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An integrated care pathway for total knee arthroplasty in a private hospital in South Africa

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AN INTEGRATED CARE PATHWAY FOR TOTAL KNEE ARTHROPLASTY IN A PRIVATE HOSPITAL IN SOUTH AFRICA.

A DISSERTATION

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MASTER OF SCIENCE IN NURSING EDUCATION

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“Everyone in healthcare really has two jobs when they come to work every day:

To do their work and to improve it.” (Batalden, P.B. & Davidoff, F. 2007).

Declaration

I Petrus Johannes Smith, student Number: 697731, declare that the dissertation “An integrated care pathway for total knee arthroplasty in a private hospital in South Africa” is my original work and that it has not been submitted before for any degree or examination at any other institution. All sources used or quoted have been acknowledged by means of complete reference in the text and bibliography.

Signature …… Date…….

Dedication

I would like to dedicate this study and my success to two people, firstly my mother, Helena Johanna Smith, who through the years has been an inspiration to me not only in my career but also to in my personal life. Secondly my spouse and companion Dennis Alan Duminy who had to put up with me during the three years that it took to complete this study. Without his support, motivation and inspiration this would not have become a reality.

Abstract

Integrated care pathways (ICP's), for total knee arthroplasty (TKA) and partial knee arthroplasty (PKA) have been used successfully in the last two decades. ICP's have been known among other terms as 'critical care pathways', 'algorithms of care', 'patient care pathways', 'collaborative care pathways'. The main aims of an ICP is that it coordinates the efforts of the members of the multi-disciplinary team through the alignment of the objectives of patient care processes. It improves outcomes of care and patient satisfaction is supported by comprehensive patient information provision both verbally and written. It is generally accepted that

ICPs have an impact on the length of stay of patients in hospital, thus further enhancing the feeling of wellbeing of patients but also significantly contributing to the cost of surgery, care and rehabilitation. (Schuur et al, 2011).

The researcher was seconded, by the company for whom he works, as the clinical lead, to bid for and deliver treatment and care to groups of patients requiring TKA and PKA. The patients had been on a National Health Service (NHS) waiting list for up to five years. This was part of United Kingdom Government's initiative to reduce waiting lists for these procedures. Implementation of the ICP for TKAs and PKAs resulted in significantly better results than those patients treated according to the NHS protocols used at the time.

On return to RSA the researcher asked the question, that has become the research question for this project: "Can ICPs developed for and used in the UK be adapted and refined to be fit for purpose in the RSA private healthcare context, and will the same improvements be seen in outcomes and patient satisfaction?'

An interventional design as described by De Vos, Strydom, Fouché and Delport (2016) was used to guide this study.

The data was collected in three phases. Phase one consisted of a pre-intervention patient documentation audit of patients that had undergone TKA or PKA in order to establish current practice in a purposefully selected hospital. The sample consisted of forty (40) patients n=40, as determined by a statistician, based on the selected outcomes to be compared after phase three of the study. The outcomes selected were length of stay in hospital, time to mobilization after surgery and satisfaction with pain management. These are not exhaustive, but many examples were found in the literature regarding the measurement of the success of ICP such as, Nilsdotter et al, 2008, Ghomrawi et al, 2015 and Kyoung et al, 2015.

The surgery, treatment and care were performed by a participating orthopaedic surgeon and a team that regularly work with him and support him. The team included an anaesthetist, physiotherapist and two expert nurses. They are also referred to in this study as the interventionists. A structured tool based on the nursing process was developed and used for the pre-intervention patient documentation audit.

Phase two of the study consisted of a focus group discussion which aimed at introducing the participating team to the ICP used in the UK, and to solicit their expert opinion on how the ICP could be adapted for use by themselves in the

hospital. The focus group discussion was audio-taped and a verbatim transcription made. A directed content analysis (Hsieh & Shannon, 2005) was used to analyse the data from the focus groups in order to establish the boundaries of each aspect of care in the ICP (Ackermann et al, 2016).

During phase three the ICP was fine-tuned, signed off by the participating team and used on patients that underwent TKA or PKA at the same purposefully selected hospital by the same participating team. A post-intervention patient documentation audit was conducted. The sample size as for the pre-intervention patient documentation audit was n=40.

