies have investigated nurses' attitudes and knowledge of pain (27-

29, 50). The evidence highlighted that combined education and organised pain management programmes might produce better patient outcomes (51).

To our knowledge, when this study was planned no study had combined education and rounding to address pain management in settings with limited resources, like Ethiopia and at JUMC. Therefore, a nurse-based pain management programme ('the programme') consisting of a Nursing In-service Educational Programme ('NIEP') and reorganisation care flow process ('rounding') was developed and introduced at JUMC. The assumption was that patients would receive better pain management and experience better outcomes if nurses had adequate knowledge and attitude toward pain management, and that they could approach patients with pain systematically and proactively, rather than randomly.

2. Overall Aim

The aim of this thesis was to evaluate the novel nurse-based pain management programme (the programme) which consisted of the two components: Nursing In-service Education Programme (NIEP) and rounding in the context of Jimma University Medical Center (JUMC). More specifically, the study's sub-aims were:

1. To investigate how an in-service educational programme influenced nurses' knowledge and attitudes regarding pain management in an Ethiopian university hospital.
2. To investigate patient-reported pain experiences before and after the introduction of the two-component nurse-based pain management programme.
3. To assess the patients' evaluation of nurse-based pain management programme in terms of patients' reports on nurses' responsiveness and their satisfaction with pain treatment information, pain care provided by nurses and the medication regimen in an Ethiopian university medical centre.

3. Background

This section provides information about pain and a brief overview of pain management from both the historical and current perspectives. The section concludes with an account of the foundation of the programme.

3.1 Pain

Pain is a multi-dimensional phenomenon involving physical, psychological, behavioural, affective, cognitive and sensory experiences (52). It is regarded as a global problem (2), is an important concern of hospitalised patients (23, 25) and is the only thing that is at the same time useful and terrifying (53). Pain is useful because it serves as a warning symptom for the body during illness and guides the diagnosis of various conditions; however, it is unpleasant and, if left untreated, can negatively affect the quality of life (1).

Historically, pain has been defined in different ways, but the definitions provided by McCaffery in 1968 (54) and the International Association for the Study of Pain (IASP) in 1973 (55) are the most popular in the study of pain. McCaffery, an American registered nurse and a founder of the field of pain management nursing, defined pain as ’whatever the experiencing person says it is, existing whenever the experiencing person it does’ (54). The IASP initially defined pain as ‘an unpleasant sensory and emotional experience associated with actual or potential tissue damage’ (55). Later, considering substantial advancements in neuroscience, the emergence of the chronic model, the quest for a multidisciplinary approach to pain management and biopsychosocial perspectives, the IASP redefined pain as ‘a distressing experience associated with actual or potential tissue damage with emotional, cognitive, and social components’ (56).

Because it guides pain assessment and treatment(s) selection, understanding pain mechanisms – such as nociception, perception and body responses to pain – is the first step towards providing adequate pain management (53, 57, 58). Knowledge about nociception helps healthcare professionals to understand the transmission of pain impulses from the peripheral to the central nervous systems (53, 57). Knowing about perception also helps to determine how a person perceives pain (57, 58). Understanding the body’s response to pain also helps to anticipate accompanying symptoms such as fear, anxiety, stress, depression, anger, fatigue, moaning, grimacing, limping, immunosuppression symptoms, activity withdrawal and the

seeking of medical attention (57-59). Knowledge about the different types of pain plays a vital role in selecting treatment modalities (58).

Most often, pain can be classified based on its underlying mechanisms as nociceptive, neuropathic or sensory hypersensitivity (57, 58). Nociceptive pain can be localised due to damage to the somatic tissues, such as bones, joints and soft tissues, or poorly localised pain, as in distended or inflamed visceral organs such as the liver, spleen, kidney, lung and heart (57). Patients with nociceptive pain often reports sore, throbbing, sharp, tender, aching, and cramping pain (58, 60). Neuropathic pain may arise as a chronic progressive neurological condition due to chronic diseases or nerve damage that can worsen at any time without an apparent pain-inducing factor (33, 57, 58). Patients with neuropathic pain describe it as a hot, burning sensation, an electric shock, stinging, painful cold, tingling and needle-like (58, 60). Centralised pain, also known as central sensitisation or sensory hypersensitivity, is any pain that occurs when the central nervous system does not process pain signals properly, as in the case of fibromyalgia (58). Patients with centralised pain may show mood disturbances, cognitive dysfunction or general hypersensitivity to bright light, loud noises or smells (58, 60).

Based on the situation, pain can be the result of an incident, breakthrough or procedural (31, 33). Situational pain refers to a painful condition with specific circumstances such as after movement (incident pain), a sudden but temporary flare of severe pain between two consecutive doses of anti-pain medication (breakthrough pain) and during or after medical interventions (procedural pain) (33, 57).

Based on duration, pain is classified as acute or chronic (31, 33). Acute pain is naturally severe, sudden, short-lived and goes away with the resolution of the damaged tissue, which usually lasts three months. Early treatment is needed to reduce the severity and prevent the risk of chronic pain (33, 57), which is usually accompanied by physiological responses such as raised blood pressure, tachycardia and muscle reflex changes (33, 58, 61). Chronic (ongoing) pain may present without evidence of any apparent physical damage and serves no such physiologic role as a symptom of disease, but by itself is a disease state that lasts beyond the average healing time of injured tissue. This kind of pain is frequently triggered by an injury or illness but may be perpetuated by factors other than the cause of the pain itself. It is characterised by chronic pain syndrome, in which the intensity of the pain is disproportionate to the original injury (33, 57).

3.2 Historical Perspective on the Understanding of Pain

How pain is understood and treated is influenced in one way or another by its historical developments (55). In ancient times, the most common pain relievers were rest; exercise; bloodletting; skin incisions; the application of resin plaster; hot water or food; prayer; wet cupping; cauterisation; and rubbing with narcotics such as mandrake, henbane and nightshades (62). Even today, there are those – out of preference, lack of access or for cultural reasons – who employ alternatives to modern medicine and use traditional non-pharmacologic remedies (63).

Influential scholars of ancient Greece, Homer and Hippocrates, explained pain in terms of individual experiences during mourning, grief, worry, violent emotion, sorrows and childbirth (55). In experiments with animals (pigs, monkeys and cattle), the Greek physician, surgeon and philosopher Galen of Pergamum recognised pain as an internal disruption and external aggression characterised by pulsetic, gravitative, tensive or pungitive sensations (62). According to Plato and Aristotle, pain is an external emotional experience that invades the body as a spirit and locates in the heart (55, 62). Religious belief influenced their perception that pain other than injury was believed to be caused by the influence of gods or spirits of death (55, 62).

In the Middle Ages (5th–15th centuries C.E.), medical knowledge transferred from the Orient to the Occident; pain was believed to be associated with damage, stretching or skin abrasions (55, 62). During the Scientific Renaissance, French writer and father of modern philosophy René Descartes (1596–1650) proposed pain sensation as an internal mechanical process that led to a disturbance within the machine (body), transmitted via nerves to the brain. Unlike Plato and Aristotle, Descartes' theory shifted pain perception from mental and mythological experiences onto physical and mechanical processes. This change in perspective opened the door to explaining pain mechanisms (55).

Early in the 19th century, new perspectives on pain gradually emerged as debates about its complexity, location and origin continued (62). There was an argument about whether pain was caused by specific receptors or nonspecific pathways in the nervous system, which contributed to the development of four major pain theories: specificity, intensity, pattern and gate control. These theories differed in how they explained the amount and type of stimuli that caused pain, and how pain was modulated. Since then, pain management has evolved from magical ritual performances to medicinal ingredients (55, 62, 64).

Advances in pain research led to the use of opium and the invention of medical gases such as chloroform and nitrous oxide. Discovered in the 1600s, opium was the first pain-relieving agent. Pain science continued by introducing ether and chloroform in the 1800s as anaesthetic agents for patients undergoing surgery. Morphine and heroin were also introduced in the 19th century as pain medications (1). Later, Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), surgical nerve blocks and transcutaneous electrical nerve stimulation became modern pain management techniques (55). Today, pain education, opioid regulation and a holistic approach to pain management are in place (55, 62, 64).

Traditional healers were the first pain management providers in Ethiopia, and in some rural areas of the country, cauterisation, bloodletting and cupping were practiced. For instance, a study on exiled Ethiopians showed a preference for injections over tablets (63). However, the Ethiopian medical system is entirely based on Western principles. As a result, this brief history of Western pain management is also relevant to Ethiopian conditions. Table 1 summarises the thoughts and understanding of pain over time.

Table 1*:Historical Understandings of Pain in Western Medicine*

Period and Ideas	**Understanding of Pain**
Antiquity: Pain as a manifestation and disease	• Felt during times of mourning, grief, worry, violent emotion and childbirth (**Homer)** • Consuming, grief and sorrow **(Hippocrates)** • External invader of the inner organ as a spirit through injury and centred in the heart (**Plato and Aristotle**) • A component of touch or tactile sensation, feeling of excitement and a sign of inflammation (**Galen of Pergamum**)
Middle Ages: Pain as a spiritual and mythical experience	• Spirits of death that entered the body through the ear and nose • Pain is a feeling of contradictory quality (**Avicenna**)
Renaissance: The centre for pain shifted from the heart to the brain	• Internal mechanical process (**René Descartes)**
Modern medicine: Pain theories, drugs, guidelines and associations	• Pain as a subjective, sensory, emotional and social component • Pain as the fifth vital sign (an *automatic pain assessment in addition to body temperature, blood pressure, pulse and respiratory rate*)

Sources: The history of the IASP: Progress in pain since 1975 (55). Current pharmaceutical design (62) and a History of pain theories, *Neuroscience Bulletin* (64), Guide to pain management in low-resource settings (60).

3.3. Nurses' Responsibilities in Pain Management

Pain management is at the heart of hospitalised patients' care that involves pain assessment and adequate analgesia to alleviate or reduce pain to the level of patient comfort (33). To fulfil their responsibility and accountability for pain management, nurses are expected to assess, manage and advocate for patients (65). In addition, nurses must choose appropriate non-pharmacologic remedies, educate patients, initiate interdisciplinary communication and evaluate patients' responses to pain treatments (66).

Pain assessment is a vital step in providing adequate pain management. This involves structured and straightforward questions to establish duration, location, severity, associated factors, radiation patterns, past medical history, prior or ongoing medication and belief systems about pain (31, 33, 60, 67, 68). Along with the four traditional vital signs, the nurse should routinely evaluate pain as the fifth vital sign (69). Although a patient's self-report is most important for establishing the existence of pain, it may not be adequate, as some patients may not tell about their pain, or hide it behind smiles and laughing, depending on their socio-cultural background and health status (70, 71). If a patient cannot report their pain, the nurse should use pain charts coded with facial expressions and observations of physical activity (33, 61).

In 1987, medical researchers tried to evaluate chronic pain objectively by using a heat beam dolorimeter, a device introduced in 1940 that claimed to be able to detect and measure pain objectively by applying heat to the skin (72). Later, the palpometer, a more modern version, was developed; it functions in the same way as its predecessor, but applies pressure instead of heat (73). However, both were unreliable and invalid (67, 68), which is why standardised pain assessment tools are now used instead (61, 74, 75). Although no single instrument is considered ideal or rated better than others, there are a number of recommended tools for assessing pain (60, 76). The most commonly used for adult patients include the Visual Analog Scale (VAS), Verbal Rating Scale (VRS), Numeric Rating Scale (NRS) and Behavioural Pain Scale (BPS) (76, 77).

The VAS is a 0–100-millimetre scale that measures pain intensity along a scale with no pain on the left, and maximum possible pain on the right. The distance in millimetres from zero to where patients place a mark defines the pain level (78). The VRS is an adjective descriptor with discrete jumps that categorise pain from none to mild, moderate or severe. Although time-consuming (as it requires the patient to read or hear all the adjective descriptors), patient

compliance with this tool is better than both VAS and NRS (79). However, since patients may interpret the terms differently, the VRS does not permit a conclusion on the magnitude of changes between two pain assessments (80). In patients with communication difficulties, the BPS is used to assess pain by observing facial expressions, restlessness, muscle tone, vocalisations and consolability (77). When assessing a patient, the nurse is also expected to apply the concept of 'total pain', as described by the noted British nurse, Dame Cicely Saunders (1918–2005), who later became a social worker and a physician (60, 81). In addition to carrying out regular pain assessments and administering appropriate therapies, the nurse is also expected to coordinate many aspects of pain management as the patient's advocate (67).

The World Health Organization's (WHO) analgesic ladder is a recommended stepwise framework for effective pain management (82). Paracetamol and NSAIDs such as ibuprofen, aspirin, diclofenac and indomethacin are used for mild pain (rated 1–3). Mild opioids like tramadol and codeine, with or without NSAID and adjuvants, are used for moderate pain (pain rated 4–6); and mild or strong opioids, such as morphine, pethidine, oxycodone and hydromorphone with or without NSAID and adjuvants, are used for severe pain (rated 7–10) (25, 82). Except for morphine (a gold-standard marker of pain management), all other opioid analgesics are used cautiously in long-term plans, as the body may develop a tolerance that could reduce effectiveness over time (25, 82). In circumstances where the long-term use of opioids is not warranted, adjuvants (anticonvulsants and antidepressants) may be given with unique prescriptions. Antidepressants and anticonvulsants have an analgesic effect in treating neuropathic pain and other chronic pain syndromes. The WHO also recommends corticosteroids to treat specific types of pain, such as that due to inflammation, and severe pain resulting from spinal compression (25, 82).

Non-pharmacological agents are a cost-effective and safe alternative to pain medication (83). In addition, they may distract patients' attention from pain (e.g., music therapy), affecting pain perception and reducing accompanying symptoms such as nausea, vomiting, neuropathy, anxiety and depressed mood by acting on the downward modulation of pain (25, 82, 83).

To discharge their responsibilities of pain management, nurses must have adequate knowledge, attitudes and skills (43, 44, 84-86). In addition, it is expected that the nurse will

respond proactively to a patient's request for pain control. Evidence shows rounding (elaborated in Section 3.5) is an appropriate practice intervention for enhancing staff responsiveness (45).

3.4. Country Context and the Ethiopian Health System

Country Context

Ethiopia is the second-most populous country in Africa, after Nigeria (87) , and shares borders with Eritrea to the north, Sudan and South Sudan to the west, Somalia and Djibouti to the east and Kenya to the south. According to the Live World Population Review, the population was estimated at 120 million in 2021 (88), with the Oromo (34.4%) and Amhara (27%) making up the majority ethnic groups (87). The population is primarily agrarian, and 80% live in dispersed rural areas. The federal government comprises 2 city administrations and 11 administrative regions. The country has an annual growth rate of 2.7% (88) ; a low GDP of 98.12 million USD; and, as of 2019, a health expenditure of 4.9% of GDP (87).

The country is home to about 81 ethnic groups with a wide range of traditions and languages belonging to four prominent families: Cushitic, Semitic, Omotic and Nilo-Saharan. Two-thirds of the population speak Afaan Oromo, Amharic or Tigrigna. Each has its norms, and religion, language and extended family traditions are all part of their cultural heritage. In society, grace is best exemplified through hospitality, and old age is regarded and valued because there is a belief that elders have wisdom, collective knowledge and selflessness (87). The country's literacy status is changing, the economy is improving and demand for quality services has recently increased. However, despite efforts to strengthen the healthcare system to achieve the Millennium Development Goals, infectious diseases, non-communicable diseases, injuries, unsafe water supply, inadequate sanitation, accidents, trauma and malnutrition are common health concerns in Ethiopia (87).

Ethiopian Health Systems

At every milestone, foreign countries and international organisations have played an important role in the development of Ethiopia's health system. Early quests for contemporary, rather than traditional, medical practices began in 16th century, and since then Western countries have devoted time and resources to establishing modern health systems. In 1886, Swedish

medical missionaries to Ethiopia introduced Western medicine. However, the progress slowed from 1936 to 1941, due to the Italo-Ethiopian War (87).

The Ministry of Health (MOH) was established in 1948, two years after a public health proclamation was issued as a legislative framework for health programmes. The Gondar Public Health College and Training Centre was established in 1954, with assistance from the WHO, the United Nations Children's Fund and the United States Agency for International Development, to train health officers, community nurses and sanitarians. Later, in 1965, Addis Ababa University established its first medical school. However, the initiative set out following the 1978 Alma-Ata Declaration on Primary Health Care to achieve primary healthcare by 2000 failed at the outset, due to a lack of clear national policies, strategies and direction (87).

During the socialist regime (1974–1991), progress was hindered, as many Ethiopian doctors either migrated or never returned after studying abroad. Although the socialist regime fell in 1991, many negative consequences remained. However, in 2005, the Health Sector Development Program III included a strategy to expand primary healthcare services and close coverage gaps to achieve universal primary healthcare access. Currently, as part of the second Growth and Transformation Plan (GTP II) 2015/2016–2019/2020, MOH, Ethiopia is gradually transferring public health management to regional health bureaus to improve the effectiveness of the service delivery system (87). Three organisations are expected offer health services: private, non-governmental and government. While private and non-governmental healthcare operates in hospitals and clinics, public health services are rendered in a three-tiered healthcare system: primary, secondary and tertiary healthcare levels, as depicted in Figure 1 (87, 89, 90).

Primary hospital, health centre and health posts are all under the primary level of care. Each health post, the lowest primary healthcare level, is staffed by two health extension workers (HEWs) and serves 3,000–5,000 people living in a rural area. One year of study is required for HEWs at Level III. These workers are expected to be familiar with the area they work in and to maintain a registry to know when women are pregnant and are expected to give birth. Although their primary duties focus on maternal and child health, they are also expected to provide health prevention activities while identifying cases that need to be referred to a health centre. As part of GTP II, according to the second Health Sector Growth and Transformation Plan (HSTP II), the current health posts are scheduled to be upgraded to second-generation health posts within ten

years. These will be staffed by HEWs upgraded to Level IV community health nurses, a position that requires two additional years of preparation beyond the basic HEW training (90).

The health centre is the next level up, and each is staffed by mid-level providers, such as nurses (holders of degrees and diplomas), health officers, midwives, laboratory technologists/technicians, druggists/pharmacists and sanitarians. Each health centre manages five health posts and serves 15,000–25,000 people living in a rural area or 40,000 people residing in an urban area. The health centres provide preventive, curative and promotive healthcare services, while referring complex cases to primary hospitals (87, 89, 90). The secondary level of care consists of general hospitals that serve 1 to 1.5 million people. Finally, specialised hospitals are in the tertiary level of healthcare system and serve 3 to 5 million people. However, only major cities have fully functional hospitals that are fully staffed healthcare providers; most of these are in Addis Ababa (87, 89, 90).

The Ethiopian healthcare reform launched in 2010 structured hospital departments into case teams of in-patient, outpatient and preventive departments to enhance ‘one-stop shopping’ for health services. However, the shortage of medical equipment and supplies, supportive technologies (eHealth technologies) and ranges of diagnostic capabilities present a persistent problem (89).

According to the WHO, the Ethiopian healthcare industry is supported by a variety of sources, such as international contributions and loans (46.8%), the Ethiopian government (16.5%), out-of-pocket payments (35.8%) and others (0.9%). The government has been working to establish community health insurance (CBHI) for the general population, and social health insurance (SHI) for those working in the government sector, to achieve universal health coverage (91). However, the health system struggles with low funding and high out-of-pocket expenditures (92, 93) , and public hospitals have a shortage of essential medicines (94, 95). For instance, a systematic review showed that the average national availability of essential medicines in public health facilities is about 70.16%, with an average stock-out of 99.2 days. In such conditions, patients must buy medicines from private drug outlets (94, 95).

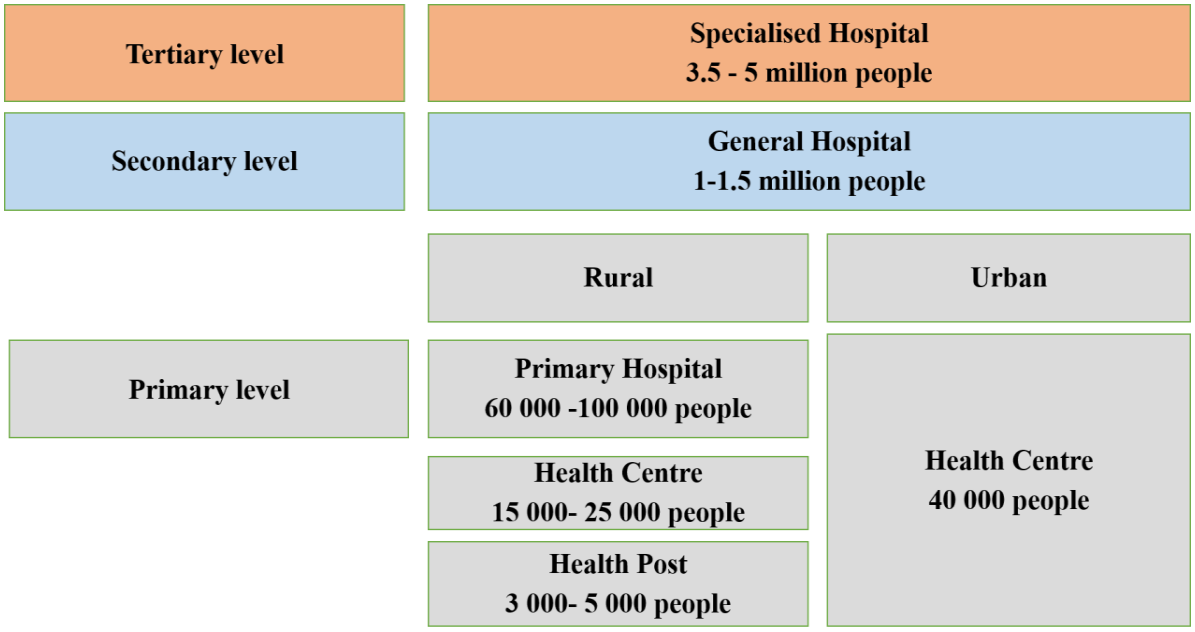

Figure 1 Ethiopia's Three-tiered Healthcare System

Source: Ethiopian health sector transformation plan II (HSTP II)(90)

Nursing and the Health System

Nurses are an integral part of the Ethiopian healthcare system and make up the largest portion of the workforce at all healthcare delivery levels. Nurses are trained through either diploma or bachelor's degree-granting nursing programmes. Until 1991, the diploma programme (currently Level IV nurses) was the highest form of nursing education. It was offered at regional government and private schools and required two-three years of study. Before, it followed the completion of Grade 12 (for those unable to score a high mark for university entrance), and now follows Grade 10. Although diploma- and certificate-level nursing training have a fairly long history in Ethiopia, there was no baccalaureate degree level until Jimma University initiated one in 1991. Subsequently, graduates of this pioneering programme could expand on their degree training at other universities in the country (96).

Bachelor programmes, usually three years for post-basic and four years for generic students in universities or university colleges, lead to a Bachelor of Science (BSc) degree in nursing. Students join this programme to upgrade from a diploma, or if they score high marks on the university entrance exam after Grade 12. The nursing programmes' duration varies; the diploma takes between two to three years and three to four years for Bachelor programmes, as

educational curriculum changes with the regime changes. In addition to their primary roles, nursing staff function as physician substitutes, particularly in health centres.

As in any other health profession, nursing students in Ethiopia pass through four stages of pre-service training. First, they attend theoretical courses in the classroom early in their academic life. They then practice at a discipline-specific and central skills development centre before clinical placement; finally, they participate in a team training programme for two months at a health centre before graduation. In addition, the student nurses must pass a comprehensive examination organised at the university level and a licensure examination by the MOH for BSc-level trained nurses. Diploma-level trained nurses need to pass a competency exam organised by regional technical and vocational education training. Only then can new graduates join the existing workforce.

However, evidence shows a transition-to-practice gap, as some nurses fail to demonstrate the competencies necessary to provide patient care. For example, according to a study from low-income countries, Ethiopian nurses had competencies below the expected national standard, resulting in public dissatisfaction (97). Another study in northern Ethiopia showed that students felt incompetent at graduation (98). According to a survey on patients' perceptions of care, nursing care is of poor quality, nursing care is shown to be of poor quality, with failing patient satisfaction (99, 100).

In Ethiopia, an in-service training programme is a typical initiative to fill the gap when a graduate lacks the necessary knowledge, skills and attitude. However, most of this training is not need-based or evaluated for quality and effectiveness. In addition, the local capacity to develop, offer, enforce, monitor and evaluate continuous, relevant and quality professional development activities is under-developed. For example, according to the 2012–2020 Ethiopian HSTP, training packages were not approved; they were often conducted by inexperienced facilitators at hotels, and managers in charge lacked the ability to administer the programmes (87, 89, 90).

Nurses working in Ethiopian hospitals have other options; instead of a well-organised education programme set by the government, there are in-service trainings organised by non-governmental organisations. As a result, there is no organised system for continuous learning opportunities for nurses after they complete formal education. However, teaching hospitals and regional health bureaus offer fully sponsored educational and career development opportunities,

so even though nurses are unable to pursue additional training on their own, they can attend evening, weekend and summer programmes.

3.5. Foundation of the Programme

As mentioned in the introduction, a nurse-based pain management programme ('the programme') was developed and introduced at JUMC. It was developed to address the random workflow process at JUMC because there was no standard monitoring system for quickly responding to patients, or a call bell system to summon nurses when needed and predictable bedside nurses' responsiveness to patients' requests as nurses were stationed far away from patients, so patients had difficulty finding a nurse on duty with whom they could discuss their pain. The five processes of Kristen Swanson's Theory of Caring (101) and Marie Hutching's caring around the clock model (102) were chosen and used in this study as the foundational framework for guiding the designing process of the programme. The five processes of Swanson's theory of caring were chosen because they provide a framework for alerting nurses to patients' needs and well-being (101). Hutching's caring round-the-clock model was regarded as helpful, as it addresses patient safety and comfort by establishing a rounding structure and system that provides meaningful and predictable nurse–patient interactions (102).

Swanson's Theory of Caring

Swanson's theory was developed based on phenomenological studies of separate perinatal contexts (101, 103). In her work on socially at-risk mothers, she addressed how care could be promoted and maintained in clinical settings, and in 1991 she proposed a variety of circumstances as the five caring processes: knowing, being with, doing for, enabling and maintaining belief (101). Each of these processes has sub-dimensions that form a basis to help patients in attaining, maintaining and regaining an optimal level of well-being (101). The theory of caring process builds on maintaining belief and combines compassion (knowing and being with) with competence (doing for and enabling) to achieve a patient's intended outcomes (101, 103).

Maintaining belief forms the basis for practice and helps nurses to welcome patients with a positive attitude. *Knowing* refers to the desire of a nurse to understand the patient by avoiding making any assumptions about him or her in advance (101, 104). This could prevent random responses and suboptimal care (105). *Being with* is an act of going one step beyond knowing to

being emotionally present for a person in need of care with a sense of compassion, empathy and comfort (104)**.** *Doing for* refers to activities that the nurse performs (101, 103) with professional competency (104) and comfort given through prompt responses, listening, giving time to speak, using touch, eye contact and verbal reassurance (106). Like doing for, *enabling* promotes a self-healing environment to empower patients by providing information, education and counselling (101, 104, 106).

The empirical referents embodied Swanson's Theory of Caring processes, such as intentional presence, showing a commitment to serve, comfort, skilful assessment, listening, educating, informing, counselling and monitoring (104) , suggest the need for regular patient visits. Furthermore, applying the theory has been found useful for several groups of patients, for example in caring for those who are experiencing painful situations, such as miscarriage (107), , stillbirth (108) and dying (109). In addition, this theory has been used effectively to design an educational intervention to engage hospital-based nurses in caring behaviours (110).

Hutchings' Caring around the Clock Model

The term 'rounding' has a variety of connotations in various fields, but generally refers to moving in or around to meet patients' needs (111). Rounding has been a nursing strategy since the era of Florence Nightingale (112) , and the term, when used in nursing literature, is interchangeable with purposeful, hourly, intentional, comfort, safety and bedside rounds (113, 114). Hutchings defined rounding as a means of enabling nurses to connect with patients on a planned, regular basis to anticipate the patients fundamental care needs and guarantee that they receive adequate care (102). Hutchings caring around the clock model is also considered an alternative approach to hourly or intentional rounding (115).

Caring around the clock was first introduced in 2012 at the UK's Nottingham University Hospital. It consisted of staff education and engagement as well as three types of rounding: staff nurse rounding, leadership rounding and senior nurse rounding (102). According to Hutchings, education refers to developing and delivering role-specific interactive trainings or workshops to facilitate nursing care, and to support the cultural transformation required to achieve excellence. Engagement is the method applied to create a shared understanding by involving staff nurses in meaningful around-the-clock caring (102). There are four more types of rounding, based on the purpose, goal, intention and frequency of visits: 1) collaborative rounding, which involves a

group of nurses with varying levels of expertise helping one another; 2) scripted rounding, which employs a standardised script for patient–nurse communications; 3) leadership rounding, involving a nursing leader ensuring quality of care and providing support for staff nurses; and 4) targeted rounding, when specific patients' issues are addressed (111).

According to Hutchings, rounding by staff nurses (also called bedside nurses) creates meaningful nurse–patient interactions so that patients feel comfortable, safe and cared for and confident to ask for anything they need. Leadership rounding is a way to make ward-level managers and nursing directors (matrons) visible, allowing them to receive feedback from patients and to provide feedback, recognition and rewards to staff nurses (102).

Numerous studies have reported on rounding as an administrative tool to improve staff engagement and responsiveness to patient requests, patient care situational awareness and care standards (112, 114, 116-121). In the US, rounding is used to improve the patient experience, whereas the UK National Health Service uses it to make patients feel safe and comfortable (122). Pain management and comfort are critical elements of activity during rounding (122). Previous studies have also reported the effectiveness of rounding in reducing call bell or light use, patient falls and hospital-acquired pressure ulcers, as well as increasing patient satisfaction and staff responsiveness (116, 123-126) in different inpatient units (117, 119, 127, 128).

4. Methods

4.1. Study Design

The study in this thesis followed a quantitative research approach based on a quasi-experimental design using several questionnaires to evaluate the programme that was implemented in JUMC. The proposed plan was to use a control group design. The planned control site was Hawassa University Referral Hospital (HURH), located 572 km from JUMC in another direction in a different administrative region (Southern Nation and Nationalities of Peoples Region). However, the plan was cancelled as the freedom of movement became inhibited by a period of public unrest in Ethiopia – particularly in the Oromia region where the study was conducted. During the study period, internet and phone communication were interrupted, making it challenging to get administrative permissions from HURH and to recruit study subjects. The political landscape in Ethiopia changed, which made traveling between JUMC and the planned control sites impossible. We considered if it was possible to implement the programme in the same units in JUMC and keep others as control. With the potential for information contamination across units, it was challenging to ensure actual control conditions at the in-site control group (129). One contextual reason to abandon the plan with a local control group was the organisation of the nurses where they every sixth month shifted the wards they were assigned to. In addition, since it was difficult to predict when the unrest would stop and the state of emergency lifted, we looked at the time feasibility of finishing the PhD work in a given period and decided to change the design.

To evaluate the programme before and after implementation of the programme, we measured nurses' knowledge and attitudes regarding pain, patient-reported pain experiences and patients' evaluations of pain management. The research was conducted between 1 September 2016 and 15 June 2017. Baseline data on the nurses' knowledge and attitudes regarding pain, patient-reported pain experiences and patients' evaluations of pain management were collected (Survey 1). All nurses working in medical, surgical, gynaecology and maternity units of the JUMC were enrolled in the NIEP. Data about nurses' knowledge and attitudes regarding pain were gathered from the same sample who responded to the first survey. Using the same survey questionnaire, data on patient-reported pain experiences and patients' evaluations of pain management from a second group were also gathered (Survey 2). Rounding was introduced into

the four selected units. Finally, a third group of patients was assessed using the same questionnaire, again, for patient-reported pain experiences and patients' evaluations of pain management (Survey 3).

As described in the research timeline depicted in Figure 2 below, data from nurses (Sub-study I) and hospitalised patients (Sub-studies II and III) were used in this thesis. The data from the nurses were collected at two points: first, the baseline data (Survey 1), and again for the second time after NIEP. The data from the hospital patients were collected on three different occasions from the group of patients present in the hospital at the time of data collection. Baseline data from the first group (Survey 1) were collected parallel to the nurses' survey, then from the following group (Survey 2) – again in parallel to the nurses' survey following the NIEP – and finally, from the third group (Survey 3), immediately after four months of rounding.

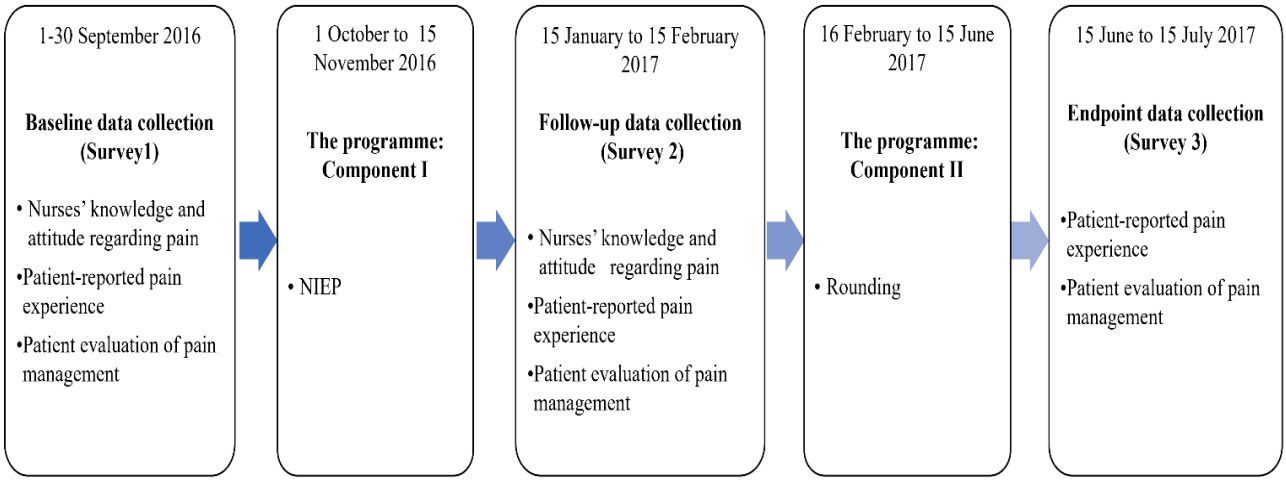

Figure 2: The study Timelines

4.2 Study Setting

The study setting was JUMC, which is located 353 km southwest of Addis Ababa, Ethiopia. It is one of the oldest public referral hospitals, serving 15 million people in the southwest of the country. According to a JUMC administrative bodies, the hospital has 800 beds and provides services to approximately 20,000 in-patients, 200,000 outpatients, 15,000 emergency cases and 4,500 institutional deliveries annually. It provides comprehensive and specialty healthcare through its emergency, ambulatory, in-patient, rehabilitative, preventive and

diagnostic services. These are organised under major units such as surgical, medical, gynaecology and maternity. Each in-patient unit has small male and female bays with eight patients in each. In addition, several other speciality services, such as emergency; paediatrics; neonatology; intensive care; psychiatry; ophthalmology; chronic illness, dialysis; oncology; physiotherapy; and ear, nose and throat are offered. Patients admitted to the centre predominantly speak Afaan Oromo.

JUMC has undergone several name changes since it was founded in 1935 by Italian occupiers to serve their soldiers. It was first named 'Ras Desta Damtew Hospital'. The name was next changed to 'Jimma Hospital', then to 'Jimma University Specialized Hospital', and finally, renamed 'Jimma University Teaching Hospital'. It is now known as JUMC, and the surrounding residents simply call it 'Jimma Medical Centre or Health Institute'. The MOH ran the hospital until its administration was transferred to Jimma University.

Under the supervision of doctors, medical students provide healthcare services at JUMC. As a result, doctors communicate about patients with medical students more often than with the nursing staff.

The nursing management team consists of the nursing director, supervisors, a chief nurse and a shift leader. The nursing and midwifery service director's office manages nursing service personnel whose education and skill levels range from generalists to specialists (very few). Diploma nurses, BSc nurses and MSc nurses make up the qualified staff. The nursing staff work in three shifts: 6 hours in the morning, 6 hours in the evening and 12 hours at night.

There is no evidence of standardised nursing care systems in Ethiopia. Based on personal observations, JUMC uses a nursing assignment system that corresponds to a shift-based total patient care model. In this system, all nurses (all with a degree or diploma-level training) have the same bedside responsibilities, regardless of their educational background. A study on the quality of nursing care in Ethiopia shows a nurse-to-patient ratio ranging from 1:6 to 1:12, based on the institution's caseload and nursing staff availability (99). However, at JUMC, each in-patient unit has a staff share of one nurse (diploma or BSc) per 8–10 patients daily, and the nurses change among patient groups every six months.

4.3 The Programme

The programme consists of two components: 1) development and provision of the NIEP and 2) rounding.

Component I: NIEP

The NIEP was developed to improve nurses' knowledge and attitudes regarding pain. It was based on Ethiopian MOH pain management guideline (31), standard nursing textbooks (130-133), WHO guidelines (32, 134) and other relevant literature (135).

The following areas of pain management were addressed in the NIEP:

- The basics of pain: definitions, pathophysiology and classifications
- Pain assessment and principles of pain care
- Pharmacological and non-pharmacological pain treatment
- Patient education and counselling

Four experts facilitated the training sessions, including two physicians (a paediatric oncologist and an internist) and two nurses (a palliative care PhD fellow and the principal investigator of this study). All the trainers held 'training of trainer' certificates on pain management from Ethiopia's MOH. The training was delivered via interactive presentations, group discussions, practical exercises, case scenarios and take-home reading assignments in the following three ways:

1. Two consecutive days (16 hours, total) of intensive in-person sessions;
2. Facilitation of self-learning through the distribution of reading materials in hard copy, soft copies on compact discs, memory sticks containing the training manual, presentation materials, selected research articles and reference manuals; and
3. Eight hours of follow-up refresher training after one month.

Component II: Rounding

Through rounding, the care flow process was re-organised. The five processes of Swanson's Theory of Caring (101) formed the foundation for re-organising the care flow process, combined with Hutchings' caring around the clock (102). This provided a basis for standardising a routine wherein it was expected that nurses would visit the patients around the clock, and how

they should approach, assess and provide care for patients with pain during these visits. The use of rounding at JUMC was regarded as valuable for the nurses to regularly follow-up with their patients. We targeted and developed specific protocols for three nursing groups who held various positions: staff nurses, shift leaders and nurse leaders (matrons and head nurses), because each held different roles and obligations in the rounding.

Nursing Rounding Support Protocol. When engaged in rounding, the nurse should visit patients every two hours during the day (8:00 a.m.– 8:00 p.m.) and every four hours at night (10:00 p.m.–6:00 a.m.). All staff nurses (also called bedside or enrolled nurses) in the implementation units were instructed to perform rounding, during which each staff nurse was to comply with the protocols described as follows.

At patient's admission, the Swanson's Theory of Caring processes of *enabling and maintaining belief* were used as the framework to guide how the nurses should approach newly admitted patients to JUMC. The nurse was expected to introduce herself or himself to the patient by name, describe her/his role and inform the patient about the rounding schedule and who would be involved. Nurses were also to inform the patient about the goal of pain management, which was to be pain-free during a whole night's sleep, while awake or alert and during physical movement. To achieve this, nurses should read an adapted script (as below) to the patients, which was translated into the Afaan Oromo and Amharic languages:

> We are going to do everything that we can to help keep your pain under control. Your pain management is our number one priority. Given your (condition, history, diagnosis and status), we may not be able to keep your pain level at zero. However, we will work very hard with you to keep you as comfortable as possible (136).

In the Afaan Oromo version:

> *Akka dhukkubiin isinitti hindhagahamneef waanta danadeenyu hunda nii goona. Dhukkubbiin keessan xiyyeefanaa keenya isa duraatii. Haala fayyumaa keessan waliigalaan walqabatee gutumaa guututti dhukkubii yoo hambsuu baannelle isinii waliin ta'uun hanga dandeenye akka dhukkubiin isinitti hinhammane ni goona.*

and in Amharic:

ሕመም እንዳይሰማዎት የቻልነውን ሁሉ እናደርጋለን፤ ለሚሰማዎት ሕመም ቅድሚያ እንሰጣለን። ከአጠቃላይ የጤናዎ ሁኔታ ጋር ተያይዞ ሕመሞን ሙሉ በሙሉ ባናስቀርም ሕመምዎ እንዳይብስቦት እናደርጋለን!

Throughout the patients stay in the hospital, Swanson's processes of *knowing, being with and doing for* was addressed. The nurses were expected to ensure presence, check that the patient was comfortable and, according to the rounding schedule, ask at the bedside how the patient felt. In addition, the nurse should ask the patient to rate their pain using the Numeric Rating Scale (NRS) (76, 77).. During the visit, he/she was to administer the prescribed medication and complete nursing care as needed or scheduled. Before leaving the patient, the nurse was to ask, 'Is there anything else I can do for you? I have time'. The nurses were also responsible for ensuring that they or another nurse (when the shift changed) made rounds again in two hours (during the daytime) or four hours (at night) and explaining to the patient where they could find help if they wanted it between rounds.

Documentation and action: The nurse should document the rounding information in a specific rounding log developed for this study (Appendix 3). The nurse compared the current pain level (at the time of visit) against the prior one and related it to the WHO pain ladder. If the current pain level was higher than before, the nurses were expected to consult the treating physician if a change in pain medication or readjustment of the dose was needed.

*Leadership Rounding Support Protocol***.** Leadership rounding is a process where nurse leaders, including the nursing director, head nurses and shift leader visit patients and meet staff nurses during the different schedules. The head nurse and shift leader should alternate in making patient visits. For example, if the head nurse had conducted rounding in the morning, the shift leaders were expected to do it in the evening. According to the protocol, the nursing director should make visits every week. During each visit, the nurse leaders should check the rounding logs, ensure the patients were comfortable and ask them whether they had any pain. Before leaving the unit, she/he had the obligation to give general feedback to staff nurses on how the programme was working out and answers any questions about the programme.

Rounding Implementation. The rounding programme was introduced in the medical, surgical, gynaecology and maternity units after Survey 2 was conducted and ran for four months, from 16 February – 15 June 2017. Before it was launched, an orientation was held for 165 staff nurses, five nursing leaders (one nursing director and four head nurses), eight shift leaders and six supervisors who monitored staff nurses' compliance with the rounding schedule. The goal of the orientation was to create a shared understanding of the rounding process. The orientation lasted eight hours for staff nurses and four hours for nurse leaders and supervisors. It was delivered through interactive, face-to-face presentations and group discussions that focused on expectations from nurses, nurse leaders and supervisors. The session covered the use of the NRS, the frequency of visits, documentation using rounding logs, how to deliver the scripted dialogue, the use of the WHO pain ladder, when to consult physicians, the roles of nurses by position and explained the monitoring and evaluation system. The principal investigator was also constantly accessible for the nurses during the entire period of the programme, if they needed further clarification on pain management.

Unit-level weekly and overall monthly discussions were organised to strengthen the rounding. The weekly meetings involved staff nurses and shift leaders and were led by head nurses, whereas the monthly discussions were organised for head nurses and led by a nurse director. Head nurses and nurse directors used the following points to guide discussion sessions:

- What is working well?
- What are the barriers?
- Rewards and recognition of success
- Patient feedback
- Feedback on completeness of rounding logs
- The way forward

Nursing directors, nurse supervisors and the principal investigator monitored compliance with the rounding schedule. This included a review of rounding logs, the unit-level rounding monitoring report sheet and the overall monitoring report sheet (Appendix 3).

In terms of rounding schedule compliance, the patients were expected to receive 10 visits per day. However, because fistula patients admitted to gynaecology unit felt discomfort one month into the programme, the frequency of visits for fistula patients was readjusted to twice

per day. The pain level was recorded on a rounding log unless a patient was unconscious, the bed was empty, or the patient was sleeping. As indicated in Table 2 and Figure 3 below, regardless of admission unit, the compliance with rounding was 85%, and the compliance level varied according to the units of admission during the rounding period. Across the periods, nurses in the maternity ward visited patients less frequently than those in the surgical, medical and gynaecology units. The percentage of rounding was calculated from the expected rounding (denominator) and documented rounding (numerator) for each unit.

Table 2. ***Summary of expected and documented frequency of rounds by unit***

Unit	Expected # of rounds	Documented # of rounds	Percent
Surgical	80,393	67,703	84%
Medical	56,490	54,230	96%
Gynaecology	38,759	31,782	82%
Maternity	10,800	4868	45%
Total	186,442	158,583	85%

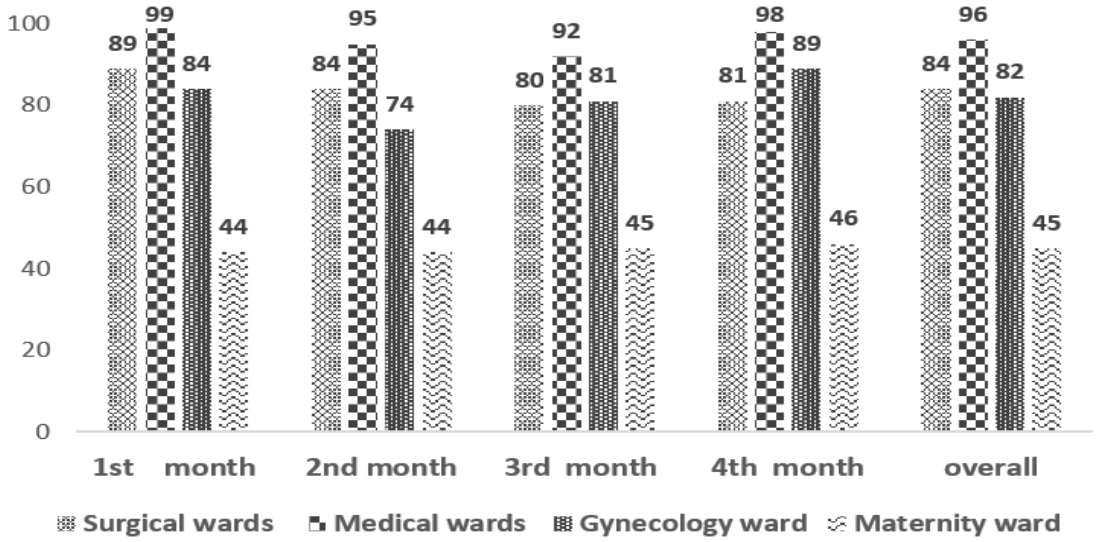

Figure 3. ***Percentage of Staff Nurses' Compliance with the Rounding Schedule, by Unit***

4.4 Study Samples

The study samples in this thesis were nurses working in, and patients admitted to, the medical, surgical, gynaecology and maternity units. As shown in Figure 4 below, Sub-study I was based on the data obtained from 111 nurses who worked in the four units and provided complete responses on both nurse surveys.

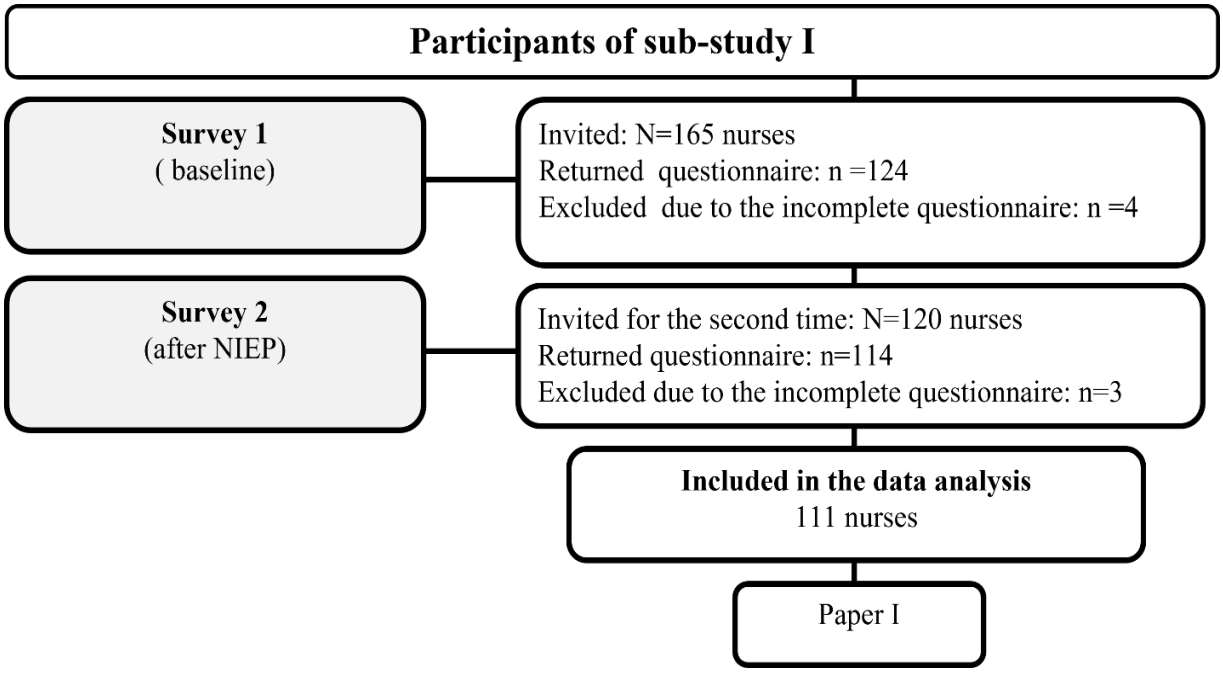

Figure 4. ***Summary of the Nurse Sample.***

As depicted in Figure 5, Sub-studies II and III were based on 782 patients out of the 845 who were invited to participate (256 out of 282 for Survey I, 259 out of 283 for Survey II and 267 out of 280 for Survey III). The sample size in each survey was estimated using the single population proportion formula (137), with a finite population correction (138). To ensure a representative sample from each unit, a proportional allocation to sample size was applied based on the number of beds in the units. All available patients admitted to JUMC during the time of data collection were included (if they fulfilled the inclusion criteria) until the required sample was sufficient. The criteria were patients giving their responses only after at least 24 hours of stay in the units, that they were at least 18 years of age, were not too ill to respond, had no known hearing impairment and had not participated in the prior surveys

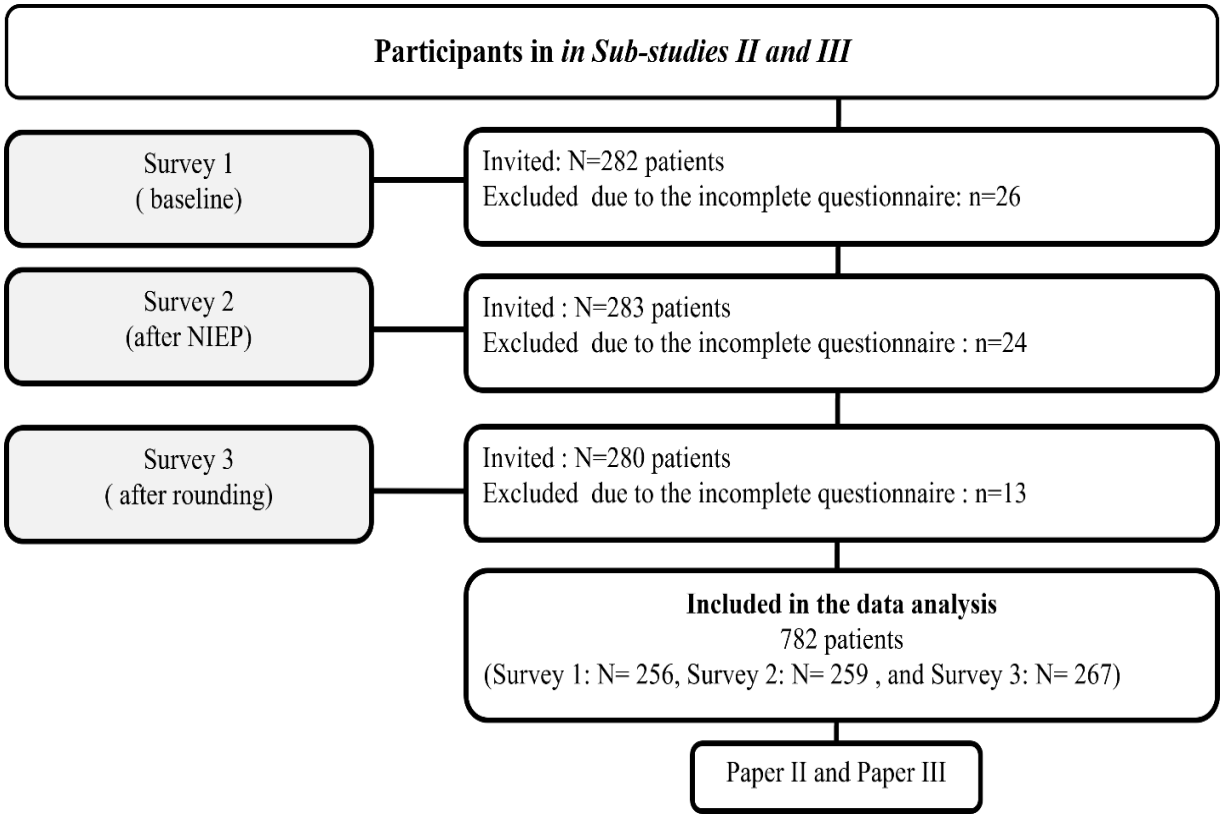

Figure 5. ***The Patient Sample in Sub-studies II and III***

4.5 Measurement

Nurses' knowledge and attitudes regarding pain were measured using a self-administered questionnaire. Patient-reported pain experiences, and their evaluations of pain management, were measured using interviewer-administered patient questionnaires.

Nurse questionnaire: The nurse questionnaire consisted of information about the nurses (gender, educational level, prior in-service training, work experience and work unit) and required them to fill out the Knowledge and Attitudes Survey Regarding Pain (KASRP) before and after the NIEP.

The KASRP was developed by Betty Ferrell and Margo McCaffery and has been widely used since 1987, with revisions over the years to reflect changes in pain management practices. The KASRP was the tool recommended for evaluating pain education programmes. The WHO, the American Pain Society and the Agency for Health Care Policy and Research pain

management guidelines and a panel of pain experts established the validity of the content. The construct validity was confirmed based on the scores of senior pain experts, student nurses, oncology nurses and graduate nurses. In addition, repeated testing at continuing education classes of staff nurses established test–re-test and internal consistency reliability, with items reflecting both knowledge and attitude domains (139).

The KASRP consists of 41 items: 22 true/false questions, 15 multiple-choice questions and two cases with two responses each. It covers pain management, pain assessment and the use of analgesics. Each correctly answered item was assigned a score of 1, with a 0 assigned otherwise. The total score could range from 0 (the lowest possible score) to 41 (the highest possible score) (139).

Previous studies have categorised the KASRP into four sub-scales: pain knowledge, pain assessment, pain drugs and pain intervention (42), or into two subscales: knowledge and attitude (84). However, the developers strongly advise researchers to avoid differentiating items as measuring either knowledge or attitudes; instead, the recommendation is to analyse responses in terms of percentages, complete scores and individual items answered independently by each respondent (139).

Patient questionnaire: The patient questionnaire consisted of items assessing the patient sample characteristics, patient-reported pain experiences and patients' evaluations of pain management (Table 3). Patient sample characteristics, such as admission unit, socio-demographic characteristics (age, gender, living area) and socio-economic variables (education level, occupation, monthly income) were also collected at each survey and described in Sub-studies II and III. Items in the patient survey questionnaire were adapted from the short form of the Brief Pain Inventory (BPI)(140), the American Pain Society Outcome Questionnaire-Revised (APS-POQ-R) (141), the Pain Treatment Satisfaction Scale (PTSS)(142) and the Patient Pain Questionnaire (PPQ)(143).

Table 3. ***Content of the Patient Questionnaire in Respective Sub-studies***

Variable	Paper-II	Paper-III
Sample characteristics [a]		
Gender	×	×
Age in years	×	×
Educational level	×	×
Occupation	×	×
Unit [b]	×	×
Living area	×	×
Monthly income, in Ethiopian Birr	×	
Pain experience variables		
Pain treatment information	×	
Pain intensity [c]	×	
Pain interference [c]	×	
Pain-management evaluation variables		
Patient perceptions of staff responsiveness [c]		×
Patient satisfaction with pain management [c]		×

[a] All variables are self-reported, [b] admission unit, [c] outcome variables

Patient-reported pain experience data were collected using 16 items adapted from the BPI (140) and APS-POQ-R (141). As presented in Table 4, items measured pain experienced in the last 24 hours, pain intensity and pain treatment information and were adapted to the context from short form of BPI (140), while items measuring pain's interference with physical and emotional functions (except those used to measure the level of pain interference with relationships to others) were adapted to the context from the APS-POQ-R (141).

The pain experienced in the last 24 hours, other than minor headaches, sprains and toothache, were measured as yes/no responses. To assess pain treatment information, patients were asked to tell the type of pain medication they had used. Pain at the worst, least and average in the last 24 hours and 'right now' (at the time of the survey) were measured on a scale from 0 (no pain) to 10 (worst pain imaginable). The NRS was used to measure pain intensity levels both during rounding and data collection. Besides being simple for both patients and nurses to use, the NRS is sensitive to change and correlates with other pain intensity measures (79). Evidence has shown that the 11-point (0–10) NRS performs better than the VAS and simple 4-point descriptive scales (79). A score of zero (0) on NRS represents no pain; pain levels 1–3 are considered mild pain, 4–6 are regarded as moderate, while severe pain is noted if the score is 7 or above (144).

Patients were asked to rate their pain interference level with physical functions (sitting up in bed, turning in bed, walking, standing, squatting, using a wheelchair and dressing), deep breathing and coughing exercises (only for postoperative patients) and sleeping (falling asleep and staying asleep). They were also asked to rate their pain interference with emotional function (mood disturbance, such as anxiety, depression, feeling frightened or feeling helpless) and relationships with others. All functions were measured on an 11-point rating scale (0 = no interference, 10 = complete interference). An interference score of 0–2 indicated mild interference, 3–4 indicated moderate interference and 5 or greater indicated severe interference (144).