The three selected outcomes as observed in the first patient documentation audit was compared with the same outcomes when the ICP was used.

In the outcomes of time to mobilization after surgery and length of stay an obvious improvement was seen. The patient satisfaction with pain management scores did not show an improvement and their use proved problematic.

This study showed that it is possible to adapt an ICP from another environment and successfully implement it in a private hospital in South Africa. The study however was limited to one hospital and one orthopaedic surgeon and needs to be tested further in other private and public hospitals. The successful implementation of the ICP is dependent on good multi-disciplinary cooperation and patient participation.

Acknowledgements

I would like to acknowledge my employer, Life Healthcare, not only for the financial support during the first stages of the study, but also for allowing me to spread my wings and gain the experience that made this study possible.

Dr Sue Armstrong, my study leader who with a steadfast and calm approach coached me through this experience in a manner that, was not only inspirational but also an enjoyable learning curve.

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The hospital management and staff where this study was undertaken, who so willingly assisted me and provided me with a platform to do this study.

All my colleagues who inspired me and encouraged me during this time when it was not always easy to juggle the balls.

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Chapter 1 Introduction

1.1 Introduction

Although integrated care pathways (ICP's) are widely used internationally to guide multi-disciplinary teams manage specific clinical problems, they are not commonly used in acute care hospitals in the Republic of South-Africa (RSA). Healthcare in the RSA is provided either by the State or via the private sector. The former provider largely caters for the uninsured population and the latter, mostly by three large private hospital groups, who deliver the bulk of acute private healthcare in the RSA for those who can afford private care and/or have health care insurance.

The private sector delivery model is somewhat unique in that it basically provides the facility (hospital), the equipment and the nursing care. The medical and ancillary care is provided by private practitioners who practice on the hospital sites and are given practicing privileges to work there. As the private hospital groups provide the nursing care, they play an essential role in the coordination of care that takes place within these hospitals. (Still et al, 2016).

The services are, to a great extent, fragmented, which is caused by the multitude of healthcare professionals all functioning in one hospital without effective communication between them, or, certainly less than is desirable.

The main aim of ICP's is to coordinate the efforts of the multi-disciplinary team and would therefore provide a potential solution for the fragmented care which is currently the norm in this context.

A critical or clinical pathway (ICP) defines the optimal care process, sequencing and timing of interventions by healthcare professionals for a particular diagnosis or procedure. It is a relatively new process improvement tool that has been gaining popularity across hospitals and various healthcare organizations in many parts of the world. It is now slowly gaining momentum in Asia and Singapore. (Choong, et al, 2013)

Ismail et al, 2012). Clinical pathways (ICP's) are developed through collaborative efforts of clinicians, case managers, nurses and other healthcare professionals with the aim of improving the quality of patient care, while minimizing cost to the patient, reducing delays in discharge planning, and improving the cost-effectiveness of clinical services. The approach and objectives of clinical pathways (ICP's) are consistent with those of total quality management and continuous quality improvement and allow for the transparent implementation and monitoring of patient-centred care. (Vanhaecht,
2012). Care pathways (ICP's) help to scrutinize in detail all the processes involved in patient care and relate these to patient outcomes. Care pathways help to identify roles of clinicians involved as well as to empower patients to be part of the care pathways
(ICP's). Clarity in leadership, roles and responsibilities of team members is important. Care pathways also help to identify critical points during which measurement (identification of clear key performance indicators, or KPI's) can take place. The use of care pathways (ICP's) will help to improve quality of care delivery, reduce errors, improve staff and patient satisfaction and reduce the costs through lean management concepts. (European Pathway Association, 2014)

The researcher had the opportunity to be seconded to a project in the United Kingdom (UK) as Clinical Lead to bid for and deliver care for the National Health Insurance (NHS) that is responsible for the delivery of acute and other care on behalf of the Department of Health in the UK. The contracts and care were for patients on a waiting list, which consisted mainly of patients requiring knee and hip replacements. In the bidding documentation it was specifically noted that prospective bidders needed to demonstrate that they were able to deliver the care via integrated care pathways. The continuum of the care was from outpatient appointment, through surgery, up to rehabilitation and included follow up six weeks post-operatively. This follow up was later extended to a follow up of one year after surgery as most of the outcomes of joint replacement surgery are of a medium to longer term nature.

Outcomes of surgery and care delivered via these contracts (to mop up backlogs) were strictly managed by a set of commercial, patient satisfaction and clinical outcome indicators. A big part of the contract was around the commercial

performance, included in the quality indicators. These, in turn, included, real time patient satisfaction, monitoring, length of stay, pain management, and mobilisation and re-admission rates. The reporting intervals were every thirty days (monthly), with a quarterly presentation and holistic review of contract performance.

On reviewing the indicators from some five thousand surgeries at four different sites using these ICP's, it was noted that considerably better outcomes were achieved than those the acute care hospitals in the NHS were able to achieve.

On return to the RSA the researcher speculated that it should be possible to adapt these ICP's to suit the RSA private healthcare context. If these ICP's are to be used it should improve outcomes significantly as in the UK. Their use should, furthermore result in better and more meaningful coordination of care in the fragmented healthcare delivery system in the private sector in the RSA.

1.2 Statement of the problem

There is anecdotal evidence that the care of patients that undergo total or partial knee replacements (TKA, PKA) in private hospitals in the RSA is inconsistent. Clinical care, patient satisfaction and outcomes vary according to operating doctor and team that care for these patients pre and postoperatively making it difficult for the hospital group, which owns these hospitals, to assure quality in all instances. Experience of the researcher in the UK, showed that the use of ICP's improves the quality of care. It is not known if the ICP's used in the UK will be of value in the private healthcare situation in the RSA. If it can be shown that they are compatible and result in improved quality of care it may be possible to introduce them throughout the hospital group as part of a quality improvement initiative. They could also be replicated to meet the needs of all other disciplines and not only TKA or PKA.

1.3 Purpose of the study

To adapt and refine an ICP for TKA and PKA used in the UK, for use in a purposefully selected private hospital that belongs to, and is managed by, a specific

private healthcare group in the RSA in an attempt to improve selected outcomes, and thus quality of care of patients.

1.4 Objectives of the study

The study has been conducted in three phases:

Phase one: To establish current practice for TKA and PKA in a purposefully selected private hospital in the RSA.

Phase two: To adapt and refine an ICP for TKA and PKA used in the UK to be fit for purpose for use in the private sector in the RSA.

Phase three: To pilot the adapted and refined ICP for TKA and PKA in the purposefully selected private hospital in the RSA and evaluate its effectiveness against selected outcomes. The outcomes are: Length of stay, time to mobilisation after surgery, and satisfaction with pain management.

1.5 Operational definitions

General practitioner:

A medical practitioner (doctor) whose practice of medicine is not limited to any specific branch of medicine or class of diseases. Practice at primary care level and usually is the first step of care from a doctor, who refer patients to specialists if it is required.

Expert nurse:

A nurse registered with the South African Nursing Council as a nurse who has undergone additional training, and has experience in a specific field such as orthopaedic nursing.

Orthopaedic surgeon:

A doctor who focuses on and has specialized in the treatment of injuries and diseases of the body's musculoskeletal system. The musculoskeletal system

includes bones, joints, ligaments, tendons, muscles and nerves that allows humans to move work and be active.

Knee arthroplasty:

The replacement of the whole or part of a failing knee joint with artificial components. These components are generally referred as prostheses. The prosthesis is made of special kinds of metals. The prosthesis comes in different sizes and a fit will be available for every size of knee joint that requires replacement.

Physiotherapist:

This is a professional who uses various means to start or improve movement such as walking. The study of physiotherapy is also referred to as the science of human movement which is one of the basic requirements for daily living. Physiotherapists employ various methods to initiate and support human movement such as assistive devices, splints, exercises (physical therapy).

High care unit:

High care units in the hospital environment refer to units where patients with a higher dependency on nurses, and other forms of clinical care that a normal ward, are cared for. Patients In these units require close observation and monitoring.

Anaesthetist:

A person, medical doctor with an additional qualification who administers anaesthetic agents to patients and cares for patients whilst surgery is in progress. The anaesthetist is involved in the care of the patient immediately before the surgery commences and until the patient is awake after the surgery and is safely handed over to another health professional.