Table 4 ***Items Used to Assess Patients' Experiences of Pain***

Variables	Source	Item/s	Scale/Response
Pain other than *minor headaches, sprains, and toothache* in the last 24 hours	BPI [a]	• In our life, most of us have had pain *such as minor headaches, sprains, and toothache* from time to time. Have you had pain other than this kind of pain in the last 24 hours?	1. Yes 2. No
Pain intensity	BPI	• Pain at its worst in the last 24 hours? • Pain at its least in the least 24 hours? • Your pain on the average? • How much pain you have right now?	The patient is asked to rate their pain on an 11-point NRS [c] (0 = no pain and 10 = worst possible pain)
Pain treatment information	BPI	Which pain control methods (if any) have you used since you were admitted?	The patient was asked to s identify the types of pain treatment used
Pain interferences	APS-POQ-R[b]	Interference with physical function Activity in bed (turning, sitting up, repositioning) Activities of daily living, such as walking, sitting in a chair, standing, squatting, using a wheelchair, dressing Falling asleep Staying asleep Deep breathing and coughing (post-op patients) Interference with emotional functions Relationships with other people[d] Anxious Depressed Frightened Helplessness	Patients were asked to rate their pain's interference on an 11-point rating scale with 0 = no interference and 10 = complete interference

[a] Brief Pain Inventory, [b] American Pain Society Outcome Questionnaire-Revised, [c] Numerical Rating Scale, [d] item source from BPI

Like patient-reported pain experience data, patients' evaluations of pain management were also collected from each patient sample using nine items adapted from the APS-POQ-R (141), PTSS (142), and PPQ (143). As shown in Table 5, the nine items were subdivided into items measuring patients' perceptions of staff responsiveness and their satisfaction with pain management. Patients were asked to reply yes/no to whether the nurse informed them that pain treatment was very important, and that they should tell the nurses if they had pain. To assess the staff's responsiveness, patients were asked to choose the longest time they waited to get pain medication from the provided options. Patients were also asked to rate their satisfaction with pain management as 5=strongly satisfied, 4=somewhat satisfied, 3=neither satisfied nor dissatisfied, 2=somewhat dissatisfied or 1= strongly dissatisfied (142). Table 5 provides a description of the category, number and sources of items with possible responses.

Table 5. ***Items Used to Collect Patients' Evaluations of Pain Management***

Variables	**Source**	**Item/s**	**Scale/Response**
Patient's perceptions of staff responsiveness	APS-POQ-R [a]	Earlier in your care, did a nurse make it clear to you that the health care provider considers the treatment of pain very important and that you should be sure to tell them when you have pain?	1.Yes 2. No
	PPQ[c]	When you asked for pain medication, what was the longest time you had to wait to get it?	1. 30 minutes or less 2. 31-60 minutes 3. More than one hour 4. Never asked for pain medication
Patient satisfaction with pain management	PTSS [b]	The information you received about your pain and treatment The care provided by the nurses for your pain and its treatment The form of medication (pill, capsule, injection, etc) How often you take your medication The amount of pain medication you take The level or amount of pain relief provided by your pain medication The duration of pain relief provided by your pain medication	The patient was asked to rate his or her level of satisfaction with each question about the pain care he or she received by answering as follows: 5. Strongly satisfied 4. Somewhat satisfied 3. Neither satisfied nor dissatisfied 2. Somewhat dissatisfied 1. Strongly dissatisfied

[a] American Pain Society Patient Outcome Questionnaire-Revised. [b] Pain Treatment Satisfaction Scale. [c] Patient Outcome Questionnaire.

4.6 Data Collection

The initial contact with the nursing staff was made through units' head nurses or shift leaders. Based on the ward roster, a code for each nurse was generated to maintain anonymity. Nurses were told to remember their code and to enter it at the top right-hand side of the questionnaire. The researcher then distributed a paper envelope containing the consent form and questionnaire before and after the NIEP, to compare participants' knowledge and attitude test scores. The questionnaire took 30–45 minutes to complete. The head nurses or shift leader collected the completed questionnaires and kept them in a secured cabinet. The principal investigator collected the questionnaire from the head nurse's office daily.

Before data collection, the patient survey questionnaire was forward-translated into Afaan Oromo and Amharic by healthcare professionals, English language experts and non-healthcare personnel (faculty at Jimma University). It was then back-translated into English by another English language expert to suit the context of the study subjects. All translators then met to discuss the translated items. Following this, we conducted cognitive interviews (145) with five people from different backgrounds to check how each item was understood. The tool was then tested on 35 patients from different units, to clarify the wording and sequence of items.

Nurses working in units other than surgical, medical, gynaecology and maternity were recruited based on their prior experience and trained by the principal investigator to act as data collectors. Patient responses were collected through face-to-face interviews. Units' head nurses or shift leaders made initial contact with the patients. Each study subject was interviewed at their bedside for approximately 40–45 minutes. The principal investigator collected the completed questionnaires daily and stored them in locked cabinets.

4.7 Data Analysis

All nurse and patient questionnaires were checked for completeness, to ensure the data quality, before being entered into the statistical software. All statistical analyses were performed using SPSS Version 20.1 for Windows (146) and additionally robust regression in Sub-study III, which was carried out using Stata Version 17 (147).

Sub-study I

The outcome variable measured in Sub-study I was nurses' knowledge and attitudes regarding pain. Only data from nurses who returned the completed questionnaire both at baseline and after the NIEP were included in the analysis. Correct answers for each item were summed up for each nurse, both at pre- and post-tests, and the difference between the post-test and pre-test scores was computed to determine if there was a change in the pre-test and post-test on the nurse's mean KASRP score. Descriptive statistics (mean and standard deviation) were employed to summarise nurses' KASRP scores. Sample characteristics were presented as frequency percentages. Parametric and nonparametric tests were employed based on the distribution of the value of outcome variables. The assumption for normality was checked, and the difference in post-test and pre-test mean KASRP scores was not normally distributed. Hence, Wilcoxon's signed rank test was used to test the difference in the mean rank of nurses' KASRP scores. The Mann–Whitney U test was applied to check whether nurses' KASRP pre-test and post-test scores differed according to their gender, educational level and prior in-service training. The Kruskal–Wallis H test was performed to analyse if the differences in the mean KASRP varied by working unit. Finally, the McNemar test was used to compare the proportions of each correctly answered KASRP item before and after the NIEP.

Sub-study II

The outcome variables in Sub-study II were patient-reported pain intensity and pain interference with physical and emotional functions. Descriptive statistics (mean and standard deviation) were employed to summarise patients' pain intensity and pain interference to compare values among surveys. Sample characteristics and pain experienced in the last 24 hours other than minor pain were presented as frequency percentages. The pain intensity and interference items were measured from 0–10 NRS and treated as a continuous scale. One-way ANOVA was used to determine differences in the mean pain intensity scores and pain interference between samples in each survey. It was chosen because it allowed us to determine if there was a difference in the sample mean pain intensity and pain interference between the three surveys (148).

Sub-study III

The main outcome variable in Sub-study III was patient satisfaction with pain management. Descriptive statistics (mean and standard deviation) were employed to summarise satisfaction with pain management, to compare values among surveys. Sample characteristics, pain treatment information and patients' perceptions of staff responsiveness were presented as frequency percentages. The pain management satisfaction items were measured using a Likert scale and treated as a continuous variable. Crude comparisons of baseline characteristics among surveys were conducted using chi-square tests for categorical variables and t-tests for continuous variables. A fitted robust regression model adjusting for the admission unit was made to determine the programme's influence on patient satisfaction. The differences in survey samples were presented as regression coefficients (B) with 95% confidence intervals (CI). All analyses were considered exploratory, so no correction for multiple testing was done.

A *p*-value of less than 0.05 was considered statistically significant for all statistical analyses. The summary of data analysis methods with outcome, instrument and sample for each sub-study are presented in Table 6.

Table 6. ***Summary of Study Method, Sub-studies I–III***

Study	Sub-study I	Sub-studies II and III
Outcome	Nurses' knowledge and attitudes regarding pain	Patient-reported pain experiences Patients' evaluations of pain management
Instrument	KASRP [a] questionnaire	Adapted from the PBI [b] APS-POQ-R [c], PPQ [d] and PTSS [d,]
Sample	Nurses	Patients
Statistical test	Wilcoxon's signed-rank test, McNamar's test, Mann–Whitney U test, Kruskal–Wallis H test	One-way ANOVA for Sub-study II and robust regression for Sub-study III

[a] Knowledge and Attitudes Survey Regarding Pain. [b] Brief Pain Inventory. [c] American Pain Society Patient Outcome Questionnaire. [d] Patient Pain Questionnaire. [P]ain Treatment Satisfaction Scale.

4.8 Ethics Approvals

Studies in this thesis were conducted per regional, national, and international research regulatory guidelines (149), based on the principles of the Declaration of Helsinki (149) and the Norwegian Health Research Act for medical and health research (150). In accordance with these guidelines, the study protocol was submitted to the Norwegian Centre for Research Data (NSD) (project number 48349). Before data collection began, ethical approvals were also obtained from the Institutional Review Board of Jimma University, Institute of Health (JUIH), and administrative permission was obtained from the former JUTH (now the JUMC). During data collection, we gave all participants a written informed consent form, and they were told that involvement in the study was voluntary and that it was possible to withdraw from giving responses during data collection (Appendices 1 and 2). Those who agreed to take part signed their consent, and the form was returned to us. Upon completion of the educational programme, each nurse participant was issued a certificate.

5. Main Results

This section presents the summary of the sample characteristics and the main results from Papers I, II, and III.

Overall Sample Characteristics

Paper I was based on the data from 111 nurses with an overall response rate of 67.3% (75% at pre-test and 92.0% at post-test). The sample included male and female nurses with varying levels of education and experience who worked in surgical, medical, gynaecology and maternity units. Eighty-eight (79.3%) of the nurses had service experience of less than or equal to five years, while 19 (17.1%) had more than five years of experience; four nurses did not respond to questions on their work experience. Ninety-nine (89.2%) had no prior in-service training regarding pain management, while 12 (10.8%) reported that they had prior in-service training. However, the content and the depth of the training was unknown. A further description of the nurse samples is provided in Table 7.

Papers II and III were based on three patient samples (256 in Survey 1, 259 in Survey 2 and 267 in Survey 3) from the three surveys that together comprised 782 hospitalised patients admitted to JUMC's four units. Each survey sample included patients from urban and rural areas with similar socioeconomic and sociocultural backgrounds. There were no statistically significant differences in the distributions of sample characteristics by survey period, except for the unit of admission, where the proportion of surgical unit patients was significantly lower in the subsequent surveys, compared to Survey 1 (Table 7).

Table 7. S*ample Characteristics*.

Papers	**I**	**II&III**		
Study Participants	Nurses	Patients		
		Survey 1	***Survey 2***	***Survey 3***
Number of participants invited	165	282	283	280
Included in the data analysis	111	256	259	267
Age (years), Mean (SD)	26.9 (5.6)	38.1 (16.2)	37.4 (15.2)	37.9 (5.2)
Gender				
Male, n (%)	44 (39.6)	125 (48.8)	139 (53.7)	134 (50.2)
Female, n (%)	66 (59.5)	131 (51.2)	120 (46.3)	133 (49.1)
Missing	1			
Unit				
Surgical, n (%)	50 (45.0)	133 (52.0)	104 (40.2)	98 (36.7)
Medical, n (%)	28 (25.2)	86 (33.6)	89 (34.4)	101 (37.8)
Gynaecology, n (%)	11 (9.9)	20 (7.8)	34 (13.1)	34 (12.7)
Maternity, n (%)	22 (19.8)	17 (6.6)	32 (12.4)	34 (12.7)
Occupation				
Farmer, n (%)		151 (59.0)	133 (51.4)	148 (55.4)
Government employee, n (%)		28 (10.9)	44 (17.0)	29 (10.8)
Self-employed, n (%)		36 (14.1)	41 (15.8)	35 (13.1)
Unemployed, n (%)		37 (14.5)	39 (15.1)	55 (20.6)
Missing		3	6	1
Educational level- Patient participant				
No formal education, n (%)		151 (59.0)	150 (57.9)	171 (64.0)
Formal education, n (%)		102 (39.8)	103 (39.8)	95 (35.6)
Missing		3	6	1
Educational level - Nurse participant				
Diploma, n (%)	58 (52.3)			
BSc degree, n (%)	52 (46.8)			
Missing	1			
Work Experience				
<1 year, n (%)	13 (11.7)			
2–5 years, n (%)	75 (67.6)			
6–10 years, n (%)	13 (11.7)			
>10 years, n (%)	6 (5.4)			
Missing, n (%)	4 (3.6)			

Nurses' Knowledge and Attitudes Regarding Pain (Paper I)

The mean post-test score was significantly higher than the pre-test score on nurses' KASRP after the NIEP. The change in the mean KASRP post-test–pre-test score was statistically significant ($p<0.001$). Nurses with prior in-service pain training and those working in the maternity unit had lower mean scores on both the pre-and post-tests, compared to the other groups. These differences were statistically significant between those who had no prior in-service training and had training, and between maternity nurses and those who worked in the surgical and medical units.

Patients' Pain Experiences (Paper II)

Patients were asked to rate their pain intensity 'right now' (at the time of data collection) and the worst, least and average pain in the last 24 hours on an 11-point (0–10) NRS. The mean pain intensity level at the time of data collection (right now) and at its worst, least and average in the last 24 hours were lower after the programme, compared to the baseline value. The differences were statistically significant between Surveys 3 and 2, and between Surveys 3 and 1 for the worst pain, least pain and pain right now ($p < 0.05$). However, the reduction in the mean score for pain intensity on average during the last 24 hours was statistically significant among all three surveys.

Following the two-component programme, the proportion of patients who received pharmacological agents increased from 62.9% in Survey 1 to 71.8% in Survey 2, and 75.3% in Survey 3. Patients were also asked to rate the level of pain interference on an 1l-point (0–10) NRS to determine if pain interfered with their physical and emotional functioning. Except for activities out of a hospital bed (such as walking, sitting in a chair, standing, squatting, using a wheelchair and dressing), the mean scores for pain interference with physical functions were significantly decreased in all items between Surveys 3 and 2, and between Surveys 3 and 1. Moreover, the mean level of pain interference with relationships and negative feelings (anxiety, depression, feeling frightened and helpless) were significantly lower in Surveys 2 and 3, compared to Survey 1.

Patients' Evaluations of Pain Management (Paper III)

Paper III was about patients' evaluations of the programme regarding nurses' responsiveness and patients' satisfaction with pain treatment information, pain care provided by nurses and the medication regimen. The proportion of patients who reported that the nurses considered their pain's treatment increased significantly, from 68.8% in Survey 1 to 82.7% in Survey 2, and then to 89.5% in Survey 3. Patients' reports of timely staff responsiveness when they requested and received pain medication within 30 minutes increased from 66.8% in Survey 1 to 71.1% in Survey 2, and to 74.2% in Survey 3, but this change was not statistically significant.

The level of patient satisfaction was statistically significantly higher for all the assessed items in Survey 3, and for a majority of the items in Survey 2, compared to Survey 1. The satisfaction score for the information they received about pain and treatment was 0.74 points higher at Survey 3 than in Survey 1. The patients' rate of satisfaction with the care provided by nurses was 0.72 points higher in Survey 3, compared to Survey 1. There was no statistically significant difference in patients' satisfaction regarding the form of medication (pill, capsule, injection) between Surveys 2 and 1; however, in Survey 3, the patients were, on average, 0.24 points more satisfied than in Survey 1. For how often they took pain medication, the score was higher in Surveys 2 and 3 than in Survey 1, with a two-fold increase between Surveys 3 and 1, compared to Surveys 2 and 1. A similar trend in higher rates of satisfaction was observed for the pain medication they took, the amount of pain relief provided and the duration of pain relief in Surveys 2 and 3, compared to Survey 1. The increase from Survey 1 to 3 was about twice as large as the increase from Survey 1 to 2 for all the assessed items. Overall, the scores were 0.27 points higher in Survey 2 and 0.49 points higher in Survey 3 than in Survey 1. Among the admission units, the highest point increase was achieved in the surgical units, and the lowest was in the maternity ward for all the analysed items.

6. Discussion

The aim of this thesis was to evaluate a novel nurse-based pain management programme implemented at JUMC. A quasi-experimental design was employed to investigate the influence of the NIEP on nurses' knowledge and attitude scores (Paper I), patients' experiences of pain (Paper II), and patients' evaluations of pain management (Paper III). In this section, the main findings of the thesis, methodological considerations and ethical considerations are discussed.

6.1. General discussion of the main findings

Health services aim to deliver high-quality care (60, 151). Adequate pain management has shown to contribute to the quality of care so that the patients experience a least possible level of pain (33). The main finding in this thesis revealed that, compared to baseline, the patients experienced lower pain intensity after the nurses had participated in the NIEP, and once rounding was organised and included in nursing care. Likewise, less pain interference with physical and emotional function was reported in the second and third surveys (Paper II). The main findings will be discussed considering the appropriateness of the programme, addressing the patients' evaluation of nurses' responsiveness, their satisfaction with the information they received about pain and pain treatment, the care provided by nurses and the medication regimen (Paper III), as well as the identified changes in nurses' knowledge and attitudes (Paper I). The socio-cultural contexts and feasibility of the programme's implementation will also be considered.

Nurses must be educated to a level that provides them with the necessary knowledge, attitudes and skills to fulfil their obligations regarding pain management (43, 44, 84-86). However, staff capacity development alone has shown not to be enough to improve pain management practices unless an organised workflow process is in place (44) to enhance regular pain assessment and the proper use of existing pain management methods (46).The findings in our study indicate that choosing an in-hospital education programme and applying Swanson theory of caring (101) combined with Hutchings rounding model (102) as a framework to re-organise the nurse pain management seems to be useful in an Ethiopian hospital context. The NIEP, showed to provide the nurses with the opportunity to learn about the basic principles of pain management (Paper I), whereas rounding, systematised the nursing pain management process (Paper III).

The framework provided guidance for how nurses should interact with newly admitted patients in order to achieve and maintain their optimal level of wellbeing on a planned and routine basis in order to provide basic care and ensure that they receive adequate pain management (101, 104). The guidance could have facilitated beneficial nurse-patient interactions, enabling patients to feel safe, cared for, and confident enough to request anything they need (102). Hence, this might have contributed to the findings that patients' experience of lower pain intensity (Paper II) and a higher rate of patient satisfaction with pain management (Paper III). These findings are in line with previous studies that also have reported that rounding increases patient satisfaction and staff responsiveness (116, 123-126). The benefits from reorganising nursing pain management might have contributed to changes in practices, ensuring high-performance standards, improve patient experiences and increase patient satisfaction (104). As a result, it could be suggested that the programme facilitated change through a systematic reorganisation process that took JUMC from a traditional reactive approach to pain management to a system that was more proactive.

When considering the program's impact on pain management, several factors should be accounted for. For example, to what extent it is the program itself or the principal investigator's availability have impacted the nurses' compliance with the program, has been outside the aim of this study to be investigated. Likewise, the leadership tradition might have influenced the findings. In Ethiopia, politics influences the health sectors; relatively inexperienced young people hold leadership roles, and there is frequent turnover in these positions. Studies have also revealed that public health facilities in Ethiopia are characterised by hierarchical organisational cultures, authoritarian control and limited leadership capabilities (152, 153). Such organisational attributes and leadership styles may fail to support teamwork that encourages an increase in professional commitment to change (154) and might influence the implementation of evidence-based practices (155). In the programme, the nurse managers were involved in the planning of the programme as well as conducting rounding themselves and facilitating discussions weekly and monthly to assess how rounding worked.

Flowers et al. reported that staff engagement, ownership, ward layout, patient acuity and time management culture affect the level of success in the implementation of rounding (156). Likewise, Deitrick et al. reported that some nurses overwhelmingly viewed rounding as more work, a challenging task due to competing priorities, and because they perceived it as a top-down

process imposed on them, they did not feel a sense of ownership (157). However, other studies have reported that nurses perceived rounding as valuable to the patient (121, 158), and nurse leaders perceived rounding as a helpful tool (124). Leadership support in rounding might have improved the time to care by engaging nurses in meaningful conversations with patients (159). These and regular visits enabled nurses to identify (102) and manage patients in pain by communicating using scripts (136). Though our study lacks information on the benefits, drawbacks, obstacles and potential enablers of the programme from the nurses and nurse leaders' perspectives, their accomplishment of the planned rounding schedule (85% for nurses, compared to 50% for nurse leaders) indirectly reflects their perceptions of the programme. After the programme was over, JUMC chose to continue regular pain assessment by including it in the standard vital sign sheet that is used in the hospital. However, it is not known if this took place because JUMC perceived the benefit of the programme and wanted to keep doing pain assessments, or because of advocacy for pain-free hospital initiatives by the MOH (25). Nevertheless, how the programme may have helped them to implement the pain assessments could be a part of future research work.

According to the script the nurses were expected to follow, the patients were informed that pain control was JUMC's top priority. The standard script read to every patient at the time of admission might have informed and made them feel safe about being properly managed for pain during their stay. This information might have helped patients feel confident requesting pain relief, even in between regular visits, rather than fearing being labelled as a 'difficult' patient or thinking that the healthcare providers could treat pain as part of their disease condition (39-41). This is supported by the observations that the percentage of patients who perceived that the nurse informed them that pain management was the focus at JUMC increased significantly, from 68.8% at Survey 1 to 82.7% at Survey 2, and then to 89.5% at Survey 3. Similarly, patients rated their satisfaction higher with the information they received about pain treatment and the care provided by the nurses about pain and its treatment (Paper III).

After the programme introduction, nurses' responses to patient requests were improved, and they were treated with pain medications in a timelier manner (Paper III). Following their participation in pain management education, the nurses may have gained confidence (160).

According to Blakely et al., nurse rounding increases overall patient satisfaction rates in medical–surgical units (116). A quasi-experimental study in an Ethiopian referral hospital also revealed a better patient satisfaction rating when nursing care was provided under hourly rounding (161). An earlier study did a realistic evaluation of intentional nurse rounding and revealed that the motivation to initiate rounding varies by country. For example, in the UK, the National Health Service has initiated rounding in response to the lack of patient-centred care, while in the US, it was initiated to improve patient experience scores. In the US, Australia and the UK, rounding activities typically target position changes and body elimination, in addition to pain (122). However, unlike the other studies, our programme emphasised pain management and considered the need for leadership to support rounding, engagement orientation and knowledge upgrades. Our study found that the level of patient satisfaction was statistically significantly higher for all the assessed items after rounding was implemented in JUMC (Paper III).

The results showed that the proportion of patients who requested pain medication and received it within 30 minutes was higher in Surveys 2 and 3, although the differences were not statistically significant (Paper III). This is supported by moderate-strength evidence from one systematic review that an hourly rounding programme improved nursing staff responsiveness (162). Though we did not follow how each nurse responded to the patients' requests, we assume that nurses followed the activities outlined in the rounding support protocol for pain management during each visit.

A scoping review of pain management found that pain management education programmes enhance practice by promoting improved skills in critical thinking, leadership, patient management, health promotion, and the ability to practice across a variety of inpatient settings (85). A Kenyan study more relevant to the Ethiopian context also found that educational interventions influenced nurses' knowledge of and attitudes toward pain (42), which subsequently enhanced their capacity to manage pain and improve patient outcomes (42, 85). Our study found similar results related to the patient-reported medicine use and the nurses' knowledge and attitudes toward pain. At Survey 1, 62.9% of the patients reported use of pharmacological agents. After the introduction of NIEP it increased to 71.8% and after rounding to 75.3% (Paper II). In a similar manner, the nurses KASRP score increased from 17.0 at pre-test to 25.8 post-test, out of the maximum possible score of 41 (Paper I). This finding is consistent with a scoping review of pain management (85), which found nursing skills are required for

effective pain management. Furthermore, the abovementioned Kenyan study also found that the mean KASRP scores of 18.4, 28.0 and 27.6 out of the maximum possible score of 40 at baseline, first follow-up and second follow-up assessment, respectively, following a pain management programme (42). However, the fact that the nurses' mean KASRP score in our study was much lower than the highest possible score of 41 might indicate the participants faced some limitations in their pain management competency. For example, it was identified that most nurses did not correctly answer the KASRP items assessing opioids, the use of adjuvants and the complication of pain medications (Paper I, supplementary material).

In the current study, male nurses (59.5%) had lower mean KASRP scores both at pre-test and post-test, compared to female nurses and nurses working in the other units (Paper I). Though we did not address how the variation in the level of motivation affected knowledge uptake in our study, a study from Malaysia revealed that male nursing students were less motivated to learn, due to social stereotypes and a lack of male role models (163). Other studies also showed that some nurses might be less motivated to learn due to competing economic and social interests (164), or the workplace culture (165), which may result in them exerting less effort or being reluctant to use the material for independent learning activities. On the other hand, White, Summer and Scott (2018) identified that a change in pain knowledge did not significantly predict any clinical outcomes (166). Furthermore, Brake stated that post-test knowledge and attitude changes might not signify actual changes in practice (160). However, since we reorganised the nursing care process, which might help them apply their pain management knowledge and skill, this might not be the case in our study. These mixed findings indicate that more studies should be conducted.

The higher patient satisfaction level related to their medication regimen in Surveys 2 and 3 might be attributable, in part, to the nurses' assessment and reassessment of pain (167) and patients being treated in a timely manner with appropriate pain medication (168). By contrast, according to a study conducted in 15 hospitals in Catalonia, Spain, patients often experienced pain in hospital settings, despite the widespread use of analgesics. This may be because of low adherence to the principles and recommendations of pain treatment guidelines (169). The current study did not investigate the extent to which the patients were treated for pain per the suggested WHO analgesic ladder (170); however, it might make it easier to follow these guidelines if re-organised nursing care and the NIEP are implemented per the protocol. For example, patients

rated their satisfaction higher with the form of pain medication (pill, injection), the amount of pain medication and the level of pain relief compared to the baseline (Paper III). However, previous study noted that patient satisfaction may be mixed up with the sum of all interactions in the process of getting care, and hence may not reflect solely the pain management (171, 172).

Sociocultural contexts affect pain perception (173) depending on how people tolerate, react to, view, and cope with pain (174). According to Hsieh et al., for example, in Chinese culture, those who value stoicism avoid talking about pain or use indirect language when reporting pain to people who do not share the same ethnic group (70). Although our study included patients and nurses from different ethnic backgrounds, we did not assess how the perception of patients about pain affected their reports of pain or satisfaction with pain management, or how that of the nurses affected their responses to patients' requests for pain control. However, the fact that we identified that most nurses did not correctly answer the KASRP items assessing subjective feelings of pain (Paper l) may be related to contextual factors, or to an attitude that Ethiopian healthcare professionals lack social empathy in evaluating patients' ability to cope with pain (36). Even though there is no population-based study about pain perception in Ethiopia, a study on Ethiopian refugees showed that they believe that wind causes pain, and they prefer injections over tablets; many also use bloodletting and cupping for pain relief (63). These is in line with our findings that patients' use several non-pharmacological therapies, such as massage, prayers and cold or hot applications (Paper II).

In general, the reduced patient pain intensity levels and less pain interference with physical and emotional functions may point towards the benefits of the programme as a stimulus to rethink how to improve healthcare providers' and organisations' efforts for better in-hospital pain management (36), beyond simply making necessary medications available and formulating treatment guidelines (31, 33, 134).

6.2. Methodological Considerations

This thesis is the first of its kind in a resource-limited setting like JUMC to address professional and systemic impediments to adequate pain management. It has several methodological considerations, which will be accounted for in the following sections.

Study Design

The current study could have benefited from using a quasi-experimental design with a control institution or randomised control trial with data collection on cohorts, rather than employing one group pre-test and post-test design (Paper I) and a separate sample pre-test/post-test (Papers II and III) (175, 176).

However, due to unforeseen political situations, as described in the method section, the initial plan changed due to the inhabitants' lack of freedom of movement that started in late 2014 and led to the declaration of a state of emergency in 2016, which happened between Surveys 1 and 2, when we planned to initiate the NIEP and conduct Survey 1. Although forced to abandon our plans to use a control group, the quasi-experimental design made it easier to implement programmes on already-grouped subjects – like in-patients, as in this thesis –aiming to detect changes in the dependent variable(s) at a different point in time (175, 176). This approach is recommended when experiments are impossible because of ethical, political and/or financial constraints (177). The adjusted design limits the ability to attribute patient reports about pain intensity, pain interference, staff responsiveness and patient satisfaction with pain management to the novel nurse-based pain management programme.

Despite the above, a separate sample pre-test–post-test design is advantageous, as it avoids testing bias, selection bias and loss of follow-up (178, 179). For example, a study participant's experience and awareness may vary between surveys and result in higher or lower scores on their pain intensity, pain interference and satisfaction ratings. This would result in a testing bias if the same sample were used. Due to the probability that research participants lost to follow-up may have a different prognosis from those who remained in the study, a prospective cohort design might lessen the chance that the findings would be misinterpreted (179). Since our study samples were patients available during the data collection periods, and the compared groups were similar in their sample characteristics (except for the proportion of patients from the surgical unit, which occurred by chance), the chance of selection bias was limited (178).

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Validity

Although we have no study that employed a similar approach to act as a comparison, the fact that the programme introduced its relevance for routine practice into the existing system suffices as typical applied research (180). The implementation was monitored using a rounding log that included the visit time, documentation key, staff initials and the shift when the visit was made, to ensure the rounding quality (Appendix 3). However, though 165 nurses participated in the NIEP, engagement orientation and rounding, we did not evaluate if there was a difference in pain management practices between those nurses who responded completely to both the pre- and post-tests (67.3%) and those who did not.