Diagnostics:

The different means that are employed in healthcare to diagnose the nature of injury and disease. Various modalities are deployed for this purpose such as x-rays and other imaging technology (scans), blood tests, urine tests.

Physician:

A doctor who has specialized in, and practices in, the discipline of general medicine.

He/she treats general diseases such as diabetes, and does not perform surgery.

Radiology:

Obtaining pictures from organs and bones by means of electromagnetic radiation for the purposes of diagnosing or treating disease and injuries. The pictures can be printed on specifically designed plates or, lately, sent via the internet as an image that is displayed on a desk top computer.

Pathology:

The diagnosis of disease by means of examining tissue, blood or other excretions from the body such as urine. Through these examinations, a determination can be made if there are any deviations from the normal that might affect a patient.

Nurse assessment:

An assessment by a registered nurse of a patient that includes, taking a history of current illness, injury and past illness as well as activities of daily living and patient needs.

Multi-disciplinary team:

The different professional clinical team members that collaborate to treat and care for patients to secure the best possible clinical and other outcomes. The team members usually include doctors, nurses, physiotherapists, social workers, dieticians and many more depending on the type of injury and disease.

Ancillary care:

This concept refers to the supplementary services that are provided to patients in hospitals or as out patients in order to support the diagnosis and treatment of diseases and injuries. In general, this category of healthcare workers includes professionals such as occupational therapists, dieticians and social workers.

Practicing privileges:

Doctors and other health professionals who are given practicing privileges at a specific hospital, are those that have been vetted by the hospital and governance structures and function within the guidelines or specifications of the specific hospital’s owners, and/or governing body.

Indicators:

These measure the success or failure of specific intervention outcomes, or the outcomes of processes. Indicators measure if specific targets have been achieved. In the context of this study, the term refers to outcomes of the specific intervention by different categories of health care workers such as doctors and nurses.

1.6 Conclusion

In the first chapter of this study the researcher gives an overview of the usefulness of integrated clinical pathways, and why he became interested in the topic of the replacement of joints as an intervention to improve the lives of patients with end stage osteoarthritis. The problem is clarified in a problem statement, the purpose of the study is indicated, and objectives for the study stated. Lastly operational definitions of key terms used in the study are clarified. The next chapter is devoted to a thorough literature review, and following that, the research methodology will be described in detail in chapter 3. The last two chapters will be devoted to the analysis and presentation of the data collected.

Chapter 2 Literature Review

The aim of this chapter is to present the literature that was reviewed in order to answer questions, verify facts and clarify concepts within the context of the study. According to Grove, Burns and Gray (2013) “the literature review is an organized, written presentation of what you find when you review literature” and they suggest that “the review be organized into sections that represent themes, identify trends or examine variables.”

Integrated care pathways (ICP’s), particularly related to knee arthroplasties, the value of their use in contributing to the outcomes are examined, that is, the characteristics of ICP’s that make them useful, and contribute to improved outcomes and patient satisfaction are presented. In addition, as this study relates to a clinical pathway for a clinical problem, i.e. osteoarthritis of the knee, literature related to this phenomenon is examined.

2.1 Incidence of Knee Arthroplasty

TKA is one of the most common orthopaedic procedures performed and it is estimated that by 2030 about three million of these procedures will be performed globally annually. (Husni, et al, 2010).

Ibrahim et al, (2013) state that there has been an increase in the number of total knee arthroplasties and partial knee arthroplasties performed nationally in the United Kingdom (UK) and the United States of America (USA). Not only has the surgical technique improved significantly in the last years, but there appears to be an increase in demand for such surgery due to the ageing populations globally. The numbers of TKAs done in the USA doubled in the years from 1999 to 2008. At the same time as the demand for these procedures has increased so have the pressures to reduce the cost of healthcare, thus making it more efficient and effective. There is a requirement for shorter lengths of stay in hospitals, and early discharge, rehabilitation and restoration for function have become key priorities.

According to the South African National Joint Registry (2015), the majority of knee arthroplasties are done on women (61%) and only 39% are performed on men.

When one considers that women tend to live longer than men, and therefore, by implication, develop osteo-arthritis more frequently, this may not be surprising. Twenty-one percent (21%) of knee arthroplasties are done on patients older than 75 years of age, 39% between the ages of 65 and 74, 30% between the ages of 55 to 64 and 10% on patients younger than 55 years of age.