The synergy between the educational programme for nurses and the reorganisation of care might result in lower pain intensity and lesser pain interference with physical and emotional functions for patients. However, the programme has more than one interconnected component (181) and was also implemented in several units where patients with various medical difficulties were hospitalised. For example, in addition to the programme that consisted of the NIEP and rounding, the nurses were also instructed to consult the responsible physician if a medication change was needed. The use of explicit criteria, such as using a script in the rounding, might also be questioned, as they did not address individual differences or the appropriateness of the entire programme for individual patients and may be contrary to the idea of patient-centredness. To compensate for this, the principal investigator was available during the entire period of the programme, if the nurses needed support or had questions that needed clarifying. One important event was that the frequency of nurse visits for fistula patients admitted to the gynaecology unit was revised from every two hours during the day and four hours during the night to twice daily, which made the programme more pragmatic.

The type of pain may be a confounder and might be associated with the outcome (182). For example, a previous study showed that patients characterise nociceptive and neuropathic pain differently, and the response to treatment also varied (183). According to a US national survey, evidence from in-hospital data revealed that post-surgical pain was the most prominent pre-surgical patient pain concern (16). Up to 86% of patients have pain following surgery, with more than 75% characterising their pain as moderate to severe (16). We have no indication that the sample composition would vary between the three surveys. We collected background

information to check whether our assumption was correct and found that the proportion of patients from surgical units was smaller in the subsequent survey. Since surgical intervention involves somatic and visceral organs associated with severe pain, the smaller number of patients from the surgical unit in the subsequent survey might have affected the group means for pain intensity and interference level. Therefore, an alternative explanation for the lesser pain intensity and pain interference with physical and emotional function could be due to the drop in the proportion of patients from the surgical unit from 52.0% in Survey 1 to 40.2% in Survey 2 and 36.7% in Survey 3, compared to Survey 1 (Paper II). It should be noticed that most of the studies in pain management investigate specific patient populations. This is not the case for this thesis where we would rather study the potential changes across different units serving different patient groups.

Data from patient participants were collected through an interviewer-administered face-to-face approach with the same data collectors for each survey. This might have presented an instrumentation effect (184). For example, data collectors might have been more familiar with the tool in the subsequent survey, and their ability to interview may have improved with subsequent interviews. As a result, interviewer bias might have occurred, as an evolving familiarity with the tool might have influenced the interview process and patients' responses in subsequent surveys. To limit this effect, we trained our data collectors before beginning the study, included them in pre-testing of the translated version of the questionnaire and gathered data in the patients' natural environment.

We employed several statistical approaches in this thesis depending on the level of measurement, sample size and number and types of groups. The distribution of the mean difference between the post-test and pre-test KASRP scores (Paper I) was examined to select the appropriate statistical tests, and it was found that the results did not follow the assumption of normality; hence, non-parametric tests were applied in Paper I. One-way ANOVA with post-hoc Bonferroni corrections was applied (148) for Paper II because it allowed the comparison of the mean pain experience scores between the three survey samples. However, the procedure chosen does not take into account that the three samples were differently composed with regard to background characteristics and this should have been adjusted for in the analysis. Possible consequences of this should have been explored. In paper III different approaches were used for the outcome variables. Chi-square tests was used for categorical outcome variables (staff

responsiveness). The outcome variable patients' satisfaction was rated on a 5-point response scale and not normally distributed. To adjust for unit of admission, we applied a robust regression, adjusting the unit of admission to determine the effect of the programme on patient satisfaction. It should be noticed that the group-level scores for patients' satisfaction with pain management at Survey 3 can be attributed to both rounding and an in-service educational programme, rather than to one or the other.

Reliability

The reliable and validated KASRP was administered in English to measure nurses' knowledge and attitudes regarding pain (136). The same data collection procedure was followed both before and after the NIEP.

The items included in the patient survey were selected from different validated questionnaires, such as the BPI (140), APS-POQ-R (141), PTSS (142) and POQ (143), tailored to the Ethiopian context and the aims of the present study. Using an unstandardised questionnaire would have been ill-advised, as it could have limited the data reliability (185); however, using a questionnaire developed in the US for Ethiopian patients directly might affect validity, due to the fact that sociocultural contexts affect pain perception (173), depending on people's tolerance, how they react, view, and cope with pain (174). Hence, evidence suggests that, when used beyond the context in which it was first developed, a questionnaire should be adapted. Cognitive interviews (145) and pre-testing were carried out before the patient data collection began, to check the understandability of wordings, layout and response options in the Ethiopian setting.

Three questionnaires returned from the 114 nurses who responded to Survey 2 were incomplete, and questionnaires with many missing values were not considered for analysis. For the patient sample, 26 questionnaires in Survey 1, 24 in Survey 2 and 13 in Survey 3 were incomplete. Incomplete questionnaires from both nurses and patients that were halted halfway through or earlier were omitted from the analyses. Since we informed the participants that they could stop taking part in the study at any time, we did not investigate why they responded as they did.

Generalisability

Generalisability is the degree to which study results can be applied to different contexts or a larger population (184). External validity can be ensured by using broad inclusion criteria to create a study sample resembling real-life situations, or by choosing realistic interventions (186). The population from which both the nurses and the patients were sampled in our study was limited to JUMC. Because of this, the study needs to be repeated with other samples/at other sites, to determine whether the results are replicable.

The patients included in our study may have impacted generalisability. First, we expected the three study samples to constitute similar characteristics throughout the study period (same distribution among the units, same medical heterogeneity and same socio-demographic characteristics). However, we observed that the proportions from different units were not the same in each subsequent survey, and there was a statistically significant difference in the proportion of surgical patients. This unfavourable situation of having three samples from different units could be statistically mitigated (187). Since critically ill patients, patients with a hearing impairment and those under 18 years old were excluded, the findings have limited external validity for the wider population.

Finally, the external validity of the programme could also have been limited by the ongoing developments in pain management practice. For example, depending on the readiness of the government, the need for in-service training can be changed with improved pre-service education (44). The frequency of bedside patient visits may be modified by introducing electronic patient monitoring system (188), and administering medications around the clock could be replaced, for example, by transcutaneous and pain patches (189). However, providing pain management by competent nurses through intentional patient visits and timely medication remains essential in hospital settings. Moreover, a particular value of this study is that it uses a combination of interventions that have been developed and tested in high-income countries and evaluates these in a low-income country context.

6.3.Ethical Considerations

To comply with the relevant guidelines and regulations, we checked first whether the study protocol should be submitted to the regional research committee (REK) or the Norwegian Centre for Research Data (NSD). Since we were not dealing with human biological products (using body samples, diagnosing new diseases, or experimenting with new drugs or technologies), we submitted the protocol to NSD. Once approved by NSD, the study protocol was again submitted to the Jimma University Ethics Review Committee for approval before data collection. We also obtained administrative permission from the former Jimma University Teaching Hospital (JUTH), now known as Jimma Medical Center (JUMC).

Obtaining informed consent from the study subjects protects the rights of the participants. In addition, individuals can decide whether or not to participate in a study only if they are informed about the potential dangers and benefits of taking part (149).

Anonymity, confidentiality and privacy of all study participants were ensured during data collection. Written informed consent from each study respondent was obtained, and the purpose, potential advantages and disadvantages during the data collection process were explained to all study participants. In addition, a noncoercive disclaimer was included in the subject information sheet, stating their complete freedom to refuse to participate and withdraw, and participants were told that refusal or withdrawal at any time would not affect their care. Finally, all data were handled confidentially and anonymised by the end of the project

7. Conclusion and Implications

7.1 Conclusion

The findings in this study support our assumption that the two-component programme was helpful for providing adequate pain management. However, since the programme consisted of more than one component, it was impossible to identify the single component that accounted for changes in the outcome variables. Nevertheless, the lower mean pain intensity and interference levels, and the higher patient satisfaction ratings with pain treatment information, care provided by nurses and medication regimen measured in the three surveys indicate that such programme facilitate pain management in an Ethiopian hospital. Moreover, regardless of methodological limitations and the complexity of the programme, the current study offers new insights into pain management and can be used as a framework for rethinking patient care in areas that need nursing attention. However, further multicentre research involving control groups must confirm the programme's relevance for pain management in other hospitals. In addition, since there are different in-service education and rounding modalities, and the perceptions of nurses, hospital leaders, nurse leaders and physicians toward rounding is unknown in this study, more in-depth research is needed to get their perspectives aiming to develop the programme and investigate its sustainability.

7.2 Implications

The growing body of research in pain management reveals that professional and organisational impediments, rather than the development of new drugs or technologies (46), are the main barriers to adequate pain management during hospitalisation, particularly in developing countries like Ethiopia (22). The findings in this thesis demonstrate that hospitalised patients may benefit from the two-phase nurse-based pain management programme developed and introduced into JUMC's nursing system. Hence, despite only accounting for the NIEP and rounding, the new programme may have clinical, educational, administrative and research implications in nursing.

Clinical Implications

The NIEP enhanced nurses' ability and confidence to manage pain. Nursing activities during rounding may benefit patients in several ways, such as empowering them with pain treatment information, instilling expectations, creating demand and fostering nurse–patient relationships to halt the state of care uncertainty that might emerge from feeling unattended. These might contribute to better pain management, lesser pain experiences, rapid recovery, shorter hospital stays, lower healthcare costs and greater satisfaction. However, since the evidence shows cultural pain perception determines how patients report pain, particularly when the patient does not speak the same language as the healthcare provider, variations in beliefs about pain among different ethnic groups should be considered (70, 173, 174).

Implications for Nursing Education

The significant shift in nurses' knowledge and attitudes, as evidenced by their KASRP score after the NIEP, implies the need to examine the pre-service education curriculum and nurses' thoughts about pain management. Moreover, even if the mean post-test KASRP score significantly increased from the baseline, it was still far below the highest attainable score of 41; hence, including in the NIEP an intensive in-person session, assisted self-learning and follow-up refresher training could be a strategy to consider when healthcare providers lack sufficient knowledge and an adequate attitude.

Implications for Nursing Leadership

The nurse-based pain management programme can be used as a framework for bringing cultural transformation to hospitals regarding their workflow processes. It might help as a rethinking strategy to develop professional and organisational capacity in providing nursing care, and to standardise the continuity of care. It might also lead to far-reaching positive consequences for many JUMC operations and similar hospitals in the country. Furthermore, rounding can be suggested to implement as an alternative strategy for ensuring the continuous presence of senior or expert nurses, to satisfy the support needs of bedside nurses in their professional practice.

For future Nursing Research

The importance of rounding reported in previous studies has mainly focused on the effectiveness of hourly or two-hour rounds, without combining them with educational programmes (116, 122). As a result, the nurse-based pain management programme may serve as a foundation for a framework for future research that aims to improve patient outcomes. Investigating implementation challenges and cost-effectiveness would provide additional validity to the results presented in these three sub-studies. A further comparative study on different rounding schedules (at 1-, 2- and 4-hour intervals) and a group of patients with similar medical conditions may be necessary. This would better establish the relationship between rounding and patient acuity levels, the required amount of time to be spent with the patient during each visit, categories of staff and the behaviours of nurses during each visit. The transferability of the programme and the findings for hospitalised patients should be tested with a replication study in other academic and public hospitals.

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The Impact of an In-service Educational Program on Nurses' Knowledge and Attitudes Regarding Pain Management in an Ethiopian University Hospital

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Background: Although pain control for hospitalized patients is a central issue for all health care providers, nurses' knowledge, and attitudes are the major barriers. Educational program is a strategy to improve nurses' knowledge and attitudes on pain management. However, there is paucity of information on how in-service education program influences nurses' knowledge and attitudes score for pain management in Ethiopia. The objective of this study was therefore, to investigate the influence of an in-service educational program on nurses' knowledge and attitudes regarding pain management in an Ethiopian university hospital.

Methods: A quasi-experimental study was conducted between 1 October and 15 November 2016. Totally 111 nurses working at Jimma University Medical Center participated in the study. We provided 2 consecutive days of intensive pain management education with a follow-up training session after 1 month. Knowledge and Attitudes Survey Regarding Pain (KASRP) was used as a tool for measuring the impact of educational program. Data were analyzed using the Wilcoxon signed-rank test, and results were considered significant at $p < 0.05$.

Result: Of the 111 nurses, who participated in the study, 39.5% were female, 46.8% had a baccalaureate degree, and 67.6% had worked in nursing for 6–10 years. The mean age of respondents was 26.9 ($SD \pm 5.6$) years. On average, participants answered 41.4% of the survey items correctly before the intervention and 63.0% after the intervention. The mean rank score of nurses' knowledge and attitudes regarding pain significantly improved following participation in the educational program ($Z = -9.08$, $p < 0.001$).

Conclusion: The educational program improved nurses' scores for pain management knowledge and attitudes. This may lead to more effective pain management by nurses.

Keywords: nurses, pain management, educational programs, knowledge, attitudes, Ethiopia

INTRODUCTION

Pain, the oldest clinical problem remains undertreated among hospitalized patients (1–4). The experience of pain from pathological conditions, medical procedures, trauma, and childbirth makes pain management very important in hospital settings (4). Alleviation of pain is an important nursing goal embodied in the profession's philosophy (5, 6). Nurses are responsible for regular pain assessment, medication administration, and monitoring of the patient's responses. These responsibilities require an understanding of the nature of pain in relation to a patient's clinical condition (7).

Although pain control for hospitalized patients is a central issue for all health care providers, major barriers are presented by nurses' inadequate knowledge, negative attitudes, insufficient assessment skills, reluctance to act as the patient's advocate (8, 9), and misconceptions (7, 9). Inadequate pain management reflects inadequate knowledge on the part of nurses. adequate pain knowledge helps nurses to underpin their practices of pain assessment, medication administration, and monitoring (10). Nurses' attitudes and beliefs may influence patient care (11). Evidence show that nurses having adequate knowledge and good attitude of pain may lead to more effective pain management (12). Nurses who believe in the importance of patient pain relief implement more pain management activities (13), and nurses with positive attitudes will have the intention and motivation to provide care for a patient with pain (11).

In Ethiopian university hospitals, the prevalence of inadequately managed pain is as high as 80.1% (14). This is higher than levels reported for other countries: 30–80% for Hong Kong (15), 45% for Italy (16), and 79.7% for Jordan (17). System failure, providers' misconceptions, inappropriate beliefs, opiophobia, and lack of knowledge (8, 14) are among the numerous factors contributing to inadequate pain management in general (8) and in Ethiopia in particular (14).

Previous studies have shown that in-service educational programs improved nurses' knowledge and attitudes regarding pain management (18–20). Nevertheless, levels of education and standards of nursing practice may vary within and between countries. For example, almost half of nurses in Ethiopia practicing in public hospital lack adequate knowledge of pain (21).

Although nurses in Ethiopian hospitals may have different levels of training backgrounds, they hold the same position and have the same bedside responsibilities (22). The level of nurses' knowledge and attitudes regarding pain is directly linked to their training during pre-service education. However, curriculum reviews indicate a lack of emphasis on pain during pre-service educational programs (22), and 50% of recently graduated nurses in Ethiopia lack adequate knowledge of pain management (21). Nurses can also acquire further knowledge of pain through work experience, in-service education, and interaction with colleagues (23). We have not identified studies investigating how in-service education program influences nurses' knowledge and attitudes score for pain management in Ethiopian university hospitals.

Thus, the aim of this study was to investigate how an in-service educational program influenced nurses' knowledge and attitudes regarding pain management in an Ethiopian university hospital.

Abbreviations: ETH, Ethiopia; FMOH, Ethiopian Federal Ministry of Health; JUMC, Jimma University Medical Center; WHO, World Health Organization; KASRP, Knowledge and Attitudes Survey Regarding Pain; NORAD, Norwegian Agency for Development Cooperation, NORHED, The Norwegian Program for Capacity Development in Higher Education and Research for Development.

MATERIALS AND METHODS

Study Design and Setting

A quasi-experimental study design with a pre-test-post-test approach was used in Jimma University Medical Center (JUMC) from 1 October to 15 November 2016. JUMC is the only teaching and referral hospital in the southwest of Ethiopia. It serves a population of 15 million people. The hospital has 600 inpatient beds in different wards (medical, surgical, gynecology, maternity, pediatric, neonatal, ICU, psychiatric, and ophthalmological). The present study was carried out in the medical, surgical, maternity, and gynecology wards. We recruited all 165 staff nurses involved in the provision of bedside nursing care in these wards. Their knowledge and attitudes regarding pain management were measured before intervention (pre-test) and again after intervention (post-test).

Intervention

An in-service education program was arranged in rounds of training. In each round, 30–40 nurses participated. The educational program was delivered in three ways: 2 consecutive days of intensive in-person sessions (16 h of face-to-face training), provision of reading materials to facilitate take-home reading assignments (self-learning), and refresher training 4 weeks later (8 h). The trainers were two doctors (a pediatrician and an internal medicine specialist) and two nurses (the principal investigator and a palliative care Ph.D. fellow). All the trainers hold "training of trainer" certificates on pain management from the Ethiopian Federal Ministry of Health (FMOH). The training was delivered by means of interactive lectures, group discussions, practical exercises, case scenarios, and take-home reading assignments.

The content of the educational program was developed based on the FMOH (Federal Ministry of Health) pain management guideline (24), standard nursing textbooks (25–28), WHO guidelines (29, 30), and relevant literature (2, 7, 31). It was tailored to the four domains of pain management competency (7): the multidimensional nature of pain, pain assessment and measurement, management of pain, and clinical conditions. The educational sessions covered the following areas:

- Introduction (definition, mechanisms)
- Classifications (nociceptive, neuropathic breakthrough, emergency, and incident pain)
- Pain assessment using a numerical rating scale and practical exercises
- Historical myths, cultural barriers
- Subjective nature of pain, and professional misconceptions

- General pain management and treatment (use of opioids, the WHO analgesics ladder, opioid side effects and toxicity)
- Addiction and dependency
- Pain treatment in children, HIV/AIDS, pregnancy and childbirth, and old age
- Non-pharmacological approaches to pain
- Patient education and counseling

The training manual and presentation materials were given in hard copy and soft copies on compact disks and memory sticks, which contained selected research articles and reference manuals. The principal investigator was accessible by phone around the clock to clarify issues related to pain management.

Data Collection Procedure

Initial contact with nurse participants was made through head nurses on the relevant wards. A code for each nurse was generated from the ward name lists, and each nurse was told to remember his or her code. The researcher then distributed an enveloped document containing the survey tool and the consent form. Nurses were asked to sign the consent form to show their willingness to participate in the study. The survey took 30–45 min, and the completed questionnaires were collected and stored in the head nurse's office.

Data Collection Instrument

We used the revised version of the Knowledge and Attitudes Survey Regarding Pain (KASRP) developed by Ferrell et al. (32). To our knowledge, it is the only available tool for measuring knowledge and attitudes of health professionals in relation to pain. It consists of 41 items: 22 true/false questions, 15 multiple-choice questions, and two cases with two responses each. It has been used all over the world since 1987 and revised over the years to reflect changes in pain management practice. The content of the tool is derived from current standards of pain management from bodies including the American Pain Society and the World Health Organization and from the comprehensive national Cancer Network Pain Guidelines (32). At the time of development, it had a test-retest reliability of $r > 0.80$ and an internal consistency reliability of $\alpha > 0.70$ (32). Each correctly answered item is assigned a score of 1; a score of 0 is assigned otherwise. A respondent's total score can range from 0 (the lowest possible score) to 41 (the highest possible score). The author of the survey questionnaire warns researchers against differentiating items as measuring either knowledge or attitudes. Since many items measure both knowledge and attitudes (for example, the item that measures the incidence of addiction), the developers recommend analyzing the responses in terms of the percentages, complete scores, and individual items answered independently by each respondent. We also collected information on nurse characteristics (work unit, gender, educational level, prior in-service training, and work experience). The questionnaire was administered in English, the main language of instruction in the Ethiopian education system.

Data Analysis

Data were checked for completeness and accuracy before being entered to statistical software package SPSS version 20.1 (IBM SPSS Statistics for Windows, Armonk, NY). Descriptive statistics were used to describe the sample characteristics and the responses to each item. Because the post-test-pre-test score differences violated assumptions for normality, we performed non-parametric tests. The Wilcoxon signed-rank test was used to analyze differences in the rank of KASRP scores before and after the educational program. McNamara's test was used to analyze differences in the proportions of correct answers for each item before and after the program. The Mann–Whitney U test was used to analyze differences in the mean rank of pre-test and post-test KASRP scores and sample characteristics (gender, educational level, and prior in-service training). The Kruskal–Wallis H test was performed to analyze differences in the mean rank of pre-test and post-test KASRP scores and the nurses' work unit. A p-value of <0.05 was considered significant for all statistical tests.

Ethical Consideration

The study has been notified to the Data Protection Officer for Research, NSD—Norwegian Center for Research Data (project number 48349). Before the commencement of data collection, ethical approval was sought from the institutional review board of the College of Health Science of JUMC, and administrative permission was obtained from JUMC. The head nurse was instructed not to keep any records of participants who did not return a completed questionnaire. During data collection, written informed consent was obtained from each participant. Upon completion of the educational program, each participant was awarded a certificate.

RESULTS

Sample Characteristics

Before the educational program, 165 survey questionnaires were distributed; 124 were returned, of which 120 were complete. During the post-test survey, 120 questionnaires were distributed; 114 were returned, of which 111 were complete. The mean age of the respondents was 26.9 years ($SD \pm 5.6$). **Table 1** shows the distribution of participants by gender, prior in-service training on pain, educational level, work experience, and work unit.

Nurses' Knowledge and Attitudes Regarding Pain Management

Except for two respondents whose scores remained the same, all respondents increased their performance on KASRP at post-test. On average, participants answered 41.4% of the survey items correctly before the intervention and 63.0% after the intervention. Our findings showed that the mean score on KASRP increased after intervention from 17 ($SD \pm 4.0$) to 25.8 ($SD \pm 7.2$) (**Table 2**). Except for two items those measures the effectiveness of non-steroidal anti-inflammatory agent in painful bone metastases and probability of respiratory depression when taking stable doses of opioids, the proportion of correct answers for each item in the survey after the intervention significantly generally increased. (**Supplementary Table 1**).

TABLE 1 | Demographic and professional characteristics ($N = 111$).

Characteristic	*n* (%)
Gender	
Female	44 (39.6)
Male	66 (59.5)
Missing	1 (0.9)
Prior in-service training on pain	
Yes	12 (10.8)
No	99 (89.2)
Educational level	
Diploma	58 (52.3)
BSc degree	52 (46.8)
Missing	1 (0.9)
Work experience	
<1 year	13 (11.7)
2–5 years	75 (67.6)
6–10 years	13 (11.7)
More than 10 years	6 (5.4)
Missing	4 (3.6)
Working unit	
Gynecology ward	11 (9.9)
Medical ward	28 (25.2)
Surgical ward	50 (45.0)
Maternity ward	22 (19.8)

TABLE 2 | Proportion of correct answer and mean pre-test and post-test KASRP[a] scores.

Test	Proportion of correct answer	Mean (95% CI)	Minimum	Maximum
Post-test score	63.0	25.8 (24.4–27.1)	13	38
Pre-test score	41.4	17.0 (16.3–17.8)	10	36
Difference	21.6	8.8 (7.6–10.0)		
Test statistic		$t = 14.1$		
p-value		<0.001		

[a] *Knowledge and Attitudes Survey Regarding Pain.*

TABLE 3 | Distribution of mean KASRP[a] score by sample characteristic.

Characteristic	Pre-test score	Post-test score	Post-test-pre-test score difference	*P*-value
Gender				0.12
Male	16.6	24.7	8.1	
Female	17.6	27.6	10.1	
Prior in-service education on pain				0.03
Yes	16.1	21.1	5.0	
No	17.1	26.3	9.3	
Level of education				0.40
Diploma	16.4	24.8	8.4	
Degree	17.6	27.0	9.4	
Length of service				1.00
<1 year	15.4	23.5	8.2	
2–5 years	17.4	26.4	9.0	
6–10 years	17.3	26.2	9.0	
More than 10 years	14.7	25.3	10.7	
Working unit				<0.05[b]
Maternity ward	14.6	18.9	4.4	
Gynecology ward	18.1	26.4	8.3	
Medical ward	17.0	27.3	10.4	
Surgical ward	17.8	27.8	10.0	

[a] *Knowledge and Attitudes Survey Regarding Pain.*

[b] *The mean difference is significant at $P < 0.05$ and the difference is between maternity ward and surgical ward, and maternity ward and medical ward.*

The mean rank score of nurses' knowledge and attitudes regarding pain significantly improved following participation in the educational program ($Z = -9.08$, $p < 0.001$) with a large effect size ($r = 0.61$). However, the sample characteristics show some variation in levels of knowledge and development of attitudes at post-test (**Table 3**). The result showed that nurses who had not received prior in-service education on pain had a higher pre-test score (17.1) compared with nurses who had received such education (16.1). Nurses who had not received prior in-service education on pain had the largest difference in post-test-pre-test scores as well.

As shown in **Table 3**, there was no statistically significant difference observed in KASRP scores improvement according to the nurses' education level. Greater improvements on KASRP scores at post-test was observed among female nurses compared with male nurses. Regarding working unit, nurses in surgical, medical, and gynecology wards scored higher than those in maternity wards (65.1, 61.8, and 59.2, respectively, compared to 26.3; $p < 0.05$).

DISCUSSION

Our findings show a significant improvement in scores for knowledge and attitudes regarding pain management following participation in the educational program. It provides an important information about the beneficial impact of an educational program on nurses' knowledge and attitudes regarding pain management. After completion of the educational program, 98.2% all participants increased their score on KASRP. This indicates improved knowledge and attitudes regarding pain for the cohort. On average, the proportion correctly answered survey items increased by 52% following the intervention.

The level of nurses' understanding and their attitudes regarding pain management may be linked to the adequacy of care they provide for patient in pain. Knowledge, the capacity to behave and perform actions with full understanding is acquired through learning, practice, and interaction with environments. To be useful, knowledge must not only be acquired but also remembered or retained (23). Attitude refers to a mental state of readiness and reaction (positive or negative) to a phenomenon. Knowledge and attitudes are learned and shaped by cumulative experiences in life (11). Nurses can therefore modify their

preexisting knowledge and attitudes toward pain by participating in an educational program designed to promote better knowledge and improved attitudes. Pre-testing of participants' knowledge and attitudes prior to an educational program provides a way to detect and identify deficiencies in knowledge and attitudes. Post-testing following completion of an educational program is important for establishing how much knowledge has been retained and the extent to which attitudes have changed.

Our findings indicate that nurses' knowledge before the educational program was limited, which is consistent with other similar studies (18, 20, 33). This may be because nurses receive inadequate preparation for pain management in their pre-service education. As evidenced by the KASRP test scores, the current study demonstrates that the educational program was effective in improving nurses' knowledge and changing their attitudes toward pain management. However, the level of improvement significantly varied by item, prior in-service education on pain, and work unit. The average number of correct answers on the survey significantly improved after the educational program, which is consistent with previous studies (18–20). An unexpected finding was that 12 nurses who had not received prior in-service education on pain had higher pre-test and post-test scores compared with nurses who had received prior in-service education. We lack information that could be used to explore the reason for this result. For example, when the other nurses received the in-service education. This could be a subject for future studies.

Although the proportion of items answered correctly increased from 41.4 to 63% following the educational program, this falls far below expectations and indicates the need for further continuous education tailored to the needs of nurses. In-person, face-to-face learning sessions integrated with self-learning are required, and additional strategies such as web-based instruction and distance learning should be customized to current levels of understanding to reach many nurses with minimal cost. The importance of continuing education has also been reported in other studies (19).

In a complex intervention with multiple components (including classroom teaching by pain experts, use of printouts and electronic copies to guide self-learning, and refresher sessions), it is difficult to attribute the contribution of each specific component to the final results (34). Within the scope of this study, we could determine only the impact of the whole intervention against baseline scores for knowledge and attitudes. The educational program in the present study upgraded nurses' understanding of pain management. This might help them to carry out patient pain assessments, aligning analgesics to pain severity levels and monitoring patient responses to treatment more confidently. Because pre-service preparation for pain management might not be adequate (7, 24), designing and implementing short in-service educational programs may be an effective strategy for addressing gaps in nursing care relating to pain control.

Other studies have reported that educational programs can improve nurses' knowledge and attitudes regarding pain (12, 20, 33) and that improved knowledge may lead to better and effective pain management (12). However, changes in nurses' knowledge and attitudes alone may not suffice. Improving the clinical practice of hospitalized pain management will require sustained effort, together with the formation of multidisciplinary teams and the implementation of system-wide changes that monitor and keep health care professionals to pay attention and to control pain in accordance with the recommended guidelines. To facilitate sustainable changes in clinical practice, it is necessary to incorporate pain management into nurses' workflow while providing continuous in-service refresher education and information. Other important facilitators that may enhance nursing actions include rounding and integration of the pre-service curriculum.

Many factors may function as limitations of the current study: the use of a non-randomized design without control, the possibility of guessing when answering survey items (as with any test that includes true/false and multiple-choice questions), and the possibility that nurses may have gained additional knowledge and improved their attitudes in interaction with medical professionals. Initially, we planned to employ a quasi-experimental design with control. However, our freedom of movement was restricted by a period of public unrest followed by a declaration of a state of emergency. This made it impossible to travel between the intervention and control sites, and our plans to use a control group had to be abandoned. A larger sample would also have strengthened the study.