Of significance to this study is the fact that 87% of all knee arthroplasties on the South African National Joint Registry (SANJR, 2015) are performed in the private sector and 55% of all knee arthroplasties take place in Gauteng province where this study was undertaken.

Lorenzoni & Roubal, 2015 reports that the number of knee arthroplasties performed is increasing every year with 2898 done in South Africa in 2011, 3610 in 2012 and 4455 in 2015). This represents an annual increase of 24%. Lorenzoni & Roubal (2015) also report that the average cost of a knee arthroplasty in South Africa is rising from R105 536 in 2011 to R114 043 in 2013, or an increase of 4%. When one considers that this indicate that some cost containment is evident in knee arthroplasty surgery. The fact that the length of stay of patients having a knee arthroplasty has decreased in this period (from 6.1 days to 5.8 days in the country) may account for some of the cost containment. Nevertheless, it is an expensive surgery and it is essential that costs are contained while not compromising on the quality of care which is what clinical pathways aim to do.

2.2 Indications for TKA or PKA (TKA or PKA as a clinical intervention)

Osteoarthritis is a worldwide phenomenon, and according to Kapstad et al (2007), internationally, 50% of both men and women above the age of 65 are affected by osteoarthritis. Osteoarthritis affects a third of all persons in the UK. Osteoarthritis in the knees manifests itself by pain in the affected knee which may vary from mild to severe pain. The pain is usually accompanied by stiffness in the knee joint that will affect the mobility of the individual. In its more severe form, pain is also experienced at rest or during the night, which, in the medium to longer term, will have serious effects on the quality of life of the person. Sometimes both knees are affected.

There are several ways to manage knee osteoarthritis such as physiotherapy, medication and in overweight people, losing weight might have shorter term positive effects. Although these modalities all will have some positive effects, in the end stage TKA or PKA will be required. (Johnson, Horwood & Gooberman-Hill, 2016)

2.3 TKA or PKA as a clinical intervention

TKA or PKA is often the last treatment of choice for severe osteoarthritis when all else has failed to yield results. By this stage, all modalities of pain management and possibly some sessions of physiotherapy have usually been offered, and proved not to be successful. Patients who are overweight and lose weight usually experience short term relief from pain and temporary improvement in mobility. Osteoarthritis is part of the ageing process and is most commonly caused by friction during the normal process of walking and movement of individuals. There are some instances where osteoarthritis is caused by, or hastened by, injury, typically the type of injuries sustained during sporting activities. All surfaces of large bones are covered by a substance called cartilage of which the main function is to cover, protect bone and facilitate smooth movement of the joint. There is fluid present in the joint to further enhance movement and prevent friction. When the cartilage becomes damaged, and the fluid depleted either by injury or old age the process of osteoarthritis commences. The knee joint is the largest joint in the human body and carries the most weight and usually is the first joint to be affected. (Zanasi, 2013)

Patients usually present with pain accompanied by mobility constraints that can vary from moderate to severe, and in extreme cases unbearable. Pain restricts the movement of individuals and thus affects their quality of life variously. According to Lee and Choi (2012) the pain in knee joints is mostly caused by osteoarthritis which progresses from the initial stages of mild to severe pain. The pain usually progresses to a point where it becomes unbearable and movement is severely restricted.

When this end stage of the disease is reached TKA or PKA is usually the only treatment of choice to alleviate the pain, restore joint function and mobility. (Danoff et al, 2013)

2.4 The value of ICP's for TKA and PKA

In 2008, Hunter & Segrott, pointed out that many different terms are used to describe ICP's including "integrated care pathways", "care pathways", and "critical care pathways". Eight years later, Cudre et al (2016) added the terms "Clinical Pathways", "Multi-disciplinary pathways of care", "Care maps", and Collaborative pathways" to the list of synonyms which are still no means exhaustive. For the purpose of this study, the term "integrated care pathway" (ICP) will be utilized.