A further limitation relates to the fact that most of the diploma nurses participating in the study were also attending other evening or weekend upgrading programs at different levels, and this could have impacted the post-test results. This may also be the reason for the absence of statistical differences between the test performances of degree-educated and diploma-educated nurses. It should also be borne in mind that the program in the present study involved the distribution of resources designed to enhance self-learning. Given all these factors, a simple pre-test-post-test design with two measurement points over a 6-week period is an inadequate basis for causal inferences. Further randomized, multicenter studies are necessary before attributing improvements in knowledge and attitudes to the effects of an educational program and before such a program can be recommended for other professions. However, the present findings indicate the potential benefits of a mixed in-service educational program (incorporating both face-to-face sessions and self-learning) for enhancing nurses' knowledge and attitudes regarding pain management for hospitalized patients, despite the resource-intensive nature of such programs. Comparison with less expensive educational programs, such as web-based and distance learning programs, will be important in identifying the most effective approach.

The current study provides empirical evidence that an educational program significantly improved nurses' knowledge and attitudes score regarding pain management in an Ethiopian university hospital. It could have been better to correlate change in nurses' knowledge and attitude with change in pain management practices that might leads to improvements in patients' experience of pain, thus further study is required to investigate the impact of an-in-service educational program on patients' experiences with pain management.

AUTHOR CONTRIBUTIONS

GG contributed conception, design of the study, and wrote the first draft of the manuscript. IS and RH revised the proposal and wrote sections of the manuscript. All the authors contributed to statistical analysis, fieldwork designing, and manuscript revision, read and approved the submitted version. All authors confirm that the manuscript is our own original work.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2018.00229/full#supplementary-material

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RESEARCH ARTICLE Open Access

Hospitalized patients' pain experience before and after the introduction of a nurse-based pain management programme: a separate sample pre and post study

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Abstract

Background: Many patients suffer from unrelieved pain in hospital settings. Nurses have a pivotal role in pain management. Hence, a nurse-based pain management programme may influence how hospitalized patients experience pain. In this study we investigated hospitalized patients' experience of pain before and after the introduction of a two-component nurse-based pain management programme.

Methods: A quasi-experimental design with a separate sample pretest-posttest approach was conducted on a convenience sample of 845 patients (Survey 1: $N = 282$; Survey 2: $N = 283$; Survey 3: $N = 280$) admitted to the four inpatient units (medical, surgical, maternity, and gynecology) of a university medical center. Data were collected at baseline, before the intervention six weeks after pain management education, and finally immediately after four months of rounding using an interviewer-administered questionnaire adopted from a Brief Pain Inventory and the American Pain Society Patient Outcome Questionnaire.

Results: All the samples had similar sociocultural backgrounds. The proportion of patients who reported average moderate and severe pain intensity in the last 24 h were 68.8% in Survey 1, 72.8% in Survey 2 and then dropped to 48.53% in Survey 3 whereas those who reported moderate and severe pain intensity at the time of interview were 53.9% in Survey 1, 57.1% in Survey 2 and then dropped to 37.1% in Survey 3. The mean pain interference with the physical and emotional function was generally reduced across the surveys after the introduction of the nurse-based pain management programme. These reductions were statistically significant with $p < 0.05$.

Conclusions: Though the survey findings must be taken with caution, they demonstrate that the nurse-based pain management programme positively influenced patient-reported pain intensity and functional interference at the university medical center. This shows the potential clinical importance of the programme for hospitalized patients.

Keywords: Pain management, Education, Nursing care, Inpatients

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Introduction

The occurrence of pain symptoms is one of the primary reasons to seek healthcare in the general population. Pain is often distressing for patients if not adequately managed [1–3] and may lead to anxiety, depression, fatigue, a desire for death, escalated pain, poor quality of life, limitations in Activities of Daily Living (ADLs), poor compliance with treatment, and prolonged hospital stays [3–6].

Despite the availability of effective therapies, many patients continue to suffer from unrelieved pain in hospital settings [7]. As a result, international pain organizations have called for a strategy to improve pain management practices [2] that include pain assessment, appropriate use of analgesics, and proactive responses [8].

Even though pain management is the responsibility of every healthcare provider, it is the primary role of nurses. Nursing is an important caregiving situation, and pain management is an integral part of the practice of nursing. Left untreated, pain is considered professional misconduct or a violation of fundamental human rights [1–3]. Despite this, inadequately managed pain is highly prevalent, particularly in Ethiopian hospitals, due to a lack of appropriate care [9]. For example, it was reported that 80.1% of surgical patients at Jimma University Hospital were inadequately managed for pain [10]. Studies have revealed that a number of factors contribute to inadequate pain management: provider negligence, fragmented care, nurses' lack of adequate knowledge of and attitudes towards pain, and the lack of a system that engages, empowers and motivates nurses [11–13].

Prior studies related to pain management were mainly focused on the prevalence of pain [14–16], the effectiveness of the educational programme [17–20], analgesic use [21], nonpharmacological therapies, and the description of interventions related to cancer and HIV pain [22, 23]. However, a study on the effectiveness of a nurse-led pain management intervention for patients with chronic pain that employed cognitive behavioral treatment showed an improvement in the reduction of pain intensity [24]. Yet, to our knowledge, there are no studies that investigate hospital patients' pain intensity and interference across various units before and after the introduction of a nurse-based pain management programme. Thus, building on the existing system, we introduced a nurse-based pain management programme in an Ethiopian university hospital. The programme consists of intensive in-service nurse education aimed to enhance nurses' knowledge of and attitudes towards pain [25], and a rounding routine to ensure the systematic monitoring of patients' pain. Ultimately, the goal was to improve pain treatment practice and to measure the effectiveness of the programme on patients' pain experiences on three occasions. The aim of this study was, therefore, to investigate the level of patient-reported pain experiences before and after the introduction of a two-component nurse-based pain management programme.

Methods

Study design and setting

A quasi-experimental design with a separate sample pretest-posttest approach was conducted at Jimma University Medical Center (JUMC) from 1 September 2016, to 15 July 2017.

Participants

A convenience sample of 845 patients (Survey 1: $N = 282$; Survey 2: $N = 283$; Survey 3: $N = 280$) was invited to participate in this study. All patients who were admitted to the four inpatient units at the hospital (medical, surgical, maternity, and gynecology wards) were included if they filled the inclusion criteria. Patients had to have been hospitalized for at least 24 h, age ≥ 18 years, and have no known hearing impairment. Initial contact with patients was made through the ward's head nurse or shifts leader. Participation in the study was voluntary. None of the patients approached declined participation.

A nurse-based pain management programme

A nurse-based pain management programme is an intervention comprised of two components: education (to enhance nurses' knowledge of and attitude towards pain) and organizational elements (to ensure the systematic monitoring of patients' pain), with the goal of improving pain treatment. In the educational component, we provided two days of intensive in-service pain management training (16 h of face-to-face training), take-home reading assignments (self-learning), and refresher training four weeks later (8 h) for all nurses in the units. The education programme was arranged in groups and completed between 1 October and 15 November 2016. Each group was comprised of 30–40 nurses. The education sessions were delivered as per the pain management protocol developed by the research team, which was based on Ethiopia's Federal Ministry of Health (FMOH) pain management guidelines [11] the World Health Organization's (WHO) guidelines for pain management [26, 27]. Following the education programme, we introduced the second component, a rounding programme to educate staff nurses and nurse leaders in patient goal-oriented pain management [28]. The rounding programme consisted of an engagement orientation on how to organize and conduct rounding. The rounding programme lasted one day (8 h) for all staff nurses and a half day (four hours) for nurse leaders and supervisors. The content of the orientation included regular pain assessment using the numerical rating scale (NRS), charting in rounding logs when it was necessary to consult the physician, scripted dialogue with the patients,

and how to assess patients using the four Ps: presence, pain, position, and personal needs. Rounding was structured in such a way that nursing directors, head nurses, and staff nurses proactively made regular and consistent visits to patients and performed scheduled tasks focused on pain management. When nurses visited patients during rounds, they introduced themselves and read the following script in either the Afaan Oromo or Amharic language (according to the patient's language preference): "*We are going to do everything we can to help keep your pain under control. Your pain management is our number-one priority. Given your (condition, history, diagnosis, status), we may not be able to keep your pain level at zero. However, we will work very hard with you to keep you as comfortable as possible*" [4]. Staff nurses made subsequent visits every 2 h during the day (8,00 am–8,00 pm) and every 4 h at night (10,00 pm–6,00 am). During each visit, nurses assured patients of their availability and informed patients when they would return, asked patients to rate their pain levels, and recorded it in the pain log. If necessary, they repositioned the patient and checked for personal needs (toileting, getting out of bed, water).

More specifically, staff nurses systematically assessed every patient admitted to the four units up to ten times (every 2 h during the day and every 4 h during the night) in a 24-h period. Unless the patient was unconscious, sleeping or the bed was empty, the pain level was self-rated using the NRS and recorded in the pain log by the nurse. After each pain assessment, the nurse decided if the patient required a change in pain treatment regimen in collaboration with the treating physician, using the WHO pain ladder framework. Based on the collaborative decision, the nurse administered adjusted pain medication by the clock. "By the clock" means that the patient would be given analgesics regularly at a fixed interval of time-based on the known pharmacokinetics of the drug in use and that the next dose of analgesics would be adjusted before the effect of the previous dose had fully worn off. The rounding log was kept easily accessible for the healthcare provider's review. In addition, nurses participated in the multidisciplinary team rounds and shared patient pain information.

Leadership rounding was performed daily by head nurses or clinical leaders (team leaders) and weekly by nursing directors. The leaders' role was to motivate, facilitate, and provide positive feedback to the nurses. In addition, the head nurse-led weekly staff nurse discussions, and the nursing director led monthly discussions for head nurses and supervisors. Compliance with the rounding protocol was monitored twice weekly by nurse supervisors, using a review of the rounding log and discussion minutes.

Measurements

Pain intensity and interference are regarded as reliable parameters to measure patients' experiences of pain [29]. To measure the patient pain experience, we used a tool consisting of 18 items adapted from the Brief Pain Inventory (BPI) [30] and the American Pain Society Pain Outcome Questionnaire-Revised (APS-POQ-R) [31]. Items that were used to measure pain prevalence in the last 24 h (one item), pain treatment information (two items), and pain intensity (four items) were adopted from the BPI. Pain intensity/severity was measured on the 11-points NRS (from 0 = no pain to 10 = worst possible pain) with four scores: for pain present at the time of interview ("right now"), pain at its worst during the last 24 h, pain at its least over the past 24 h, and pain on average over the past 24 h. A pain severity/intensity level less than 4 is regarded as mild pain, greater than or equal to 4 and less than or equal to 6 is moderate, and greater than or equal to 7 is severe pain on the 0 to 10 NRS [1]. Eleven items used to measure pain interference (six items for physical functions and four items for emotional functions) were adopted from the APS-POQ-R. Patients were asked to rate their pain's interference with physical functions such as activity in bed (sitting up, turning in bed), activity out of bed (walking, standing, squatting, use of wheelchair, dressing, etc.), deep breathing and coughing exercise (postoperative patients), sleeping (falling asleep, staying asleep), and relationships with others as well as interference with emotional function, in this case mood disturbance (anxious, depressed, frightened, feeling helpless). All functions were measured on an 11-point rating scale (0 = no interference, 10 = complete interference). Scores less than 3 indicate mild, greater than or equal to 3 and less than or equal to 4 indicate moderate, and greater than 4 indicate severe interference [1].

The tool was initially translated by healthcare professionals to Afaan Oromo and Amharic; linguistics and non-health care professionals then retranslated back to English. Then, all the translators came together to discuss the translated items. To check how each item was understood, a cognitive interview was conducted with five people of varying backgrounds [32]. Finally, the tool was tested on 35 patients from various units to clarify words and the sequence of the items. We have also collected information on admission unit (the type of unit), sociodemographic characteristics (age, sex, address), and socioeconomic variables (educational level, occupation, monthly income). The principal investigator collected the completed questionnaires from the data collectors daily and stored them in locked cabinets.

Data collection procedure

Data was first collected at baseline (Survey 1), again six weeks after the educational programme (Survey 2), followed by a third survey immediately after four months of rounding (Survey 3). The data were collected by trained

nurses through a structured face-to-face interview that lasted approximately 40–45 min.

Data analysis

All surveys were assessed for missing or incomplete data before being analyzed (survey 1: 26, survey 2: 24, survey 3: 13). Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 20.1 (IBM SPSS Statistics for Windows, Armonk, NY). Descriptive statistics (i.e., mean, standard deviations, range, frequency) were calculated for patient characteristics (age, income), pain severity, and interference response items. Reduction in the sample means score was calculated by subtracting the mean value of survey 3 from the mean value of survey 1, dividing it by the survey 1 value, and multiplying by 100. Differences between the mean pain intensity and interference scores at baseline (Survey 1), six weeks after the in-service educational program (Survey 2), and immediately after four months of rounding (Survey 3) were analyzed using a one-way Analysis of Variance (ANOVA) with a post-hoc Bonferroni test. The significant differences between the surveys were declared at $p \leq 0.05$.

Results

Sample characteristics

Of the 845 eligible patients, 782 patients' complete responses from (Survey 1: $N = 256$; Survey 2: $N = 259$; Survey 3: $N = 267$) were analyzed (Fig. 1). There were no differences in the mean ages of the respondents (Survey 1: mean age = 38.1 (SD ± 16.2); Survey 2: mean age = 37.4 (SD ± 15.2); Survey 3: mean age = 37.9 (SD ± 5.2)). Though the percentage of missing values for income was high (30.4% for Survey 1, 42.8% for Survey 2, and 60% for Survey 3), the median monthly income in Ethiopian currency was 1000 birr for all surveys: the interquartile range was 1054 birr for Survey 1, 1500 birr for Survey 2, and 1500 birr for Survey 3. When converted to US currency, 50% of respondents earned just over one US dollar per day (1 US dollar ≈ 27.91 Ethiopian birr). There were no statistically significant differences in sociocultural characteristics between the three samples, and there were no reports of new disease epidemics in the area. As shown in Table 1, except for the unit of admission, there was no difference in the distribution of the sample characteristics by survey period.

Pain treatment

Most patients received anti-pain medication intramuscularly and/or intravenously. In Survey 2, the proportion of patients treated with a pharmacological agent increased by 14.1% compared with Survey 1, by 4.8% in Survey 3 compared with Survey 2, and by 19.7% in Survey 3 compared with Survey 1. Prayers, massage, and cold or hot application were commonly reported nonpharmacological pain therapies provided by patient attendants (Table 2).

Pain intensity

Table 3 shows the samples' mean pain intensity in the first, second, and third surveys. The results of all three surveys show that patients generally had moderate to severe pain. However, the mean pain intensity levels were generally reduced across the survey period. This reduction was statistically significant between the second and first survey as well as between the third and first survey for the worst pain, least pain, and pain "right now". Reduction in the samples' mean scores for pain

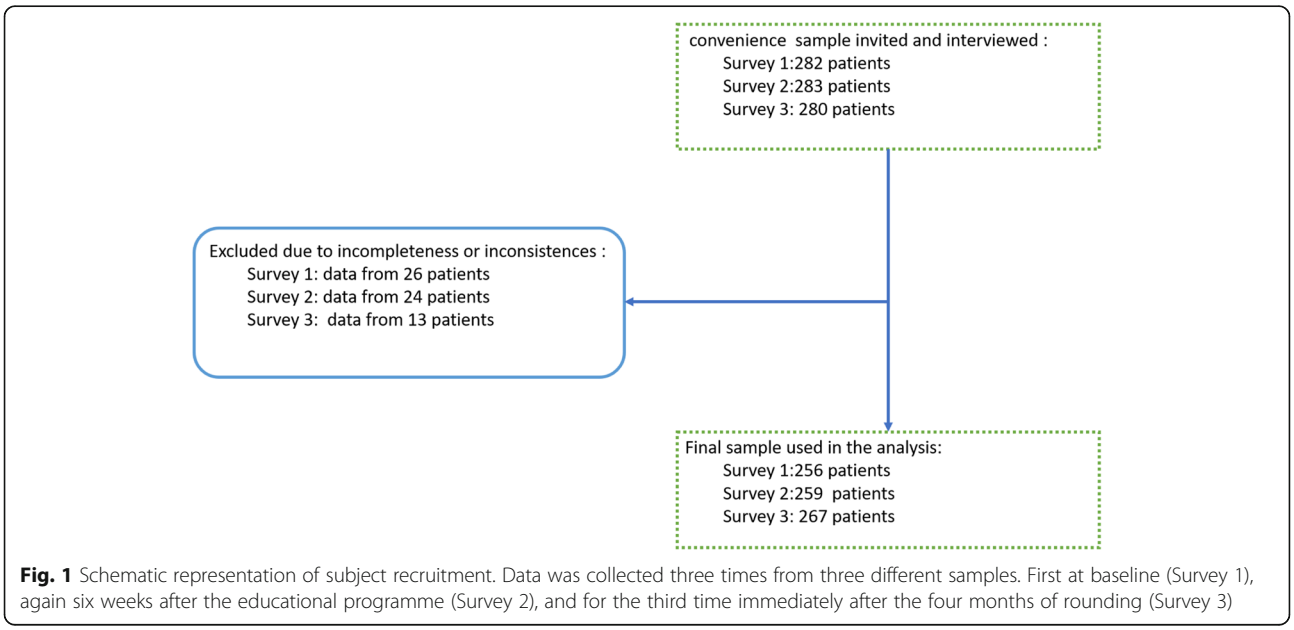

Fig. 1 Schematic representation of subject recruitment. Data was collected three times from three different samples. First at baseline (Survey 1), again six weeks after the educational programme (Survey 2), and for the third time immediately after the four months of rounding (Survey 3)

Table 1 Sample characteristics

Sample characteristics	Survey 1 Number (%)	Survey 2 Number (%)	Survey 3 Number (%)	*p*-value [a]		
				Survey 1 vs Survey 2	Survey 1 vs Survey 3	Survey 2 vs Survey 3
Gender	(*N* = 256)	(*N* = 259)	(*N* = 267)			
Male	125 (48.8)	139 (53.7)	134 (50.2)	0.274	0.757	0.426
Female	131 (51.2)	120 (46.3)	133 (49.1)			
Address	(*N* = 247)	(*N* = 237)	(*N* = 263)			
Urban	169 (68.4)	164 (69.2)	173 (65.8)	0.808	0.528	0.418
Rural	78 (31.6)	73 (30.8)	90 (34.2)			
Educational level	(*N* = 253)	(*N* = 253)	(*N* = 266)			
Had no formal education	151 (59.7)	150 (59.3)	171 (64.3)	0.928	0.282	0.243
Had formal education	102 (40.3)	103 (40.7)	95 (35.7)			
Occupation	(*N* = 253)	(*N* = 253)	(*N* = 266)			
Farmer	151 (59.9)	133 (51.8)	148 (55.4)	0.168	0.366	0.074
Government employee	28 (11.1)	44 (17.1)	29 (10.9)			
Self-employed	36 (14.3)	41 (16.0)	35 (13.1)			
Unemployed	37 (14.7)	39 (15.2)	55 (20.6)			
Unit of admission	(*N* = 256)	(*N* = 259)	(*N* = 267)			
Surgical	133 (52.0)	104 (40.2)	98 (36.7)	0.008	0.001	0.831
Medical	86 (33.6)	89 (34.4)	101 (37.8)			
Gynaecology	20 (7.8)	34 (13.1)	34 (12.7)			
Maternity	17 (6.6)	32 (12.4)	34 (12.7)			

[a] Critical value when proportions were compared using WINPEPI, using a comparison of two independent samples

intensity at its average during the last 24 h was statistically significant between all three surveys. In the third survey, the sample means' pain intensity was reduced by 27.6% at for pain at its worst, 23.8% for pain at its least, 25.5% for pain at its average over the last 24 h, and current pain by 29.3% compared with Survey 1. Even though the proportion of patients who reported pain in the last 24 h generally decreased after the intervention, the proportion of patients who experienced pain in the last 24 h in the second survey was slightly higher (94.5%) than in the first survey (93%). However, immediately after four months of rounding (in the third survey), the proportion was reduced to 87.3%.

The results of all three surveys show that patients generally had moderate to severe pain when asked for "average pain in the last 24 hours" and "pain right now". However, as indicated in Table 4, the proportion of patients with severe pain was generally reduced across the survey period.

Table 2 Patient-reported pain treatment method and route of pain medication administration

Pain treatment	Survey 1 (*N* = 256) Number (%)	Survey 2 (*N* = 259) Number (%)	Survey 3 (*N* = 267) Number (%)
Method of treatment			
Pharmacological	161 (62.9)	186 (71.8)	201 (75.3)
Non- pharmacological	13 (5.1)	8 (3.1)	4 (1.5)
Mixed	72 (28.1)	57 (22.0)	56 (21.0)
None	8 (3.1)	8 (3.1)	6 (2.2)
Missed data	2 (0.8)	0	0
Route of pain medication			
Parenteral (IM/IV)	105 (45.1)	124 (51.0)	137 (53.7)
Oral	44 (18.9)	54 (22.2)	44 (17.3)
Both	84 (36.1)	65 (26.7)	74 (29.0)

Table 3 The sample mean pain intensity scores

Pain intensity	Survey 1 Mean (SD)	Survey 2 Mean (SD)	Survey 3 Mean (SD)	*p*-value [a]		
				Survey 1 vs. Survey 2	Survey 1 vs. Survey 3	Survey 2 vs. Survey 3
Your pain at its worst in the last 24 h	5.8 (2.6)	5.3 (2.0)	4.2 (1.8)	0.069	0.000	0.001
Your pain at its least in the last 24 h	4.2 (2.4)	4.0 (2.0)	3.2 (1.6)	0.627	0.000	0.001
Your pain on average in the last 24 h	4.7 (2.2)	4.2 (1.2)	3.5 (1.4)	0.008	0.000	0.001
How much pain you have right now	4.1 (2.8)	3.8 (2.0)	2.9 (1.9)	0.387	0.000	0.001

[a] *P*-value using one-way ANOVA with post hoc test

Pain interference

In all three surveys, the score for the mean pain interference scales indicates moderate to severe interference with both physical and emotional functions. As shown in Table 4, only minor differences were observed in the level of patient-reported pain interference between Survey 1 and Survey 2. Apart from activities out of bed, a statistically significant reduction in pain interference with physical functions was observed between both the first and third surveys and the second and third surveys. On the other hand, the mean level interference with relationship and negative feelings (anxious, depressed, frightened, and helpless) significantly decreased in Survey 2 and Survey 3 compared with Survey 1. However, the reduction in feeling helpless occurred between the third and second surveys (Table 5).

Discussion

In this study, we investigated patients' pain experiences before and after the introduction of a nurse-based pain management intervention. The goal of the intervention was to improve pain treatment practices and provide timely and optimal treatment. The overall findings show that patients reported less pain intensity as well as functional interference after the intervention. The mean pain intensity level at its worst, least, and on average in the last 24 h and at the time of survey ("right now") was generally reduced in the third survey immediately after four months of rounding. On the other hand, the proportion of patients who reported pain in the last 24 h was reduced from 93% in Survey 1 to 87.3% in Survey 3. Similarly, the mean pain interference with physical and affective functions was also greatly reduced. These reductions can be attributed to better pain management following the intervention. This could have prevented patients from severe discomfort and impaired physiological homeostasis such as depressed mood, fatigue, limitation of ADLs, and anxiety [3–6, 33]. The intervention is in line with the WHO [34], the APS [8], the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) [35], the (FMOH) [11] guidelines. These guidelines recommend regular pain assessment and appropriate use of pain therapies.

Pain intensity and interference with function are important parameters in the evaluation of the effectiveness of pain management interventions on the part of patients [29, 36] and patient responses to pain-producing medical procedures [37]. The findings of the current study show the degree to which patients received the essential elements of pain management: pain assessment, aligning analgesics with the patient's pain level, and consistent monitoring. Compared with the results in Survey 1, pain intensity level (at present, at least, at worst, and on average), and the level of pain interference with physical and emotional function significantly decreased in the second and third surveys. Though there are no similar studies with which to compare, the findings are in accordance with results from other earlier, related studies, including nurse-based pain management programmes [24], pain educational programmes [17–20], and

Table 4 The proportion of patients with mild, moderate and severe pain when asked for average pain in the last 24 h and pain "right now" by survey period

Severity of pain		Survey 1	Survey2	Survey 3
Average pain	N	237	247	233
	Mild	31.2	27.1	51.5
	Moderate	47.3	69.2	46.4
	Severe	21.5	3.6	2.1
Pain at the time of the interview ("right now")	N	256	259	267
	Mild	46.1	42.9	62.9
	Moderate	32.4	49.4	34.5
	Severe	21.5	7.7	2.6

Table 5 The samples' mean scores on pain interference with physical and emotional function

Pain interference with	Survey 1 Mean (SD)	Survey 2 Mean (SD)	Survey 3 Mean (SD)	*p*-value		
				Survey 1 vs. Survey 2	Survey 1 vs. Survey 3	Survey 2 vs. Survey 3
Physical functions						
Activity in bed	4.6 (3.4)	4.6 (3.1)	3.9 (2.8)	1.000	0.026	0.021
Activities out of bed	5.0 (3.6)	4.9 (3.1)	4.4 (3.1)	1.000	0.073	0.170
Falling asleep	4.3 (3.1)	4.3 (2.8)	3.5 (3.1)	1.000	0.014	0.015
Staying asleep	4.3 (3.1)	4.1 (3.0)	3.7 (3.2)	1.000	0.044	0.379
Deep breathing and coughing	3.4 (3.2)	3.1 (3.4)	1.2 (2.2)	1.000	0.000	0.001
Emotional functions						
Relationships with others	3.6 (3.2)	3.0 (3.1)	2.8 (2.9)	0.089	0.010	1.000
Anxious	5.4 (3.1)	5.3 (2.7)	4.3 (3.0)	1.000	0.000	0.001
Emotion (Depression)	5.2 (3.0)	5.2 (2.7)	4.3 (3.1)	1.000	0.001	0.003
Frightened	4.9 (3.2)	5.0 (3.0)	4.1 (3.4)	1.000	0.019	0.011
Helplessness	3.7 (3.4)	3.8 (3.3)	3.1 (3.9)	1.000	0.142	0.036

[a] *P*-value using one-way ANOVA with post hoc test

postoperative pain management programmes [22, 23] on chronic pain and its interference with physical and emotional function.

Even though the current study showed a significant positive impact on the mean pain intensity, mean functional interference level, and the proportion of patients who reported pain in the last 24 h (93% in Survey 1 vs. 87.3% in Survey 3), the proportion of patients who reported pain in the last 24 h at the end of intervention was still high when compared with the results of prior prevalence studies in a German teaching hospital (63%) [14], and in Chicago, USA (59%) [38]. Even though the proportion of patients regularly assessed for pain and treated with anti-pain medication through different routes significantly increased, the findings of the current study imply that a larger number of patients still suffer from manageable pain. This could be due to limitations on the availability of anti-pain medication. There is also a possibility that increased attention to pain management from nurses may have given the patients higher expectations towards pain relief and thereby impacted patient responses to Surveys 2 and 3.

The commonly-used pain medications in the study hospital were tramadol, Non-Steroidal Anti-Inflammatory Drugs (NSAID) (paracetamol, ibuprofen, diclofenac, indomethacin), and, rarely, pethidine. However, morphine, the gold standard indicator of adequate pain management, was either not regularly available or not appropriately used. The explanation of medication choice may be linked to various reasons. Those patients who came from districts where community-based health insurance was established and was legally allowed to receive healthcare services free of charge (the poor, pregnant mothers) automatically received all available pain medications in the hospital. However, patients outside this category paid out of pocket. In addition to pharmacological agents, some patients also used nonpharmacological interventions such as massage, prayer, or hot or cold application. On the other hand, the fact that the average monthly income of patients was just over one US dollar per day means that many patients who pay out of pocket may not be able to afford medication or get the medication in a timely fashion. Another possible reason could be the nature of pain. Acute pain is a protective warning signal indicating inflammatory or traumatic tissue damage, whereas chronic pain is a disease per se [2]. Thus, the patient may be in unnoticed acute pain due to missed visits or inadequately managed chronic pain at the time of data collection. However, these situations were the same in the three observation periods.

In a complex intervention that consists of an educational programme and rounding, it is difficult to attribute the contribution of each specific component to the final results [39]. The educational programme improved nurses' knowledge of and attitudes towards pain [25] and was a cornerstone for an evidence-based pain management practice. This could inspire individual nurses to practice proper pain management. Thus, the findings from the second survey, which occurred after the educational programme, could be related to these changes in pain intensity except for average pain in the last 24 h. Rounding, on the other hand, further improved pain treatment by systemizing nurses' care delivery practices in pain management routines. Hence, changes in pain intensity and interference in the final survey are most likely due to the combined effect of both the educational program and rounding. Within the scope of this study, we could only determine the impact of the entire intervention against the baseline result for patient-reported

pain intensity and functional interference, though these findings must be taken with caution. The educational components of the nurse-based pain management programme upgraded nurses' understanding of pain management, which seemed to help them carry out pain assessments, align analgesics to pain severity levels and monitor patient responses to treatment more confidently. Rounding in this program helped nurses apply their knowledge by organizing pain management practices so that patients were assessed regularly and treated for pain based on the WHO pain ladder.