ICP's appear to have their origins in industry and were adopted by healthcare providers as a method to coordinate and facilitate clinical care processes. According to Audimoolam et al (2005), ICP's can be compared to the mapping process used by industry, particularly in the field of engineering from as early as the 1950's. In the 1980's, clinicians in the United States of America (USA) began to develop the pathway tool within managed care by attempting to re-define the delivery of care and identify measurable outcomes. They focussed on the patient rather than the system, but needed to demonstrate efficient processes in order to fulfil the requirements of the insurance industry. Developed and used initially for the purpose of cost containment, the emphasis in the UK since the late 1980's, has been to use ICP's as a tool to improve the quality of care, and the patient experience.

Rotter et al (2008), states that ICP's are often referred to as complex interventions that are designed taking into consideration the latest clinical evidence available. They propose that the most effective ICP's are developed and used when there is participation from all the members of the multi-disciplinary team such as doctors, nurses, physiotherapists and other ancillary team members, including administrative staff. ICP's standardize and coordinate clinical care in a variety of healthcare settings. (Wang et al, 2014).

The main aim for the use and the value of ICP's appear to be that they improve the quality of care as they are based on best evidence, enhance collaborative working by team members in the clinical area, provide a set of patient documentation, provide continuous patient information and enhance the overall experience of the patient, with the treatment and care that is provided. Seehusen (2010), believes that ICP's have become a popular way of attempting to positively influence patient care.

Conceptual definitions of ICP's generally emphasize that pathways are structured and multidisciplinary and cater for a specific medical condition that might require different approaches to care – in the context of this study, TKA and PKA. He further states that

ICP's are designed based on best available evidence for the purposes of improving clinical outcomes, improving resource management, and reducing the cost of medical care. Clinical decision making is supported by ICP's and the patient is part of this process. If patients feel that they are part of the overall process of their care and treatment they know what objectives have to be achieved during the different steps in the process which will enhance their recovery and feeling of well-being. (Balatsoukas, et al, 2015).

ICP's have as their main focus area, the coordination of effort of the different members of the healthcare team caring for patients. The healthcare team is also referred to as the multi-disciplinary team. The patient is an active participant in their care. ICP's force the multi-disciplinary team members to be involved in the care processes from assessment until rehabilitation and discharge of patients. There is evidence that this coordinated effort has a positive influence on specific outcomes such as early mobilisation and the length of hospitalization. Early mobilisation facilitates a decrease in the complications of surgery and bed rest. Earlier discharge from hospital has economic benefits, and also affects the overall satisfaction or feeling of well-being of the patient. (Chaurasia et al, 2014).

ICP's support an approach of patient centred care. One of the most important pillars of patient centred care is shared understanding between patients and healthcare professionals about the path of their care and the outcomes that can be expected from the care as well as the individual efforts of the patients to contribute to their own outcomes, in this instance preparations for surgery, care treatment and rehabilitation. In this way, they address issues of patient compliance and ownership of their own plan of care. (Cooper et al, 2016).

Whittle & Hewson, (2007), summarize the value of ICP's by saying that they facilitate the utilization of local guidelines, including evidence based practice, and provide prompts to different members of the healthcare team, they encourage

multidisciplinary team communication and collaboration when planning the care of patients, promote the improvement of patient focussed care. All members of the multi-disciplinary team use the same patient record, and they improve patient education and participation, as well as outcomes such as length of stay, re-admission and mortality rates. Variability in care between wards is reduced, and duplication of care is prevented. They also support the development of electronic patient records.

While Whittle & Hewison (2007) list all the advantages of using ICP's, even when ICP's were first introduced in the 1990's, it was acknowledged (Campbell et al, 1998) that there were some challenges in introducing them. Among these were problems relating to the fact that people may perceive that they discouraged personalised care, that they did not respond well to changes in the patient's condition, that it would take time for ICP's to gain acceptance in the workplace and that they would only succeed with commitment from the staff and the organisational structures to support them.

This commitment may be difficult to achieve, particularly in the private sector where fragmentation of care often exists and respect and cooperation between doctors and nurses is often not evident. For ICP's to be successful the administrative staff need to cooperate and the information technology systems need to be sound.

There appears to be general agreement among authors (Carter et al, 2011, Skrove et al, 2016 & Maruthappu et al, 2015) on the subject, that certain enablers are required if ICP's are to be successfully implemented. Communication between health professionals and information sharing are important enablers, as are clinical leadership, accountability, joint decision making and patient participation. (Carter et al, 2011).