Strengths and limitations

The current findings indicate the potential benefits of a nurse-based pain management programme (in-service educational programme and rounding) for hospitalized patients. However, several factors may limit the findings of the current study. One limitation could be attributed to the study design, the use of a non-randomized design without a control group. Initially, we planned to employ a quasi-experimental design with a control group. This was however complicated by a period of public unrest followed by a declaration of a state of emergency, which made it impossible to travel between the intervention and control sites, and our plans to use a control group had to be abandoned. Another limitation is the possibility that nurses may have gained additional knowledge by interacting with medical professionals, thereby improving their practices, resulting in the possibility of physician-initiated pain treatment rather than nurse-initiated pain treatment through consultation. Given all these factors, a simple pre-post study design with three measurement points on separate samples is inadequate for causal inference. Further randomized, multicenter studies are necessary before attributing a nurse-based pain management programme to changes in patient-reported pain intensity and interference. Even though we have no data on the duration of hospitalization or types of procedures the patients had undergone during their hospital stays, it should be noted that this might have influenced the severity of pain.

Conclusion

The current study provides empirical evidence that a nurse-based pain management programme (in-service education and rounding) significantly improved patient-reported pain intensity and interference. The instruments used in this survey could be used for monitoring pain management practices at regular intervals to ensure that the changes are sustainable. The findings also imply the need for educational programmes to improve nurses' technical capacity in in-hospital nursing care. In addition, the phased intervention approach we have used in this study can easily be applied to nursing practices other than pain management, to improve patient-reported outcomes.

Abbreviations

ANOVA: Analysis of Variances; APS: American Pain Society; APS-POQ-R: American Pain Society Pain Outcome Questionnaire-Revised; BPI: Brief Pain Inventory; FMoH: Ethiopia's Federal Ministry of Health; IM: Intramuscular; IV: Intravenous; JCAHO: Joint Commission on Accreditation of Healthcare Organizations; JUMC: Jimma University Medical Center; NRS: Numerical Rating Scale; NSAID: Non-Steroidal Anti-Inflammatory Drug; SD: Standard Deviation; SPSS: Statistical Package for the Social Sciences; WHO: World Health Organization

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Ethics approval and consent to participate

The study has been notified and approved by the Norwegian Centre for Research Data - project number 48349. Before the commencement of data collection, ethical approval was sought from the institutional review board of the College of Health Science of JUMC, and administrative permission was also obtained from JUMC. During data collection, written informed consent was obtained from each participant.

Authors' contribution

All authors have made substantial contributions to this manuscript. GG contributed to the conception and drafted the article. IS and RH critically revised the article for important intellectual content. All authors contributed to the statistical analysis, the design of the study including fieldwork preparation, and the article revision as well as read and approved the submitted version.

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Availability of data materials

Due to the NSD's (Norwegian Centre for Research Data) policy, data from this research will not be shared to ensure data confidentiality but can be made available based on official request.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Patient satisfaction with a nurse-led pain management programme: a quasi-experimental study in Ethiopia: *Accepted on 08-Nov-2022: SAGE open Nursing*

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Abstract

Introduction: Patient satisfaction is one of the important indicators of quality care provision.

Objective: To examine patient ratings of pain management satisfaction before and after introducing a nurse-led management programme.

Methods: a quasi-experimental design with three cross-sectional surveys between 1 October 2016, and 15 June 2017. A total of 845 patients admitted to the four inpatient departments (medicine, surgery, maternity, and gynaecology) of Jimma University Medical Centre were invited to participate in the study. A questionnaire adapted from the American Pain Society Patient Outcome Questionnaire, Pain Treatment Satisfaction Scale, and related literature was used for the survey. Data were analysed using the chi-square test (categorical variables), t-tests for continuous variables, and robust regression to determine the effect of nurse-led management programme on patient satisfaction. For all tests, p-values <0.05 were considered statistically significant.

Results: Of the 845 patients invited, 782 (92.5%) participated in the surveys – Survey 1: N=256; Survey 2: N=259; Survey 3: N= 267. The proportion of patients who perceived that staff responded within 30 minutes increased from 67.8% in Survey 1 to 71.1% in Survey 2 and 74.2 % in Survey 3. On a scale of 1 to 5 (1= strongly dissatisfied and 5= strongly satisfied), the overall mean patient satisfaction with pain management was 3.61 (SD 0.80) in Survey 1, 3.81 (SD 0.86) in Survey 2, and 4.10 (SD 0.64) in Survey 3. Moreover, the patients scored significantly higher on all satisfaction items in Survey 2 (B ranged between 0.12 and 0.41) and Survey 3 (B ranged between 0.24 and 0.74) compared to Survey 1.

Conclusion: The patients' ratings of their satisfaction and staff nurse responsiveness following the nurse-led pain management programme have increased compared to the levels before the intervention. However, further studies, including those with a control group, are warranted to confirm the results.

Keywords: nurse-led pain management, patient satisfaction, staff responsiveness

Introduction

The global burden of pain is rising (Enright & Goucke, 2016). According to the International Association for the Study of Pain (IASP), globally, one in five adults experiences pain, one in ten adults is diagnosed with chronic pain every year (Enright & Goucke, 2016; Goldberg & McGee, 2011), and about two-thirds of hospitalized patients suffer from uncontrolled pain (Farooq, Khan, & Ahmed, 2016). This problem affects more low and middle-income countries (LMICs) (King & Fraser, 2013), and thus the burden of unrelieved pain is disproportionally distributed across the world (Goldberg & McGee, 2011).

Pain management varies depending on the context. For example, while rich countries are more concerned with establishing a balance between an effective treatment of pain and fighting opiate addiction, the LMICs are worried about inadequacies in pain management (Morriss & Roques, 2018; Ribeiro et al., 2012; Wang et al., 2016). Importantly, inadequately treated pain not only causes unnecessary patient suffering and reduces patient satisfaction rates (Malloggi, Leclère, Le Glatin, & Moret, 2020; McFarland, Shen, & Holcombe, 2016; Mitchell, Lavenberg, Trotta, & Umscheid, 2014; Shin & Park, 2018) but also increases hospital stays, impairs physical function, delays recovery, and thus ultimately leads to poor quality of life (Alaloul, Williams, Myers, Jones, & Logsdon, 2015; Simon, 2012).

Review of literature

Globally, there has been a greater interest in understanding and measuring patient satisfaction after improving the health care environment since 2001 (Siegrist Jr, 2013). However, in Ethiopia pain management has been given limited attention despite the fact that a considerable number of patients suffer from pain. For example, a study by Admassu et al. showed that 78% of post-operative patients experienced moderate to severe pain (Admassu, Hailekiros, & Abdissa, 2016), and 91.4 % of post-operative patients reported insufficient pain care when treated at a university hospital in Ethiopia (Woldehaimanot, Eshetie, & Kerie, 2014).

There are several constraints for pain management practices, particularly in Ethiopia. These include factors predicting and delaying the provision of optimal pain management, such as the limited number of skilled nursing staff per patient (Weldetsadik et al., 2019), poor nurse-patient communication, and inadequate medication education (Shin & Park, 2018; Shindul-Rothschild, Flanagan, Stamp, & Read, 2017). The other barrier may also be the way the nurses are organized

in Ethiopia. For example, nurses were stationed far from patients, and patients had difficulty finding a nurse on duty with whom they could discuss their pain. Nurses' responses to patients' needs and the amount of time nurses spend with patients are among the numerous factors affecting patients' satisfaction (Shin & Park, 2018), implying that better care delivery organization and a meaningful engagement of nurses with patient care lead to proper pain management.

Previous studies (Dräger et al., 2017; Haller et al., 2011; Ribeiro et al., 2012; Rice et al., 2019; Shindul-Rothschild et al., 2017; Stamer, Liguori, & Rawal, 2019) do not address how to meaningfully engage nurses in their interactions with patients while delivering pain management, regardless of the patients' illness or admission unit, particularly in the Ethiopian context. Hence, the researchers developed a context-specific programme to ensure nurse-patient interactions for pain management (the detailed intervention components are explained in the method section). Findings from a previous study showed that patient experienced reduction in mean pain intensity and interference with physical function when the nurses had gained new knowledge and attitudes regarding pain and pain management system re-organised (Germossa, Hellesø, & Sjetne, 2019). Moreover, several hospital-based studies indicate the magnitude of pain reported among post-operative patients in Ethiopia (Argaw, Berhe, Assefa, & Teklu, 2019; Belay, Fitiwi, Yilkal, Woldegerima & Enyew, 2020; Eshete et al., 2019). The researchers have not identified studies investigating patient satisfaction with pain management regardless of their admission unit. Therefore, this study aimed to evaluate nurse-led pain management programmes in terms of nurse responsiveness and patient satisfaction with pain treatment information, pain care provided by nurses, and medication regimen in an Ethiopian university medical centre.

Methods

Design

The researchers used a quasi-experimental design with three cross-sectional surveys to evaluate patient satisfaction and patient perception of staff responsiveness before and after the nurse-led pain management programme. The study was conducted in four inpatient units (medical, surgical, gynaecology, and maternity) of Jimma University Medical Center (JUMC). JUMC is a 750-bed teaching hospital and tertiary referral medical centre in Oromia, in southwest Ethiopia, which provides services to 15 million people. At this medical centre, all nurses (all with a degree or diploma-level training) have the same bedside responsibilities regardless of their educational

background. This paper is part of a research project designed to evaluate a nurse-led pain management programme in a resource-limited hospital setting

Intervention (Nurse-led pain management programme)

The nurse-led pain management programme ('the programme') consisted of two phases: 1) development and provision of an in-service education programme and 2) organizing a caring around the clock model (from now on, referred to as 'rounding'). The researchers' assumed patients would experience better pain management if nurses had adequate knowledge and a positive attitude toward pain management, and if the care was organized, nurses would be able to approach patients systematically and proactively.

As a framework, the researchers' used Swanson's theory of caring where she presents five caring processes – Maintaining belief, Knowing, Being with, Doing for, and Enabling – which promote a therapeutic relationship (Shin & Park, 2018; Swanson, 1993).

Each of Swanson's caring processes has sub-dimensions that form the basis for nursing intervention and apply to the nursing process, whereby patients can be assisted in attaining, maintaining, or regaining an optimal level of well-being (Shin & Park, 2018). Building on the principle of maintaining belief, the caring process combines compassion (knowing and being with) with competence (doing for and enabling) to achieve a patient's intended outcomes (Swanson, 1991, 1993). When applied to nursing practice, these five caring processes guide nurses to deliver care and promote patient well-being (Kalfoss & Owe, 2015; Lillykutty & Samson, 2018). In addition, Hutchings' caring around the clock model was considered as an appropriate framework for re-organizing how nurses approached the patients, with the aim of enabling a relationship for pain care (Harris et al., 2017; Hutchings, 2012; Hutchinson, Higson, & Jackson, 2017; Rondinelli, Ecker, Crawford, Seelinger, & Omery, 2012).

In the nurse-led pain management programme, the principles of enabling and maintaining belief were used to develop step 1 of the nurse support protocol, which the researchers used to guide nurses in the rounding process (**see Supplementary material 1).** The protocol describes the nurse's self-introduction, role in pain management, rounding schedule, personnel involvement in rounding, information about the purpose of pain management, and script communication. Step 2 of the nurse support protocol for rounding (**see Supplementary material 1)** was designed based on the principles of knowing, being with, and doing for, which are about presence, pain

assessment, and rating pain on the Numerical Rating Scale (NRS) and administering pain medications and other nursing care as needed. While rounding was used to structure a nursing pain care system at a fixed time interval to assess and manage patients' pain care needs. Swanson discussed how care could be promoted and maintained in clinical settings, and proposed a variety of circumstances where the interaction would happen between nurses and patients, where nurses demonstrate care as essential to patient well-being as caring for them through clinical activities such as administering medications and monitoring patients by spending time with them (Shin & Park, 2018). Whereas Hutching (Hutchings, 2012) emphasized meaningful interaction between patients and the nurses who provide care for them several times a day, so that they can ask for anything they need and do not feel helpless, or making nurse leaders visible to get daily feedback from the patient or provide real-time positive feedback to the staff (Hutchings, 2012).

Implementation of the programme

In phase I of the intervention, all staff and head nurses in the units, nurse supervisors, and the nursing service director participated in an in-service education programme for a total of 24 hours. The researchers arranged the educational programme in groups of training sessions with 30–40 nurses per session. The training was delivered in three ways. First, two consecutive days of intensive in-person sessions lasted for a total of 16 hours. This was followed by facilitated self-learning (distributing reading materials in hard copy, soft copies on compact discs, and memory sticks that contain the training manual, presentation materials, selected research articles, and reference manuals). Lastly, the researchers gave eight hours of follow-up refresher training after one month. The content of the education programme was developed based on the Ethiopian Ministry of Health pain management guidelines (MOH, 2007), WHO guidelines (Arora & Baidya, 2013; WHO, 2007), and the four domains of pain management competency (multidimensional nature of pain, pain assessment and measurement, management of pain, and clinical condition) (Fishman et al., 2013). In addition, the principal investigator was accessible to nurses by phone to clarify pain management issues as required during the implementation of the programme.

In phase II of the intervention, a nurse support protocol for rounding (**see Supplementary material 1)** was implemented, guided by Swanson's five principles of caring. Before implementing the protocol, an engagement orientation that lasted one day (8 hours) for staff and one half-day (4 hours) for nurse leaders and supervisors was organized. The orientation included information about

the rounding process and what staff nurses, head nurses, senior nurses/shift leaders, and the nursing director (Matron) should observe, assess, and do during and after each round.

Staff nurses were expected to visit patients every two hours during the daytime and every four hours at night time to show their presence to the patient. During each visit, the nurses ensure that patients are comfortable by employing the principle of knowing, doing for, and enabling; asking the patient to rate his/her pain; administering medication as ordered; documenting observation findings in the rounding log, and informing the patient when the nurse will return. If medicine needs to be changed, the nurse discusses this with the treating physician. Nurses were also instructed not to deviate from the rounding schedule unless the patient was sleeping or there was a risk of skin breakdown, which necessitated repositioning, or it was time for medicine delivery.

The head nurse and the senior nurse/shift leader did rounds daily, whereas the nursing director did round every week. At each visit, the head nurse, the senior nurse/shift leader, and the nursing director check if rounding is being done as scheduled, ask the patient if he/she is in pain, and give positive feedback to staff nurses. The head nurse also leads weekly staff nurse discussions, and the nurse director leads monthly head nurse and supervisor discussions (**Supplementary material 1).**

Research question

Does nurse-led pain management programme improve nurses' responsiveness and their satisfaction with pain treatment information, pain care provided by nurses and the medication regimen?

Sample

Patients who were 18 years or older and had stayed in the ward for at least 24 hours were asked to participate. The study excluded patients who were critically ill and unable to respond to questionnaires.

Data collection

The researchers collected the data using an interviewer-administered questionnaire from three different patient samples on three separate occasions between 1 October 2016, and 15 June 2017. Survey number 1 (S1) collected baseline measurements, Survey number 2 (S2) was carried out six weeks after the in-service education programme for nurses was completed, and Survey number 3 (S3) after sixteen weeks of practicing rounding. Data was collected by six experienced BSc nurses who received three-day intensive training covering topics such as: how to build a shared understanding of the contents of the data collecting tool, how to fill out each question, interviewing techniques, and protocols to be followed during the survey to ensure the quality of data collection.

The ward head nurse or shift team leader made initial contact with each eligible patient to request participation in the study.

The Instrument

After an extensive review of the available literature, the researchers adopted relevant items from various questionnaires (Comley & DeMeyer, 2001; Evans et al., 2004; Gordon et al., 2010), as shown in **Table 1**.

Table 1. The content of the patient survey questionnaire

Variable	Response alternatives
Part I: Sample characteristics	
1.1 Age in years	
1.2 Gender	1. Male 2. Female
1.3 Place of living	1. Urban 2. Rural
1.4 Educational level	1. Had no formal education 2. Had formal education
1.5 Occupation	1. Farmer 2. Government employee 3. Self-employed 4. Unemployed
1.6 Admission unit	1. Surgical 2. Medical 3. Gynaecology 4. Maternity
Part II: Patient perceptions of staff responsiveness	
2.1. Earlier in your care, did a nurse make it clear to you that we consider treatment of pain to be very important and that you should always tell your nurses when you have pain?	1. Yes 2. No
2.2. When you asked for pain medication, what was the longest time you had to wait to get it?	1. 30 minutes or less 2. 31-60 minutes 3. More than one hour 4. Never asked for pain medication
Part III: Satisfaction with pain care	
4.1. The information that you received about your pain and treatment 4.2. The care provided by the nurses for your pain and its treatment 4.3. The form of medication (pill, capsule, injection…) 4.4. How often you take your medication 4.5. The amount of pain medication you take 4.6. The level or amount of pain relief provided by your pain medication 4.7. The duration of pain relief provided by your pain medication	The patient was asked to rate his or her level of satisfaction with each question about the pain care he or she received by answering as follows: 5. Strongly satisfied 4. Somewhat satisfied 3. Neither satisfied nor dissatisfied 2. Somewhat dissatisfied 1. Strongly dissatisfied

The final questionnaire consists of 15 items divided into three sections. The first section covers data related to the patient characteristics, such as age, gender, address, educational level, occupation, and unit of admission. The second and third sections were used to assess patient perceptions of staff nurse responsiveness and the patient's satisfaction with pain management. This section also contains questions adapted from the American Pain Society Patient Outcome Questionnaire-Revised (APS-POQ-R) (Gordon et al., 2010) and related literature (Comley &

DeMeyer, 2001), for the assessment of patients' perceptions and considerations given to pain management and nurses' responsiveness. The last part of the questionnaire contains seven items that were adapted from the Pain Treatment Satisfaction Scale (PTSS) (Evans et al., 2004) to measure satisfaction with pain treatment.

Health care professionals, English language experts, and non-healthcare personnel (faculty in Jimma University) initially translated the questionnaire into the two commonly spoken local languages (Afaan Oromo and Amharic), and it was translated back to English by other language experts. Then the translators were brought together to discuss the translated items and to reach a consensus. Finally, to check how the patients understood each item, the researchers conducted a cognitive interview of five people with diverse backgrounds, such as young, middle age, and elderly adults and nurses, based on the principle of cognitive interviewing (Beatty & Willis, 2007) and the questionnaire was pre-tested on 35 patients from various units.

Data analysis

SPSS version 20.1 (IBM SPSS Statistics for Windows, Armonk, NY) and Stata ver. 17 were used to analyse the data. Continuous data (age) were described using mean and standard deviation (SD). Categorical data were presented as counts and percentages. Crude comparisons of baseline characteristics between S1, S2 and S3 were conducted using chi-square tests for categorical variables and t-tests for continuous variables.

As the outcome was not normally distributed, and to adjust for unit of admission, the researchers fitted robust regression adjusted for the unit of admission to determine the effect of the programme on patient satisfaction. Possible differences among surveys are presented as regression coefficients (B) with 95% confidence intervals (CI). All the analyses were considered exploratory, so no correction for multiple testing was done. P-values < 0.05 were considered statistically significant.

Result

Sample characteristics

Out of the 845 eligible patients who were invited to participate, 785 (92.5%) gave their consent and responded to the three surveys distributed at S1: N=282; S2: N=283; and S3: N= 280. The participant sample for S1 (mean age=38.1 (*SD* 16.2) years) had comparable mean age with those for S2 (mean age =37.4 (*SD* 15.2) years) and S3 (mean age = 37.9 (*SD* 15.4 years). Except for the unit of admission, there were no differences in the distribution of sample characteristics by survey period (**Table 2**).

Table 2. Sample characteristics

Sample characteristics	S1 (%)	S2 (%)	S3(%)	*p*-value		
				S1 vs S2	S1 vs S3	S2 vs S3
Gender	(*N*=256)	(*N*=259)	(*N*=267)	0.27	0.75	0.42
Male	125(48.8)	139(53.7)	134(50.2)			
Female	131(51.2)	120(46.3)	133(49.1)			
Residence	(*N*=247)	(*N*=237)	(*N*=263)	0.85	0.52	0.41
Urban	169(68.4)	164(69.2)	173(65.8)			
Rural	78(31.6)	73(30.8)	90(34.2)			
Educational level	(*N*=253)	(*N*=253)	(*N*=266)	0.90	0.28	0.24
Had no formal education	151(59.7)	150(59.3)	171(64.3)			
Had formal education	102(40.3)	103(40.7)	95(35.7)			
Occupation	(*N*=253)	(*N*=253)	(*N*=266)	0.17	0.35	0.08
Farmer	151(59.9)	133(51.8)	148(55.4)			
Government employee	28(11.1)	44(17.1)	29(10.9)			
Self-employed	36(14.3)	41(16.0)	35(13.1)			
Unemployed	37(14.7)	39(15.2)	55(20.6)			
Unit of admission	(*N*=256)	(*N*=259)	(*N*=267)	0.01	<0.01	0.83
Surgical	133(52.0)	104(40.2)	98(36.7)			
Medical	86(33.6)	89(34.4)	101(37.8)			
Gynaecology	20(7.8)	34(13.1)	34(12.7)			
Maternity	17(6.6)	32(12.4)	34(12.7)			

Patient perception of staff responsiveness

As shown in Table 1 above, Part II, two items were used to assess the patients' perception of timely staff responsiveness with pain care. First, the proportion of patients who answered "yes" to the question asking, "Earlier in your care, did a nurse make it clear to you that we consider treatment of pain to be very important and that you should always tell your nurses when you have pain?" was significantly increased from 68.8% at S1 to 82.7% at S2 and then to 89.5% at S3. As shown in **Table 3**, item two regarding the proportion of patients who requested and received pain medication within 30 minutes increased from 77.9% in S1 to 78.1% in S2 and 80.5% in S3, but this did not reach statistical significance.

Table 3. The longest waiting time for pain medication

Staff response	S1(*n*=217)	S2(*n*=237)	S3*(n=246)*	P-Value
	Percentage (95%CI)	Percentage (95%CI)	Percentage (95%CI)	
30 minutes or less	77.9 (72.4-84.4)	78.1 (72.8-83.4)	80.5 (75.5-85.5)	0.21
31-60 minutes	12.0 (7.7-16.3)	11.8 (7.7-15.9)	15.0 (10.5-19.5)	
More than one hour	12 (4.8-6.2)	5.9 (2.9-8.9)	3.3 (1.1-5.5)	
Never received	4.6 (1.2-7.4)	4.2 (1.6-6.8)	1.2 (0.2-2.6)	

Patient satisfaction with pain care

On a 1-5-point scale, the crude means overall patient sample satisfaction scores increased by 0.2 at S2 and 0.5 at S3 compared to S1, and the mean sample satisfaction level with pain care varies by item **(Table 4).**

Table 4: Mean Patient satisfaction with pain care

Satisfaction	Survey 1 Mean (SD)	Survey 2 Mean (SD)	Survey 3 Mean (SD)
The information that you received about your pain and treatment	3.5(1.2)	3.9(1.0)	4.3(0.7)
The care provided by the nurses for your pain and its treatment	3.8(1.1)	4.0(1.0)	4.5(0.6)
The form of medication (pill, capsule, injection.)	3.7(1.1)	3.8(1.0)	3.9(0.9)
How often you take your medication	3.5(1.1)	3.7 (1.1)	4.0(0.9)
The amount of pain medication you take	3.5(1.1)	3.7(1.0)	4.0(1.0)
The level or amount of pain relief provided by your pain medication	3.6(1.0)	3.8(1.1)	4.0(0.9)
The duration of pain relief provided by your pain medication	3.6(1.1)	3.8(1.1)	4.0(0.9)
Overall patient satisfaction	3.6(0.8)	3.8(0.9)	4.1(0.6)

As the distribution of patients at the various hospital units was different between S1, S2, and S3, all analyses were adjusted for the type of admission unit. The level of patient satisfaction was statistically significantly higher for all the assessed items in S3 compared to S1, and for a majority of items in S2 compared to S1. For item 1, the scores were 0.74 points higher at S3 than S1. For item 2, the scores were 0.72 points higher at S3 than S1, more than threefold increase compared to the difference between S1 and S2 (B=0.19). For item 3, there was no statistically significant difference in patients' satisfaction between S2 and S1; however, at S3, the patients were on average 0.24 points more satisfied than at S1. For item 4, the scores were significantly higher at S2 and S3 than at S1, with two times increase between S3 and S1 compared to S2 and S1. A similar trend was observed for items 5 and 6, and 7, with a significant increase at S2 and S3 compared to S1. The increase from S1 to S3 was about twice as large as the increase from S1 to S2 for all the above items. Regarding the overall patient satisfaction, the scores were 0.27 points higher at S2 and 0.49 points higher at S3 than S1Of the included wards, the highest point increase was achieved in the surgical units and the lowest in the maternity ward for all the analysed items (**Table 5**).

Table 5: Robust regression analysis results showing the effect of the nurse-based inpatient pain care programme

Satisfaction items	Variables		B	95%CI	p-value
1. The information that you received about your pain and treatment	Survey number	S1	ref		
		S2	0.41	0.23-0.58	<**0.01**
		S3	0.74	0.57-0.91	<**0.01**
	Admission unit	Surgical	ref		
		Medical	0.12	-0.01-0.31	0.06
		Gynaecology	-0.17	-0.41-0.06	0.15
		Maternity	-0.22	-0.47-0.02	0.08
2. The care provided by the nurses for your pain and its treatment	Survey number	S1	ref		
		S2	0.19	0.04-0.34	**0.01**
		S3	0.72	0.57-0.87	<**0.01**
	Admission unit	Surgical	ref		
		Medical	0.04	-0.09-0.18	0.55
		Gynaecology	-0.37	-0.57- -0.17	<**0.01**
		Maternity	-0.38	-0.58- -0.18	<**0.01**
3. The form of medication (pill, capsule, injection.)	Survey number	S1	ref		
		S2	0.12	-.006-0.28	0.22
		S3	0.24	0.06-0.41	<**0.01**
	Admission unit	Surgical	ref		
		Medical	0.10	-0.06-0.25	0.24
		Gynaecology	-0.05	-0.28-0.19	0.69
		Maternity	-0.10	-0.34-0.14	0.41
4. How often you take your medication	Survey number	S1	ref		
		S2	0.22	0.04-0.40	**0.02**
		S3	0.43	0.25-0.61	<**0.01**
	Admission unit	Surgical	ref		
		Medical	0.09	0-.07-0.26	0.27
		Gynaecology	0.07	-0.18-0.32	0.57
		Maternity	-0.12	-0.42-0.09	0.19
5. The amount of pain medication you take	Survey number	S1	ref		
		S2	0.23	0.05-0.413	**0.01**
		S3	0.45	0.27-0.63	<**0.01**
	Admission unit	Surgical	ref		
		Medical	0.06	-0.11-0.22	0.51
		Gynaecology	0.07	-0.16-0.33	0.49
		Maternity	-0.19	-0.44-0.06	0.14
6. The level or amount of pain relief provided by your pain medication	Survey number	S1	ref		
		S2	0.25	0.08-0.43	<**0.01**
		S3	0.43	0.23-0,61	<**0.01**
	Admission unit	Surgical	ref		
		Medical	0.15	-0.01-0.31	0.07
		Gynaecology	0.02	-0.22-0.26	0.89
		Maternity	-0.12	-0.37-0.12	0.33
7. The duration of pain relief provided by our pain medication	Survey number	S1	ref		
		S2	0.20	0.06- -0.41	<**0.01**
		S3	0.43	0.25-0.60	<**0.01**
	Admission unit	Surgical	ref		
		Medical	0.13	-0.03- -0.29	0.11
		Gynaecology	-0.04	-0.28- -0.19	0.72
		Maternity	-0.09	-0.34- -0.18	0.44
Overall patient satisfaction score	Survey number	S1	ref		
		S2	0.27	0.14-0.40	<**0.01**
		S3	0.49	0.34-0.63	<**0.01**
	Admission unit	Surgical	ref		
		Medical	0.12	-0.00-0.24	0.06
		Gynaecology	0.00	-0.18-0.18	0.96
		Maternity	-0.15	-0.33-0.03	0.99

Key: Survey 1 (S1) indicates the baseline values; Survey 2 (S2) refers to values after in-service education, and Survey 3 (S3) shows values after rounding

Discussion

The findings of this study show that the scores for perceptions of staff responsiveness and patient satisfaction with pain management significantly increased across the surveys following the nurse-led pain management programme. The level of patient satisfaction was statistically significantly higher for all the assessed items in S3 compared to S1 (baseline), and for a majority of items in S2 compared to S1. However, the size of the increase from the baseline to S2 and S3 differs by all satisfaction items and units of admission. Compared to the baseline value, a minor increase was observed on the item assessing satisfaction with type of pain medicine (pill, capsule, injection.), and the highest increase was observed on the item assessing the information a patient received regarding his/her pain and treatment at both S2 and S3.

Given the characteristics of the patients assessed at S1, S2 and S3 are similar expect for the admission unit, which adjusted for in the analyses, the result revealed significant changes in scores for patients' satisfaction after the introduction of the in-service educational programme. This indicates that improving nurses' knowledge and attitudes allows them to provide essential pain care (pain assessment, medication administration, and use of the WHO pain ladder) and helps them discuss pain issues with patients and other healthcare professionals. This is consistent with other studies that have found that an education programme improves nurses' knowledge and attitude toward pain management practices (Al Qadire & Al Khalaileh, 2014; Gugsa N Germossa et al., 2018).

In addition to the changes associated with the introduction of the in-service educational programme, further changes in the patients' satisfaction with pain management in S3 may show the significance of rounding. In the present study, the rounding programme was used to reorganize nurses' work processes to better use the existing nursing system and increase the frequency of contact for appropriate inpatient pain management. According to Marie Hutchings (2013) , in addition to ensuring accountability, intentional presence, and therapeutic engagement, rounding can also help nurses assess patient needs proactively, rather than randomly, during their time on duty (Hutchings, 2012).