The benefits of ICP's are well known but the cost of development and implementation need to be considered when measuring the cost benefit of using ICP's.

It may well be that the decision of whether to implement ICP's or not may be taken by the health insurance industry, who are constantly attempting to reduce and standardise costs without compromising on quality.

The researcher was required to take all these factors into account when adapting and piloting the ICP for this study.

2.5 Conclusion

In this chapter the literature related to knee arthroplasty (total and partial), and the use of integrated pathways has been reviewed.

The following chapter will describe the methodology and research design used in the study.

Chapter 3 Research Methodology

3.1 Introduction

An overview of the study was described in the first chapter. This was followed by a detailed literature review in chapter two. This chapter provides a full description of the methodology used which includes the research design, the research setting, and the population studied. The sampling, data collection and data analysis is also described, as well as the efforts made to ensure reliability and validity. Lastly an explanation is given as to how the researcher dealt with the necessary ethical principles.

3.2 Research design

The design of any research study refers to the methods or plans that were used to answer the research question or questions. Research design can also be described as the map to get the final destination. (Babbie & Mouton, 2011).

One of the fundamental aims of undertaking research or the study of a specific phenomenon in the healthcare environment, is to improve care processes and outcomes. (Stangor, 2015).

For this study an interventional approach was used. The intervention is an integrated care pathway (ICP), for total knee arthroplasty (TKA) and partial knee arthroplasty (PKA). Such an ICP has been used very successfully in the United Kingdom (UK), and this study adapted the UK version of this ICP to make it fit for purpose in the private healthcare context in the Republic of South Africa (RSA).

The term intervention is used as it is looking to solve problems in care or care processes and to achieve pre designed objectives. (De Vos et al, 2016)

Grove et al, (2013) explains that interventional research seems to address nursing care processes and issues that are of concern to members of multi-disciplinary health care teams, who have input into the care and rehabilitation of patients. Some of the processes mentioned by Grove et al, (2013), includes patient assessment,

admission and discharge planning, provision of patient information, preparation for surgery and care, and modalities of pain management. These processes are part of ICP's and thus the adaptation of an ICP for TKA and PKA fit into the description of intervention research. As the ICP for TKA and PKA in this study is seen as an intervention, the participants in the study can be seen as interventionists.

Grove et al, (2013) further elaborate that the processes mentioned in the previous paragraph, are undertaken on a daily basis by nurses. Intervention research will assist to evaluate the effectiveness of the mentioned interventions, and thus contribute to the existing base of knowledge in general, and to nursing practice. According to Fraser, et al (2009), intervention research always starts with a nurse or any other clinical person trying something new to improve the delivery of care to patients, and then write down what they did. Intervention research always involves the utilisation of several methods.

The intervention research processes as described by De Vos, Strydom, Fouché and Delport (2012) consist of 6 steps. Table 3.1 demonstrates how these steps were used in the study.

Table 3.1: A summary of the steps of intervention research (de Vos et al., 2016)

STEPS OF INTERVENTION RESEARCH (DE VOS ET AL, 2016)	**PHASES & STEPS OF THIS RESEARCH STUDY RELATED TO THE STEPS OF INTERVENTION RESEARCH**
Step one: Problem analysis and project planning.	Conceptualization of the research questions, development, submission and approval of the research proposal.

Step two: Information gathering and synthesis.	**Phase one of the study:** Research objective: to establish current practice for TKA and PKA in a purposefully selected private hospital in the RSA. Step one consisted of the development of a tool for pre-intervention patient documentation audit. This step was needed to determine current practice to provide pre-intervention data. The pre-selected outcomes measured during this phase were time to mobilisation after surgery, length of stay in hospital and satisfaction with pain management.
	Step two consisted of the audit of the records of the pre-intervention patients to provide further data regarding the quality of care. n=40.
Step three: Design	**Phase two of the study** Research objective: To adapt and refine an ICP for TKA and PKA used in the UK to be fit for purpose for use in the private sector in the RSA. Step one consisted of a focus group with the multidisciplinary team (MDT) to review current practice and the UK ICP Step two consisted of adapting the (ICP) for TKA and PKA used in the UK, according to the recommendations of the MDT & developing the new ICP documents including the revised algorithm.
Step four: Early development a testing.	**Phase three of the study** Research objective: To pilot the adapted and refined ICP for TKA and PKA in the purposefully selected private hospital in the RSA and evaluate its effectiveness against selected outcomes. Step one consisted of implementation of the adapted ICP on 40 patients. That is, their pre- and post-operative care followed the adapted algorithm. Step two consisted of an audit of the records of the post-intervention patients to provide further data regarding the quality of care.