Despite the fact that staff nurse compliance with rounding reports varies (see supplementary material 2) by admission unit and intervention time, eight out of ten patients were visited promptly. However, the patients in the maternity unit were those who were visited the least frequently. Therefore, nurses' attention may be focused more on admissions, discharges, and

transfers than on the rounding schedule at the hospital's maternity unit. In addition, the mother should stay in the hospital for 24 hours after normal delivery and 72 hours after Caesarean section. Thus, due to a high caseload and turnover, a mother may be discharged sooner than expected or transferred to a neonatal intensive care unit if the baby is in poor condition and, hence, she is visited less often.

The more frequently the nurses visit the patient, the better they can interact with them and assess their pain. The patient suffers less from pain left untreated and hence reports higher satisfaction scores with the pain care. The purpose of the visit by nurse leaders (head nurses, nurse directors, and shift leaders) was to identify missed rounding schedules and to provide a supportive environment for staff nurses. Evidence shows that rounding can improve patient outcomes and improve patient perception of care (Hutchings, 2012).

Making a scheduled visit for each patient is consistent with Swanson's (1993) caring principles, such as being with, doing for, and enabling or informing (Swanson, 1993). When patients are informed and enabled to participate in pain treatment through scripted communication, it may positively impact how they evaluate their pain care. According to various studies, rounding improves patient satisfaction, reduces call bell usage, and prevents falls and pressure ulcers (Harris et al., 2017; Hutchings, 2012; Olrich, Kalman, & Nigolian, 2012; Rondinelli et al., 2012). A replication study on hourly rounding shows that intentional hourly rounding improves healthcare quality, reduces potential harm, raises fundamental standards of care, and empowers patients to ask for what they need to maintain their comfort and well-being (Langley, 2015)

The increased mean patient satisfaction score at S2 and S3 may suggest that patients received better attention and care required to treat their pain compared to those at baseline. Staff responsiveness, pain treatment consideration, and patient reassurance that the nurse will return for additional rounds, are potential reasons for an increased mean satisfaction score. Other studies have found that if patients know when they will receive assistance, they are more likely to be satisfied (Langley, 2015). Moreover, the current study's findings are supported by Patterson (2014) on a general surgical unit, claiming that patients are more satisfied when they are reassured, and nurses respond to their needs proactively (Patterson, 2014). According to a study by Blakley et al., patients may be more satisfied when nurses communicate effectively with them, manage pain appropriately, and provide treatment information that meets their needs (Blakley, Kroth, & Gregson, 2011). Several other studies have found a link between staff-patient

interaction and patient involvement in their care, staff responsiveness, and patient satisfaction (Bowling et al., 2012; Hewitson, Skew, Graham, Jenkinson, & Coulter, 2014; Staniszewska et al., 2014).

Strengths and limitations

The current study is relatively extensive and the first of its type in nursing pain management in Ethiopia. The samples are representative for the chosen patient population, and response rates were very high. However, several factors should be considered when interpreting the results. It is difficult to attribute each specific element of intervention to the final intervention results that consist of more than one component (Richards & Hallberg , 2015). For example, the group-level scores for patients' satisfaction with pain management at S3 can be attributed to both rounding and an in-service educational programme, rather than to one or the other. Study design is considered to be another limitation. This study measured the impact of rounding that followed the educational programme on three different samples from different admission units, using a quasi-experimental design which does not ensure equivalence between groups. Initially, the study was planned to be conducted using a quasi-experimental design with a control site located 625 km from Jimma on the other side of southwest Ethiopia. However, unanticipated public unrest made it impossible to enrol patients from this unstable area. Following the public unrest, the government declared a state of emergency. This made it impossible to move between the intervention and control sites, and the researchers' plan to use a control group was abandoned. The study was conducted on patients with different medical conditions, but the same socio-economic backgrounds and from the same geographic areas. Due to differences in medical diagnoses, their pain experiences and pain relief expectations may differ. Hence their evaluation of pain care may vary. Thus, a further study considering such variability is important. However, despite these limitations, the observed changes in the satisfaction score of patients' assessment of their pain care and their perception of staff responsiveness indicate the usefulness of the new nurse-led pain management programme, which may be applied in settings where patient-centred care is essential. However, further research with a control site is required to validate the effect of the new care model on increased nurses' time spent with patients, optimized use of the existing system, and care experiences.

Implications for practice

Adequate pain treatment has become increasingly recognized as a human right (Brennan, Lohman, & Gwyther, 2019). Despite progress in pain care modalities, the most successful pharmacological and non-pharmacological therapies are not widely used. Hence, the solution to inadequate pain care does not lie so much in developing new analgesics or techniques, but in establishing a new pain care system to enhance the use of existing approaches (Colvin & Rice, 2019; Stamer et al., 2019). Nurse-led in-hospital pain management thus has a significant practical implication since it considers the nurses' competency and anticipation of patients' needs ahead of time through rounding. Patients benefit from rounding because they receive regular visits and feel cared for, and at the same time, rounding reduces the uncertainty that might emerge from feeling unattended or alone. Rounding embodied with Swanson caring principles may have increased regular interaction between nurses and patients and thereby enhanced standards of pain management practice in facilities that previously offered substandard care. This implies that the programme optimizes the use of the existing system. Furthermore, the rounding programme seems to be a suitable framework for enabling the caregiving process, which is likely to have far-reaching consequences to relevant operations for JUMC and similar hospitals. The combination of an in-service educational programme and rounding can also be applied in any nursing practices that need re-organization.

Conclusion

This study demonstrates that the nurse-led pain management programme appears to positively impact patients’ satisfaction with pain care and their perceptions of staff responsiveness. In addition, the programme might improve nurses' knowledge and attitudes about pain and the delivery of the pain management process through meaningful patient-nurse interactions.

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Availability of data material

As per NSD (Norwegian Centre for Research Data) policy, data from this research will not be shared, to ensure data confidentiality, but can be made available from the corresponding author on reasonable request.

Ethical approval and consent to participate

Data Protection Officer for Research, NSD – Norwegian Centre for Research Data has notified the study – project number 48349. Before data collection, ethical approval was sought from the Jimma University Institute of Health Sciences' institutional review board. During data collection, written informed consent was obtained from each participant

Competing interest

The authors declare that they have no competing interests.

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Appendices

Appendix 1: Nurse Questionnaire

Subject Information Sheet and Consent

Background and purpose

I am inviting that you participate in my PhD research project, which intends to develop knowledge about in-hospital pain management in Ethiopia. You are selected as a participant who is working in inpatient wards to provide information on your competency (knowledge and skill) in the area of pain management.

What does the study entail?

The study is intervention-based. The intervention is a nurse-based, in-hospital pain management programme which includes an insesrvise education and rounding. Nurses in the intervention unit will take two consecutive days (16 hrs) of training on pain management with an additional one-day (8 hrs) refresher training on pain care and one day (8 hrs) orientation on rounding. The study will be carried out in the Gynaecology, Medical, Surgical, Maternity and Gynaecology units.

Potential advantages and disadvantages

As a respondent of this study, you will have an opportunity to learn about pain management. Except for the time you spent filling in the questionnaire, there are no anticipated risks or discomforts related to the study. In case there is any discomfort or inconvenience, please let us know.

What will happen to the information?

The data that we will obtain from you will only be used for the study, as described above. All the information will be processed without the name, ID number, or other directly recognizable types of information. A code number links you to your information through a list of names. It will not be possible to recognise you in published or presented results from the study. All data will be kept anonymous until 31 December 2021.

Voluntary involvement

The involvement in this study is voluntary. If you agree to take part at this time, you may later withdraw your consent without your work affected in any way. Mr. Gugsa Nemera Germossa who can be reached at +251955064965, email: gugsanemera@gmail.com or g.n.germossa@studmed.uio.no will address if have questions about the study.

The research project Supervisors are Professor Ragnhild Hellesø (Institute of Health and Society, University of Oslo) and Professor Ingeborg Strømseng Sjetne (Norwegian Institute of Public Health).

Consent for participation

I have been requested to participate in the study about in-hospital pain management. I have read information about the study, benefits, and possible risks. I also been given the name and address of a researcher whom I can quickly contact in case of any discomfort or inconveniences. I have read the preceding information. Questions I have raised have been responded to my satisfaction. I consent voluntarily to participate as a respondent participant in this research. I know that I am free to stop participating in research at any time without in any way affecting my work.

Name of Participant: _____

Signature of Participant: _____

Date: _____

A copy of this Consent is given to participant _____ (initialled by the researcher/assistant)

Nurses Survey Questionnaire

Survey type		1. Survey 1 (Baseline) 2. Survey 2 (After Educational programme)	
Q#	Part I: subject identifiers		
1.	Interview date in EC:	_____/___/_____	
2.	Ward/unit:	1. Medical 2. Surgical	3. Maternity 4. Gynaecology

Part II: Musses knowledge and attitude survey		
True-False item		
Response		Question items
T	F	1. Vital signs are always reliable indicators of the intensity of a patient's pain.
T	F	2. Because their nervous system is underdeveloped, children are under decreased pain sensitivity and have limited memory of painful experiences.
T	F	3. Patients who can be distracted from pain usually do not have severe pain.
T	F	4. Patients may sleep despite severe pain.
T	F	5. Aspirin and other non-steroidal anti-inflammatory agents are NOT effective analgesics for painful bone metastases.
T	F	6. Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months.
T	F	7. Combining analgesics that work by different mechanisms (e.g., combining an NSAID with an opioid) may result in better pain control with fewer side effects than using a single analgesic agent.
T	F	8. The usual duration of analgesia of 1-2 mg morphine IV is 4-5 hours.
T	F	9. Opioids should not be used in patients with a history of substance abuse.
T	F	10. Elderly patients cannot tolerate opioids for pain relief.
T	F	11. Patients should be encouraged to endure as much pain as possible before using an opioid.
T	F	12. Children under the age of 11 cannot reliably report pain, so that clinicians should rely solely on the parent's assessment of the child's pain intensity.
T	F	13. Patients' spiritual beliefs may lead them to think pain and suffering are necessary.
T	F	14. After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response.
T	F	15. Giving patients sterile water by injection (placebo) is a useful test to determine if pain is real.
T	F	16. Vicodin (hydrocodone 5 mg + acetaminophen 300 mg) PO is approximately equal to 5-10 mg of morphine PO.
T	F	17. If the source of the patient's pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to correctly diagnose the cause of pain.
T	F	18. Anticonvulsant drugs such as gabapentin (Neurontin) produce optimal pain relief after a single dose.
T	F	19. Benzodiazepines are not effective pain relievers and are rarely recommended as part of an analgesic regimen.
T	F	20. Narcotic/opioid addiction is defined as a chronic neurobiologic disease, characterized by behaviours that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving.
T	F	21. The term 'equianalgesia' means approximately equal analgesia and is used when referring to the doses of various analgesics that provide approximately the same amount of pain relief.
T	F	22. Sedation assessment is recommended during opioid pain management because excessive sedation precedes opioid-induced respiratory depression.

Multiple Choice – Place a check by the correct answer	
23.	The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is: A. Intravenous B. Intramuscular C. Subcutaneous D. Oral E. Rectal
24.	The recommended route administration of opioid analgesics for patients with brief, severe pain of sudden onsets such as trauma or postoperative pain is: A. Intravenous B. Intramuscular C. Subcutaneous D. Oral E. Rectal
25.	Which of the following analgesic medications is considered the drug of choice for the treatment of prolonged moderate to severe pain for cancer patients? A. Codeine B. Morphine C. Meperidine D. Tramadol
26.	A 30 mg dose of oral morphine is approximately equivalent to: A. Morphine 5mg IV B. Morphine 10mg IV C. Morphine 30 mg IV D. Morphine 60 mg IV
27.	Analgesics for post-operative pain should initially be given A. Around the clock on a fixed schedule B. Only when the patient asks for the medication C. Only when the nurse determines that the patient has moderate or greater discomfort
28.	A patient with persistent cancer pain has been receiving daily opioid analgesics for 2 months. Yesterday the patient was receiving morphine 200 mg/hour intravenously. Today he has been receiving 250 mg/hour intravenously. The likelihood of the patient developing clinically significant respiratory depression in the absence of new co morbidity is: A. Less than 1% B. 1-10% C. 11-20% D. 21-40% E. >41%
29.	The most likely reason a patient with pain would request increased doses of pain medication is: A. The patient is experiencing increased pain. B. The patient is experiencing increased anxiety or depression C. The patient is requesting more staff attention. D. The patient's requests are related to addiction.
30.	A. Which of the following is useful for the treatment of cancer pain? B. Ibuprofen (Motrin) C. Hydromorphone (Dilaudid) D. Gabapentin (Neurontin) E. All of the above

31.	The most accurate judge of the intensity of the patient's pain is the: A. Treating physician B. Patient's primary nurse C. Patient D. Pharmacist E. Patient's spouse or family
32.	Which of the following describes the best approach for cultural considerations in caring for patients in pain? A. There are no longer cultural influences in the USA due to the diversity of the population. B. Cultural influences can be determined by an individual's ethnicity (e.g., Asians are stoic, Italians are expressive, etc). C. Patients should be individually assessed to determine cultural influences. D. Cultural influences can be determined by an individual's socioeconomic status (e.g., blue collar workers report more pain than white collar workers)
33.	How likely it is those patients who develop pain already have an alcohol and/or drug abuse problem? A. < 1% B. 5 – 15% C. 25 - 50% D. 75 - 100%
34.	The time to peak effect for morphine given IV is: A. 15 min B. 45min C. 1hr D. 2hrs
35.	The time to peak effect for morphine given orally is: A. 5 min B. 30min C. 1-2hrs D. 3hrs
36.	A. Following abrupt discontinuation of an opioid, physical dependence is manifested by the following: B. Sweating, yawning, diarrhoea and agitation with patients when the opioid is abruptly discontinued. C. Impaired control over drug use, compulsive use, and craving. D. The need for higher doses to achieve the same effect. E. A and B.
37.	Which statement is true regarding opioid induced respiratory depression: A. More common several nights after surgery due to accumulation of opioid. B. Obstructive sleep apnoea is an important risk factor. C. Occurs more frequently in those already on higher doses of opioids before surgery D. Can be easily assessed using intermittent pulse oximetry
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.	
38. A	Patient A: Andrew is 25 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. 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 (*no pain/ discomfort)*	1	2	3	4	5	6	7	8	9	*8 worst pain/discomfort)*

38. B	Your assessment, above, is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 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. A. Administer no morphine at this time. B. Administer morphine 1 mg IV now. C. Administer morphine 2 mg IV now. D. Administer morphine 3 mg IV now.										
39. A	Patient B: Robert is 25 years old and this is his first day following abdominal surgery. 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. 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 (*no pain/ discomfort)*	1	2	3	4	5	6	7	8	9	10 (*worst pain/discomfort)*	
39. B	Your assessment, above, is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 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: A. Administer no morphine at this time. B. Administer morphine 1 mg IV now. C. Administer morphine 2 mg IV now. D. Administer morphine 3 mg IV now.										
Part IV: demographic information											
1.	Are you?									1. Female 2. Male	
2.	What is your Level of education?									1. Diploma 2. Bachelor's degree	
3.	Have you ever attended any in-service training on pain management?									1. Yes 2. No	
4.	How old are you?									_____	
5.	How many years of patient care experience do you have as nurse?									_____	

Thank you for your participation!

Appendix 2: Patient Questionnaire

Subject Information Sheet and Consent

Background and purpose

Hello! Good morning/afternoon/evening! My name is: _____, I am requesting that you participate in a PhD research project on in-hospital pain Management. You are selected as a subject to provide information on your demographic data, pain status,staff responsifvess and satisfaction with pain management while being treated for your illness here in this hospital.

What does the study entail?

In this study, we aim to develop knowledge about in-hospital pain management in Ethiopia. You are asked to participate because you are hospitalized in this medical centre. The project will be carried out at Medical, Surgical, Maternity and Gynaecology wards/units. Data will be collected using interviwere administered questionnaire.

Potential advantages and disadvantages

As a respondent in this study, you will have an opportunity to communicate with the research team regarding pain. Except for the time you spent during the interview with the interviewer, there are no anticipated risks or discomforts related to the study. In case there is any discomfort or inconvenience please let us know.

What will happen to the information about you?

The data that you will give us will only used for the study, as described above. All data will be processed without any directly recognisable type of information and kept anonymised until December 31, 2021.

Voluntary participation

Participation in the study is voluntary. You can withdraw your consent to participate in the study at any time and without stating any reason. This will not have any consequences for your further treatment. If you wish to participate, we ask you to consent on the final page. If you agree to participate at this time, you may later withdraw your consent without your treatment being affected in any way. If you have questions concerning the study, you may contact Gugsa Nemera Germossa, phone number +251955064965, email: gugsanemera@gmail.com or g.n.germossa@studmed.uio.no.

The research project supervisors are Professor Ragnhild Hellesø (Institute of Health and Society, University of Oslo) and Professor Ingeborg Strømseng Sjetne (Norwegian Knowledge Centre for the Health Services).

Consent for Participation

The research team asked me to participate in the study about in-hospital pain management. I have received information about the study, benefits, and possible risks. I have also been given the name and address of a researcher who can be easily contacted in case of any discomfort or inconveniences. I have read the preceding information, or it has been read to me. Any questions I have asked to have been responded to my satisfaction. I voluntarily consented to take part in this research. I understand that I have the right to withdraw from the research at any time without in any way affecting my medical care.

Name of Participant: _____

Signature of Participant: _____

Date (day/month/year): _____

If the participant cannot read and write

A literate witness; a person who will have no connection with the research team will be selected by the participant to sign the consent on behalf of the participant

I have seen and heard the accurate reading of the consent form to the participant. I approve that the respondents has given consent freely.

Name of witness: _____

Signature of witness: _____

Date (day/month/year): _____

Relationship with the participant: _____

A copy of this informed Consent has been provided to participant _____ (initialled by the researcher/assistant)

Subject Information Sheet and Consent (Afaan Oromo)

Waamichaa hirmaannaa qorannoo

Odeefannoo bu'uuraa fi barbaachisummaa qoranichaa

Haloo!Akkam bultan!/Akkam ooltan!/ashamaa!Maqaankoo_____jedhama!Ani akka isin barnoota digirii sadaffaaf qorannoo waa'ee yaalii dhukkubaa geggeffamu irratti hirmaattaniif isin gaafadha.Isin kan filatamtan odeefannoo bu'uuraa fi dhibee keessaniif yeroo hospitaala kana keessa turtan yaalii dhukkubaa isiniif kenname irratti muuxannoo keessan akka nuuf ibsitaniif.

Qoranichi waa'eemaalitii?

Kaayyoon qorannoo kanaa beekumsa waa'ee muuxannoo yaalii dhukkubaa hospitaalota Itoophiyaa keessatti qabu hundeessuu dha.Akka hirmaattaniif kan gaafatamtan, sababa hospitaala kana ciistanii yaalamaa jirtaniifi. Pirojeektichi kutaa ciisichaa dhibee keessoo, dhibee baqaqsanii yaaluu fi dhibee gadaameessa keessatti gaggeeffama.Odeeffanoon kan funaanamu af-gaaffii fuulaa fuulleen.

Bu'aa fi miidhaa qorannichaa

Akka hirmaataa/ttuu qorannoo kanaatti, waa'ee yaalumsa dhukkubaa irratti garee qorannoo kanaa waliin carraa odeeffannoo waljijjiruu qabdu.Yoo yeroo gaaffii fi deebii sa'aatii isin jalaa fudhate malee dhiibbaa fidu kamillee hinqabu. Yoo waan isiniif hin mijanne jiraate maaloo nu beeksisaa.

Odeeffannoon isin laattan maal ta'aa?

Ittifayyadaminni odeefannoo isin nuuf laattan akka faayidaa isaa armaan olitti ibsamee ta'a.Oddeeffannichi kallattii kamiinillee akka hinbeekamnetti adeemsifama.Bu'aan qorannichaa utuu maqaa hin ibsin maxxansama ykn ibsama.Odeeffannoon hundi maqaa-maleessa ta'ee hanga muddee 31,2021tti tura.

Hirmaannaa fedhiinii

Qorannoo kanatti hirmaachuun fedhiidhaani.Sababa tokko malee hirmaannaa keessan addaan kutuu nidandeessu. Kun immoo kunuunsa keessan irratti dhiibbaa kamillee hinqabu.Yoo hirmaachuuf fedha qabaattan bakka mallattoo armaan gadii irratti nuuf mirkaneessaa.Ammas erga waliigallee boodas taanaan utuu tajaajila keessan irratti dhiibbaa hinfidin addaan kutuu nidandeessu. Yoo gaaffii qabaattan obbo Gugsaa Namarraa Germoossaa karaa gama bilbila isaa 0955064965 fi imeela isaa gugsanemera@gmail.com ykn g.n.germossa@studmed.uio.no

qunnamuu dandeessu.Qorannicha kan too'atu Pirofeesara Raagnhiil Heeliisoo (Unibarsiitii Osilootti Inistiituutii fayyaa hawaasaa) fi Profeesara Ingibirgii Stroomseengi Shitinee (wiirtuu beekumsaa tajaajila fayyaa Noorweeyii) tiin

Waliigaltee hirmaannaa

Qorannoo waa'ee dhiibbaa akkayaa kunuunsi mar-sa'aatiin muuxannoo dhukkubsattootaa yaalii dhukkubaa irratti qabu irratti akkan hirmaadhuuf gaaffiin naaf dhihaateera. Odeeffanoo waa'ee bu'aa fi dhiibbaan qoranichi qabus argadheera.Yoo natti toluubaatees maqaa fi teessoon qorattootaas natti himameera.Odeeffanoon jiru naaf dubbifameera ykn ibsameera.Gaaffii gaafachuufis carraa argadheera.Gaaffii gaafadheef deebiin kennames naquubseera.Kanaaf,qorannoo kanarratti hirmaachuuf fedhii kootiin waliigaleera. Yoon gidduutti addaan kutes tajaajila koo irratti dhiibbaa akka hinfidnen hubadheera .

Maqaa_____

Mallattoo _____

Guyyaa(guyyaa/ji'a/ bara)_____

Yoo hirmaattun/taan kandubbisuu fi barreessu hintaane

Bakka hirmaataa/ttuu bu'uun akka mallatteesu/situuf namni barreessuu fi dubbisuu danda'uu fi qorataa waliin firooma hinqabne tokko filamee nimallatteessa.

Akka waliigalteen kun hirmaataa/ttuu kanaa dubbifamee fi carraa gaaffi gaafachuu akka argatan ragaanan baha.Waliigaltichi fedhiin akka ta'e nanmirkaneessa.

Maqaa bakka bu'aa/tuu:_____

Mallattoo bakka bu'aa/tuu:_____

Guyyaa (guyyaa/ji'a/bara): _____

Walitti dhufeenya hirmaataa/ttuu waliin qaban:_____

Koppiin walii galtichaa hirmaataa/ttuu qorannichaaf kennameera_____(jalqaba maqaa gargaaraa ykn qorataa)

Subject Information Sheet and Consent (Amharic)

ቃለ መጠይቅ

መግቢያ እና የጥናቱ አላማ

ሰላም! ደህና አደራቹ/አረፈዳቹ/አመሻቹ ስሜ _____ሲሆን ለዶክትሬት ዲግሪ ህመም መቆጣጠር ላይ የሚደረገው ምርምር ላይ እንዲሳተፉልን እየጠየኩዎት ነው፡፡ እርሶ የተመረጡት የምርምሩ አንዱ አካል ሆነው እርሶን የሚመለከቱ እና በሆስፒታሉ ቆይታዎት ህመምዎን ለመቆጣጠር በተደረገልዎት እርምጃ ያለዎትን ልምድ እንዲነግሩን ነው፡፡

ጥናቱ ምን ይፈልጋል?

በዚህ ጥናት በኢትዮጵያ ሆስፒታሎች ውስጥ **በታካሚዎች የህመም ህክምና ልምድ** ላይ እውቀት ለማግኘት አስበናል፡፡ እርሶ ተሳታፊ እንዲሆኑ የተጠየቁት በሆስፒታሉ ውስጥ ተኝተው እየታከሙ ስላሉ ነው፡፡ ምርምሩ የሚደረገው በውስጥ ደዌ፣ በቀዶ ጥገና እና በማህፀን መኝታ ክፍል ነው፡፡ መረጃዎቹ የሚሰበሰቡት ፊት ለፊት በሚደረግ ቃለ መጠይቅ ነው፡፡

ሊኖሩ የሚችሉ ጥቅሞች እና ጉዳቶች

በዚህ ጥናት ውስጥ ተሳታፊ በመሆኖ ጥናቱን ከሚያካሂዱት የቡድን አባላት ጋር የህመም ህክምና በተመለከተ የመነጋገር/የመወያየት እድል/አጋጣሚ ያገኛሉ፡፡ በቃለ መጠይቁ ግዜ ቃለ መጠይቁን ከሚያቀርበው ሰው ጋር ከሚያሳል□ት ግዜ ውጪ ምንም አይነት ጉዳት ወይም ምቾች የሚነሳ ነገር አይገጥሞትም፡፡

እርሶ የሰጡን መረጃ ምን ይሆናል?

እርሶ የሰጡንን መረጃ ከላይ በተገለጸው መሠረት ለጥናቱ አላማ ብቻ የሚውል ይሆናል፡፡ የጥናቱ ዉጤት ስታተምም ሆነ በሚቀርብበት ወቅት የርስዎ ማንነት ሰይገለጽ ይከሄዳል፡፡ ሁሉም መረጃዎች እስከ ታህሳስ 3,2021 ድረስ በማይታወቅ/በድብቅ መልክ ይቆያሉ፡፡

በፍቃደኝነት ላይ የተመሰረተ ተሳትፎ

በዚህ ጥናት ላይ መሳተፍ ሙሉ በሙሉ በእርሶ ፍቃድ ላይ የተመሠረተ ነው፡፡ ከጥናቱ መውጣት ከፈለጉ በማንኛውም ሰዓት ምንም አይነት ምክንያት ማስቀመጥ ሳያስፈልግ መውጣት ይችላሉ፡፡ ጥናቱን ካቋረጡ በሚደረግሎት ህክምና ላይ ምንም አይነት ተጽእኖ አይኖረውም፡፡ በጥናቱ ላይ ለመሳተፍ ፍላጐት ካለዎት መጨረሻ ገጽ ላይ መስማማቶን በፊርማ እንዲያረጋግጡልን እንጠይቆዎታለን፡፡ አሁን በጥናቱ ለመሳተፍ ፍቃደኛ ሆነው ነገር ግን ከግዜያት/ከቆይታ በኃላ ተሳትፎውን ማቋረጥ ካፈለጉ ቀጣይ በሚደረግሎት ህክምና ላይ ምንም ተጽእኖ ስለማይኖረው ማቋረጥ ይችላሉ፡፡

ጥናቱን አስመልክቶ ማንኛውም አይነት ጥያቄ ካለዎት በሚከተለው አድራሻ ማግኘት ይችላሉ ፡፡ ጉግሳ ነመራ ገርሞሳ ስ.ቁ 09 55064965 ኢሜል gugsanemera@gmail.com or g.n.germossa@studmed.uio.no

የጥናቱ/ምርምሩ ተቆጣጣሪዎች ፕሮፌሰር ራንሂልድ ሄሌሶ (በአስሎ ዩኒቨርስቲ የጤናና ህብረተሰብ ተቋም) እና ፕሮፌሰር ኢንገቦርግ (የኖርዌይ ጤና አገልግሎት የእውቀት ማዕከል)

በጥናቱ ላይ ለመሳተፍ የፍቃድ መስጫ /የስምምነት በየሰዓቱ የሚደረገዉ እንክብካቤ ሞዴል በታካሚዎች የህመም ህክምና ልምድ ላይ የሚያመጣውን ተጽእኖ አስመልክቶ ለሚደረገው የጥናቱ መሳተፍ እንዲሆን ተጠይቄያለው፡፡ ጥናቱ ስላለው ጠቀሜታ፣ ሊኖረው ስለሚችለው ጉዳት እንዲሁም ስለጥናቱ በቂ መረጃ ተሰጥቶኛል፡፡ ተጨማሪም ማንኛውም ችግር ቢፈጠር በቀላሉ ላገኘው የምችለውን ተመራማሪ አድራሻ ተሰጥቶኛል፡፡ ከላይ ያሉትን መረጃዎች አንብቤያለው ወይም ተነቦልኛል ጥያቄዎችንም እንዳነሳ እድል ተሰጥቶኝ ነበር፡፡ የጠየኳቸው ጥያቄዎችም አጥጋቢ በሆነ መልኩ ተመልሶልኛል፡፡ በሚደረገው ምርምር ላይም ለመሳተፍ ሙሉ ፍቃደኛ ነኝ፡፡ ከምርምሩ ተሳታፊነትም በማንኛውም ሰዓት አቋርጬ መውጣት እንደምችል እና ማቋረጤም በሚደረግልኝ የህክምና አገልግሎት ላይ ምንም አይነት ተጽእኖ እንደሌለው ተረድቻለው፡፡

የተሳታፊ ስም _____

ፊርማ _____

ቀን (ቀን/ወር/ዓ.ም) _____

ተሳታፊው ማንበብ እና መፃፍ ካልቻለ

ማንበብ እና መፃፍ ለማይችል ተሰታፊ ተክቶ ነገር ግን ምርምሩን ከሚያካሂደው ቡድን አባላት ጋር ምንም ግንኙነት የሌለው ሰው ተመርጦ በተሳታፊው ፍላጐት እንዲፈርም ይደረጋል፡፡

በጥናቱ ላይ ለሚሳተፈው ሰው ሁሉ በትክክል መነበቡን ምስክር ሆኛለው እንዲሁም ተሳታፊው ጥያቄዎችን ለመጠየቅ እድል ተሰጥቶታል፡፡ ተሳታፊው ፍቃደኝነቱን በነፃነት መውሰኑን አረጋግጣለው፡፡

የምስክር ስም _____

ፊርማ _____

ቀን (ቀን/ወር/ዓ.ም) _____

ከተሳታፊው ጋር ያለው ግንኙነት _____

የመስማሚያ ውል ፎርሙ ግልባጭ ለተስማሚው _____ ተሰጥቷል፡፡

Patient Survey Questionnaire

Survey type		1. Survey 1 (Baseline) 2. Survey 2 (After Educational programme) 3. Survey 3(After rounding)	
Part I: subject identifiers			
I1	Interview date in EC:	_____/___/_____	
I2.	Ward/unit	1. Surgical 2. Medical	3. Gynaecology 4. Maternity
Part II: pain inventory			
PI1	In our life, most of us have had pain such as minor headaches, sprains, and toothache from time to time. Have you had pain other than this kind of pain in the last 24 hours?		1.Yes 2. No

The following statement asks you about the level of pain that you suffer from. Please indicate the number that represents your pain level on scale from 0 to 10, with 0 representing "no pain" and 10 representing "worst possible pain. (please *show the pain ladder*).

PI2	Pain at its worst in the last 24 hours										
	0 (no pain)	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10 (worst pain possible)*
PI3	Pain at its least in the least 24 hours										
	0 (*no pain*	1	2	3	4	5	6	7	8	9	10 (*worst pain possible)*
PI4	Your pain on the average?										
	0 (*no pain)*	1	2	3	4	5	6	7	8	9	10 (*worst pain possible)*
PI5	How much pain you have right now?										
	0 (*no pain)*	1	2	3	4	5	6	7	8	9	10 (*worst pain possible)*

Part III: Pain treatment information	
PIrx1	Which pain control methods (if any) have you used since you were admitted?
Part IV: Pain interference	

PIF1. Mark in the box beside the number that best describes how, during the past 24 hrs, pain has interfered with or prevented you from

PIF1.1	Activity in bed (turning, sitting up, repositioning)										
	0 (*Does not interfere)*	1	2	3	4	5	6	7	8	9	10 (*Completely interferes)*
PIF1.2	Activities of daily living such as walking sitting in chair, standing, squatting, use wheelchair, dressing										
	0 (*Does not interfere)*	1	2	3	4	5	6	7	8	9	10 (*Completely interferes)*
PIF1.3	Relationship with other people										
	0 (*Does not interfere)*	1	2	3	4	5	6	7	8	9	10 (*Completely interferes)*
PIF1.4	Falling asleep										
	0 (*Does not interfere)*	1	2	3	4	5	6	7	8	9	10 (*Completely interferes)*
PIF1.5	Staying asleep										
	0 (*Does not interfere)*	1	2	3	4	5	6	7	8	9	10 (*Completely interferes)*

PIF2: Pain can affect our mood and emotions. On this scale, please circle the one that best shows what emotion and how much pain you felt.

PIF2.1	Anxious Relationship with other people										
	0 (*not at all)*	1	2	3	4	5	6	7	8	9	10(*extremely)*
PIF2.2	Depressed										

	0 (*not at all)*	1	2	3	4	5	6	7	8	9	10 (extremely
PIF2.3	Frightened										
	0 (*extremely)*	1	2	3	4	5	6	7	8	9	10 (extremely)
PIF2.4	Helpless										
	0 (not at all)	1	2	3	4	5	6	7	8	8	10 (extremely)
PIF6	Deep breathing and coughing (post op patients)										
	0 (*Does not interfere)*	1	2	3	4	5	6	7	8	9	10 (completely interferes)

Part V: Patient Perceptions of staff responsiveness		
PR1	Earlier in your care, did a nurse make it clear to you that the health care provider considers the treatment of pain very important and that you should be sure to tell them when you have pain?	1 yes 2 No
PR2	When you asked for pain medication, what was the longest time you had to wait to get it?	1. 30 minutes or less 2. 31-60 minutes 3. More than one hour 4. Never asked for pain medication

Part VI: Satisfaction with pain care

The following statements are about your satisfaction with your current pain medication and the care you receive. Please respond to each question by answering: 5 strongly satisfied: 4 somewhat satisfied: 3 neither satisfied nor dissatisfied: 2 somewhat dissatisfied: 1 dissatisfied

How satisfied are you with each of the following?		Degree of satisfaction				
S1	The information that you received about your pain and treatment	5	4	3	2	1
S2	The care provided by the nurses for your pain and its treatment	5	4	3	2	1
S3	The form of medication (pill, capsule, injection…)	5	4	3	2	1
S4	How often you take your medication	5	4	3	2	1
S5	The amount of pain medication you take	5	4	3	2	1
S6	The level or amount of pain relief provided by your pain medication	5	4	3	2	1
57	The duration of pain relievers provided by your pain medication	5	4	3	2	1

Part VII: Sociodemographic characteristics			
SD1	What is your age?		
SD2	Gender	1. Female	2. Male
SD3	Where are you from?	3. Rural	4. Urban
SD4	What is your highest educational level?	1. Cannot read and write 2. Read and write only 3. Highest grade completed _____	
Part VIII: Socioeconomic information			
SE1	What is your occupation?	1. Farmer 2. Government employee	3. Self-employed 4. Unemployed
SE2	How much does the household earn in a month?	_____	

Thank you!!!

Name of interviewer	Signature	Date

Patient Survey Questionnaire (Afaan Oromo)

Bargaaffii dhukkubsattootaa

Gosa/ haala yeroo qorannoo		1. Kan jalqabaa/ka'umsaa 2. Leenjiin booda *3. Kunuunsa mar-sa'aatiin booda*	
Kutaa 1ffaa I: Calaltuu Hirmaataa/ttuu			
I1	Guyyaa	------/------/------	
I2	Kutaa ciisichaa	1. Dhibee gadaamessaa 2. Dhibee keessoo	3. Baqaqsanii yaaluu 4. Kutaa deessu/haadholi
Kutaa 2ffaa : Sakatta'a dhukkubbii			
PI1	Irra jireessi keenya jireenya keenya keessatti dhukkubbii yeroo adda addaatti nutti dhagahaman qabna (Fkn mataa bowwuu salphaa dhukkubbii maashaa qaamaa, ribuu fi ilkaanii). Sa'aa digdamii arfan darban kana keessatti gosoota dhukkubbii kanneen irraa adda kan ta'e kamiyyuu qabduu/isinitti dhagahameeraa? (yoo lakkii jedhan PI3, PI4 PIF1 irra darbi)	Eeyyee Lakkii	

Gaaffiileen armaan gadii waa'ee dhukkubbii isin ittiin hubamaa jirtan waliin walqabata. Safartuu madaalli 0 hanga 10tti jiru keessaa "0" kan bakka bu'u dhukkubbiin hin jiru yeroo ta'u "10" immoo dhukkubbii jiraachuu malu isa bay'ee cimaadha. Maaloo lakkoofsa sadarkaa dhukkubbii keessan ibsu safartuu kana irraa nutti agarsiisaa/himaa? (maaloo safartuu madaallii itti agarsiisi).

PI2	Sa'aati 24 keessatti Dhukkubbii isinitti dhagahame hangam ta'aa?										
	0 Hinjiru	1	2	3	4	5	6	7	8	9	10*(dhukkubbiin cimaa jiraachuu malu)*
PI3	Dhukkubbii salphaa sa'aa 24 keessatti isinitti dhagahame hangam ta'aa?										
	0 Hinjiru	1	2	3	4	5	6	7	8	9	10*(dhukkubbiin cimaa jiraachuu malu)*
PI4	Dhukkubbii isintti dhagahamu gidugaleessan										
	0 Hin Jiru	1	2	3	4	5	6	7	8	9	10*(dhukkubbiin cimaa jiraachuu malu)*
PI5	Yeroo ammaa kana dhukkubiin isinitti dhagahamu hangam ta'aa?										
	0 (Hin Jiru)	1	2	3	4	5	6	7	8	9	10(dhukkubbiin cimaa jiraachuu malu)

Kutaa 3ffaa: Odeeffannoo yaaliinsa dhukkubbii	
PIrx1	Erga ciistee dhukkubbii too'achuuf mala kamiin fayyadamtanii?
Kutaa4ffaa :Dhiibbaa dhukkubiin geessise	
PF1	Sa'aa 24 darbe keessatti dhukkubbii keessaniin walqabatee dhiibbaa isin irra ga'e safartuu madaallii 0 hang 10tti jiru irratti ibsaa. "0" kan bakka bu'u dhiibbaan hinjiru yeroo ta'u "10" immoo guutumaa guutuutti dhiibbaan jiraa dha. Maaloo lakkofsa sadarkaa dhiibbaa geessisee ibsu safartuu kana irraa nutti agarsiisaa/himaa? (maaloo safartuu madaallii itti agarsiisi).

PF1.1	Sochii siree irrattii (asii fi achi siree irratti garagaluu, oljedhanii taa'uu)										
	0(dhiibbaa hinqabu)	1	2	3	4	5	6	7	8	9	10(guutumaa guututti dhiibbaa geesiseera)
PF1.2	Sochii sireen alaa (Deemuu, taa'uu, dhaabbachuu, quphanuu, wiilcherii fayyadamuu, uffachuu)										
	0(dhiibbaa hinqabu)	1	2	3	4	5	6	7	8	9	10(guutumaa guututti dhiibbaa geessiseera)
PF1.3	Walitti dhufeenya namoota biroo waliin										

	0(dhiibbaa hinqabu)	1	2	3	4	5	6	7	8	9	10(guutumaa guutuutti dhiibbaa geessiseera)
PF1.4	Hirriibni isin qabuu irratti										
	0(dhiibbaa hinqabu)	1	2	3	4	5	6	7	8	9	10(guutumaa guutuummatti dhiibba geesiseera)
PF1.4	Rafaa turuu irratti										
	0(dhiibba hinqabu)	1	2	3	4	5	6	7	8	9	10(guutumma guutuutti dhiibbaa geessiseera)

PIF2: Dhukkubbiin haalaa fi miira namaa miidhuu danda'a. Safartuu kana irratti hagam akka yaadi isinitti dhaga'ame safartuu madaallii 0 hanga 10tti jiru irratti ibsaa. "0" kan bakka bu'u gonkumaa yeroo ta'u "10" immoo baay'ee ol-aanaa dha. Maaloo lakkoofsa sadarkaa dhiibbaa kana ibsu safartuu kana irraa nutti agarsiisaa/himaa? (maaloo safartuu madaallii itti agarsiisi).

PF2.1	Dhiphachuu/cinqamuu										
	0 (gonkumaa)	1	2	3	4	5	6	7	8	9	10 (baay'ee olaanaa)
PF2.2	Gadduu/Yaadda'uu										
	0 (gonkumaa)	1	2	3	4	5	6	7	8	9	10 (baay'ee olaanaa)
PF2.3	Sodaa										
	0 (gonkumaa)	1	2	3	4	5	6	7	8	9	10 (baay'ee olaanaa)
PF2.4	Nama nagargaaru hinqabu jedhanii yaadu										
	0 (gonkumaa)	1	2	3	4	5	6	7	8	9	10 (baay'ee olaanaa)
PF3	Argansuu cimaa fi Qufaa (Yaala baqaqsanii hodhuu kan fudhatan qofaaf)										
	0 (gonkumaa)	1	2	3	4	5	6	7	8	9	10 (baay'ee olaanaa)

Kutaa 6ffaa: Dhimmamuu fi deebii ogeessota yaala kennanii

PR1	Kunuunsa isiniif godhame keessatti, doktarii ykn narsiin wal'aansi dhukkubbii baay'ee barbaachisaa ta'uu fi yeroo dhukkubbiin isinitti dhagahamu sirriitti akka himtan ifa isinii godhaniiruu?	Eeyyee Lakkii
PR2	Yeroo dhukkubbii keessaniif jecha qoricha gaafattan, sa'aatii dheeraan isin qoricha kana argachuuf eegdan hammam ture?	1. Daqiiqaa 30 fi isaa gadi 2. Daqiiqaa 31 – 60 3. Sa'a tokko ol 4. Gaafadhee hin beeku

Kutaa 7 ffaa: Itti quufinsa yaala dhukkubbii

Gaaffiileen armaan gadii waa'ee ittiiquufiinsa qoricha dhukkubbii fi kunuunsa argachaa jirtanitti. Maaloo 5. baay'ee itti quufeera.4. Haga ta'e itti quufeera. 3. itti quufeera ykn hinquufne jechuu hindanda'u 2. Haga ta'e itti hin quufne, 1. itti hin quufne jechuun naaf deebisa

Gaaffilee		Amma itti quufinsaa				
S1	Odeeffannoo waa'ee dhukkubbii fi yaala dhukkubbi argattan irratti	5	4	3	2	1
S2	Tajaajila narsoonni yaalii dhukkubbii keessaniif godhan irratti	5	4	3	2	1
S3	Akaakuu/ gosa qorichaa (Kiniinii, marfee) isinif kenname irratti	5	4	3	2	1
S4	Waa'ee guyyaatti hanga fudhannaa qorcha keessanii irratti	5	4	3	2	1
S5	Hanga/hamma qorichoota fudhattanii irratti	5	4	3	2	1
S6	Qorichi dhukkubbii isin fudhattan hanga fooyya'iinsa isinif kenne irratti	5	4	3	2	1
S7	Turtii qorichi dhukkubbii isinitti dhaggeefachiise/fooyyessee irratti	5	4	3	2	1

Kutaa 8ffaa :Gaaffii waa'ee hawaasummaa

SD1	umriin keessan waggaa meeqa/hagam?_____		
SD2	Saala/koorniyaa	1. Dhalaa	2. Dhiira

SD3	Bakka jireenya keessanii eessaa?	3. Baadiyyaa	4. 2.Magaalaa
SD4	Haala Barnootaa keessani (Yoo barumsa idilee kan barattan ta'e kutaa ol aanaa barumsaa keessani meeqaa?	5. Barreessuu fi dubbisuu hin danda'u 6. Barreessuu fi dubbisuu qofan danda'a 7. kutaa _____ xumureera	

Kutaa 9ffaa : Gaaffii waa'ee hawaas-dinagdee			
SE1	Hojiin keessan maalii?	Qonnaan bulaa Hojjetaa mootummaa	Hojii mataa ofii qaba Hojii hin qabu
SE2	Galiin maatii keessani giddu-galeessan Ji'atti meeqaa?		Qarshiin _____

Galatoomaa!!!/ Thank you!!!

Maqaa afgaafataa	Mallattoo	Guyyaa

Patient Survey Questionnaire (Amharic)

ታካሚዎች የዳሰሳ ጥያቄዎች

የዳሰሳ አይነት		1. መሠረታዊ 2. ስልጠና ከተሰጠ በኃላ 3. ታካሚዎቹን ዞሮ መካታተል ከተጀመረ በኃላ
ክፍል አን ድ፡ የጥናቱ ተሳታፊ መለ□		
I1.	ቃለ መጠይቅ የተደረገበት ቀን በኢ.አ	_____/_____/_____
I2.	መኝታ	1. ማህፀን ህክምና ክፍል 2. የውስጥ ደዌ ህክምና መኝታ ክፍል 3. የቀዶ ጥገና ህክምና ክፍል 4. ማዋለጃ ክፍል
ክፍል ሁለት፡ የህመም ደረጃ መጠየቅ		
PI1	አብዛኞቻችን በህይወታችን ውስጥ በተለያየ ጊዜ የህመም ስሜቶች ይኖሩናል፡፡ ባለፉት 24 ሰዓታት ውስጥ □ህመም ስሜት አለ•ት? **(የለም ከሆነ** PI3፣PI4 እና PIF1 ይለፉ)	

ከዚህ ቀጥሎ ያሉት ዐረፍተ ነገሮች አሁን እያሰቃየዎት ላለው የህመም መጠን ወይም ደረጃ የሚጠይቅ ነው፡፡ **ከ 0-10 ባለው፡** መለኪያ ቁጥሮች፡- **0 ምንም የህመም ስሜት የለኝም** የሚተካ ስሆን **10** ደግሞ ሊኖር የሚችለውን የመጨረሻ የህመም ደረጃ ያሳያል፡፡ አባከዎት የህመምዎትን መጠን የሚገልፀውን ቁጥር ያመልክቱ ወይም ይንኩን (እባክህን/ሽን የህመም መጠን መለኪያ አሳያቸዉ)፡፡

PI2	ባለፈው 24 ሰዓታት ውስጥ የነበረቦዎት በጣም ከፍተኛ የህመም ደረጃ ምን ያህል ነበር?										
	0(ምንም የለም)	1	2	3	4	5	6	7	8	9	10 (ሊኖር የሚችለው ከባድ ህመም)
PI3	ባለፉት 24 ሰዓታት ውስጥ ዝቅተኛው የህመም ደረጃ ምን ያህል ነበር? ?										
	0(ምንም የለም)	1	2	3	4	5	6	7	8	9	10 (ሊኖር የሚችለው ከባድ ህመም)
PI4	ያሎት የህመም መጠን ደረጃ በአማካይ ምን ያህል ነበር? ?										
	0(ምንም የለም)	1	2	3	4	5	6	7	8	9	10 (ሊኖር የሚችለው ከባድ ህመም)
PI5	በአሁን ሰዓት ያሎት የህመም መጠን/ደረጃ ምን ያህል ነው?										
	0(ምንም የለም)	1	2	3	4	5	6	7	8	9	10 (ሊኖር የሚችለው ከባድ ህመም)

ክፍል ሦስት ፡የህመም ህክምናን በተመለከተ መረጃ

PIrX1	በዚህ የሕክምና ክፍል ተኝተው መታከም ከጀመሩ ወዲህ (ተጠቅመው ከሆነ) የትኛውን የሕመም መቆ□□ር□ መንገድ ተ□ቅመ□ል?

ክፍል አራት ፡□ህመም ተፅዕኖ

PIF1. **ባለፉት 24 ሰዓታት □ስ በሚሰማ- ት ህመም ምክንያት ማከናወን ያልተቻሎትን ተግባራት ከ 0-10 ባለው፡**መለኪያ ቁጥሮች ይግለጹ፡፡ **0 ምንም የህመም ተፅኖ የለም** የምተካ ሲሆን **10** ደግሞ ሙሉ በሙሉ **ተፅዕኖ መኖሩን** ያሳያል፡፡፡ እባኮዎት የህመሞትን **ተፅዕኖ** የሚገልፀውን ቁጥር አመልክቱ ወይም ይንኩን (እባክህን/ሽን የህመም መጠን መለኪያ አሳያቸዉ)፡፡

PIF1.1	የአልጋ ላይ እንቅስቃሴ (መገላበጥ፣ቁጭ ማለት፣ ጎን መቀየር/በደንብ መንቀሳቀስ)									
	0(ምንም ተፅዕኖ የለዉም)	1	2	3	4	5	6	7	8	9	10.ሙሉ በሙሉ **ተፅዕኖ** አለ□ ም
PIF1.2	ከአልጋ ውጪ ላሉ እንቅስቃሴዎች (በወንበር ላይ መቀመጥ፣ መቆም ማጐንበስ ወይም ቁጢጥ ማለት ዊልቼር መጠቀም፣ መልበስ እና የመሳሰሉትን የዕለት ተዕለት እንቅስቃሴዎች)									
	0(ምንም ተፅዕኖ የለዉም)	1	2	3	4	5	6	7	8	9	10.ሙሉ በሙሉ **ተፅዕኖ** አለ□ ም
PIF1.3	ከሌሎች ሰዎች ጋር ያለዎት ግንኙነት									
	0(ምንም ተፅዕኖ የለዉም))	1	2	3	4	5	6	7	8	9	10.ሙሉ በሙሉ **ተፅዕኖ** አለ□ ም
PIF1.4	በእንቅልፍ ለመወሰድ /ለመተኛት/									
	0(ምንም ተፅዕኖ የለዉም)	1	2	3	4	5	6	7	8	9	10.ሙሉ በሙሉ **ተፅዕኖ** አለ□ ም
PIF1.5	ተኝቶ ለመቆየት /ለረጅም ሰዓት መተኛት									
	0(ምንም ተፅዕኖ የለዉም)	1	2	3	4	5	6	7	8	9	10.ሙሉ በሙሉ **ተፅዕኖ** አለ□ ም

PIF2 **፡ህመም ስሜታቸንን □□□ል ፡፡ ይህንን በተመለከተ ህመም በሚኖርቦት ጊዜ በስሜቶት ላይ ያለዉ ጉዳት ከ 0-10 ባለው፡** መለኪያ ቁጥሮች ይግለጹ፡፡ 0 ***በጭራሽ ጉዳት የለም*** የሚተካ ሲሆን 10 ደግሞ ***እጅግ በጣም ከፍተኛ ጉዳት*** ያሳያል፡፡፡ እባኮዎት የህመሞትን **ተፅዕኖ** የሚገልፀውን ቁጥር አመልክቱ ወይም ይንኩን (እባክህን/ሽን የህመም መጠን መለኪያ አሳያቸዉ)፡፡

PIF2.1	*መጨነቅ*										
	0 (*በ□ ራሽ*)	1	2	3	4	5	6	7	8	9	10 (*ጅግ በጣም ከፍተኛ*)
PIF2.2	*መዶከክ /መተከዝ*										

	0 (ብ□ ራሽ)	1	2	3	4	5	6	7	8	9	10 (ጅግ በጣም ክፍተኛ)
PIF2.3	ፍርሃት (መፍራት)										
	0 (ብ□ ራሽ)	1	2	3	4	5	6	7	8	9	10 (ጅግ በጣም ክፍተኛ)
PIF2.4	የረዳት አልባነት ስሜት										
	0 (ብ□ ራሽ)	1	2	3	4	5	6	7	8	9	10 (ጅግ በጣም ክፍተኛ)
PIF3	በደንብ ወደ ውስጥ አየር ማስገባት እና መሳል (ቀዶ ጥገና ለተሠራላቸው ብቻ)										
	0 (ብ□ ራሽ)	1	2	3	4	5	6	7	8	9	10 (ጅግ በጣም ክፍተኛ)

ክፍል አምስት፡ የታካሚዎች ተሳትፎ ደረጃ

PIrX4	ስለ ህመሞት ህክምና ውሳኔዎች ላይ በሚፈልጉት መጠን የጤና በለሙያዎች እንድሳተፉ ያዳርጋሉ? **ከ 0-10 ባለው፡** መለኪያ ቁጥሮች ይግለጹ፡፡ 0 ***በጭራሽ አያሳተፉኝም*** የሚተካ ሲሆን 10 ደግሞ በጣም አሳትፈውኛል ያሳያል፡፡፡ አባከዎት የተሳትፎ መጠን የሚገልፀውን ቁጥር አመልክቱ ወይም ይንገሩን (እባክህን/ሽንየተሳትፎ መጠን መለኪያ አሳያቸዉ)፡፡

0 (በጭራሽ አልተሳተፈኩም)	1	2	3	4	5	6	7	8	9	10 (በጣም አሳትፈውኛል)

ክፍል ስድስት ፡ የታካሚዎች የህመም ህክምናን በተመለከተ የመረጃ ፍላጐት

IFN1	በተደረገሎት ህክምና፤ የሚከታተልዎት ነርስ/ዶክተር የህመም ህክምና ጉዳይ በጣም አስፈላጊ እነደሆነ እና ህመም በተሰማዎት ሰዓት እንዲናገሩ ግልጽ አድርገውሎታል?	አዎ አላደረጉም
PR1	የህመም ማስታገሻ መድሐኒት እነዲሰጥዎት ሲጠይቁ ለማግኘት በጣም ረዥም ሰዓት የቆዩት ምን ያህል ነው?	1. <30 ደቂቃ 2. 31 – 60 ደቂቃ 3. >60 ደቂቃ 4. የህመም ማስታገሻ ጠይቄ አላውቅም

ክፍል **ሳበት**፡ በህመም ህክምና ላይ ያለዎት እርካታ
የሚከተሉት ዓረፍተ ነገሮች በአሁን ሰዓት እየወሰዱ ባሉት የህመም ማስታገሻ መድሐኒት እና እየተሰጡ ባሉት የህክምና አገልግሎት ላይ ያለውን እርካታ ይመለከታል፡፡ እባክዎትን ጥያቄውን ሲመልሱ ቁጥሮች እና ትርጉሙ እንደሚከተሉት ነው፡፡
1)*በጣም አልረካውም* ፤2)**አልረካውም**፤3) **እረክቻለውም አልረካውምም አልልም/መሀል ላይ ነኝ**፤4) **እረክቻለው**፤5) **በጣም ረክቻለው**

በሚከተሉት ዓረፍተ ነገሮች ምን ያህል እረክተዋል		የእርካታ መጠን				
S1	ስለ ህመም እና ህክምና በተመለከተ ያገኙት መረጃ	5	4	3	2	1
S2	ህመምን እና ህክምናውን በተመለከተ በነርሶች በተደረገልዎት እንክብካቤ	5	4	3	2	1
S3	በታዘዘልዎት የመድሐኒት አይነት (መርፌ፤ የሚዋጥ …)	5	4	3	2	1
S4	በቀን ስለሚወስዱት የህመም መድሐኒት መጠን (በየስንት ሰዓት)	5	4	3	2	1
S5	በምወስዱት የመድሐኒት ብዛት	5	4	3	2	1
S6	የወሰዱት የህመም ማስታገሻ መድሐኒት ለመስራት በሚወሰድበት ጊዜ	5	4	3	2	1
S7	የወሰዱት የህመም ማስታገሻ መድሐኒት ህመሙን አስታግሶ የቆዬበት ሰዓት	5	4	3	2	1

ክፍል **ስምንት** : ማህበራዊ መረጃ

S01	እድሜ	
S02	ፆታ	1 ሴት 2. ወንድ
S03	የመጡበት ቦታ	1 ገጠር 2. ከተማ
S04	ከፍተኛው የትምህርት ደረጃ	2 ማንበብ እና መፃፍ የማይችል 3 ማንበብና መፃፍ የሚችል 4 ከፍተኛ ት/ት ያጠናቀቀ፡ ከፍል---------

ክፍል ዘጠኝ: ኢኮኖሚያዊ መረጃ

SE1	ሥራ	1 ግብርና 2 የግል ሠራተኛ 3 የመንግስት ሠራተኛ 4 ሰራ አጥ/የሌለው
SE2	የቤተሰቦ የወር ገቢ ምን ያህል ነዉ?	

Appendix 3. Rounding implementation monitoring format

Rounding log

Note: *All patients in the unit should be visited every 2 hours by nursing staff between 8:00 am-8:00 pm, and every four hours between 10:00 pm–6:00 am. Please place your initials in the corresponding time box after rounds have been completed: a round is complete only if the key behaviours have been done*

Ward:_____Bed Number**:**_____Card number**:**_____

Time	**Key**	**Days/ date**							**Staff initial**	**shift**
		Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**		
8:00 am	**O**									Morning
	PL									
10:00am	**O**									
	PL									
12:00am	**O**									
	PL									
2:00pm	**O**									
	PL									
4:00pm	**O**									Evening
	PL									
6:00pm	**O**									
	PL									
8:00pm	**O**									
	PL									
10:00pm	**O**									Night
	PL									
2:00 am	**O**									
	PL									
6:00 am	**O**									
	PL									

key behaviours	**O: observations**	**PL: pain level**
Greet the patient with opening key words **Address pain** **Perform scheduled tasks** **Assess additional comfort needs** **Conduct environmental assessment** **Use closing key words** **Explain when you will return** **Document the round on the log**	**PL:** Patient pain level **C**: Patient comfortable **S:** Patient sleeping **E**: bed empty	Measure patient pain level using NRS, VA and VRS

Nursing rounding monitoring sheet at ward level

Ward: _____ Date: _____

Focus	Days/ date						
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Total rounding expected							
Total rounding documented							
Summary in %							

Overall nursing rounding schedule monitoring sheet

Date: _____

	Units			
	Gynaecology	Medical	Surgical	Maternity
Total rounding expected				
Total rounding documented				
Summary in %				

Errata

Name of the candidate: Gugsa Nemera Germossa

Title of the Thesis: Reorganising In-hospital Pain Management: Evaluation of a Novel Nurse-Based Pain Management Programme in an Ethiopian University Medical Centre.

Abbreviations for different types of corrections

Cor— Correction of Language

Cpltf— change of page layout or text format.

Side	line	Footnote	Original text	Type of correction	Corrected
IV	1		Ethiopia's Three-tiered Healthcare System	Cpltf	*Ethiopia's Three-tiered Healthcare System*
12	18		Three organisations are expected offer health services:	Cor	Three organisations are expected to offer health services:
14	1(Figure title)		Figure 1 Ethiopia's Three-tiered Healthcare System	Cpltf	*Figure 1 Ethiopia's Three-tiered Healthcare System*
15	17		……nursing care is of poor quality, nursing care is shown to be of poor quality,	Cor	nursing care is shown to be of poor quality,
24	9		Rating Scale (NRS) (76, 77)..	Cpltf	Rating Scale (NRS) (76, 77).
41	23		in-hospital education programme	Cor	in-service education programme