Step five: advanced Evaluation and development.	Step three consisted of the evaluation and comparison of the pre-selected outcomes i.e. time to mobilisation after surgery, length of stay in hospital and satisfaction with pain management. Note: advanced development was outside the scope of this study that only included pilot testing.
Dissemination	Advanced development and a full roll out of the adapted ICP will be done after this study and only then will it be disseminated.

Table 3.2 provides details of each phase and step of the study to illustrate how the methodology was applied.

Table 3.2: Research design

PHASE AND STEPS OF THE STUDY	RESEARCH OBJECTIVE	METHODS USED	SAMPLE
PHASE 1	To establish current practice for TKA and PKA in a purposefully selected private hospital in the RSA.		
Step 1		Development of a tool for pre-intervention patient documentation audit. The company audit tool related to in-patient care was used and the pre-assessment and outcome measures used in the UK ICP were added. The final tool was subjected to expert scrutiny by 3 nursing quality experts and approved for use.	3 experts
Step 2		A record audit of the records of the pre-intervention patients regarding the quality of care.	n=40
PHASE 2	To adapt and refine		

Step 1	an ICP for TKA and PKA used in the UK to be fit for purpose for use in the private sector in the RSA.	A focus group with the multidisciplinary team (MDT), or interventionists, to review current practice and the UK ICP. The focus group discussion was audio recorded, and transcribed verbatim. Once the ICP was adapted, it was shown to the interventionists (MDT) for approval (member checking).	n = 5 Surgeon, Anaesthetist Physiotherapist 2 expert nurses
Step 2		Adaptation of the (ICP) for TKA and PKA used in the UK, by the researcher, according to the recommendations of the MDT & development of the new ICP documents including the revised algorithm.	

PHASE 3	To pilot the adapted and refined ICP for TKA and PKA in the purposefully selected private hospital in the RSA and evaluate its effectiveness against selected outcomes.		
Step 1		Implementation of the adapted ICP. That is, their pre- and post-operative care followed the adapted algorithm.	n = 40
Step 2		An audit of the records of the post-intervention patients to provide further data regarding the quality of care.	n = 40
Step 3		An evaluation and comparison of the pre-selected outcomes i.e. time to mobilisation after surgery, length of stay in hospital and satisfaction with pain management.	n = 40

3.3 Research setting

When qualitative research is undertaken, great care must be taken to carefully select the site where the research will be undertaken. This cannot be done randomly. (Creswell, 2014. The selection of the site will be influenced by the data that has to be collected to meet the objectives and answer the research questions. (Brink et al,

2013). The hospital that was selected for this study was purposefully selected as the participating orthopaedic surgeon works exclusively in this hospital. He performs a significant number of TKA and PKAs annually that provided sufficient numbers for a meaningful study.

The cooperation and participation of an orthopaedic surgeon was essential for this study as the intervention or ICP involved not only the orthopaedic surgeon but also the multi-disciplinary team members that regularly work with and support him.

The participating orthopaedic surgeon performs approximately 178 (68%) of the 258 TKAs or PKAs that are performed annually at the purposefully selected hospital.

The hospital where the study was undertaken is situated in the west of the Johannesburg metropolitan area, in the Gauteng Province of the Republic of South-Africa (RSA). The hospital is owned and managed by one of the three largest hospital groups in the RSA. The purposefully selected hospital has 223 beds with a dedicated orthopaedic ward with 44 beds. An additional 21 beds in the hospital are allocated to orthopaedic surgery according to need.

3.4 Population

Brink et al (2012 refer to the persons that are included in the study as research participants. Burns et al (2013), states that the objects or individuals that meet the inclusion criteria can be seen as the participants or be referred to as the population that is being studied. The population for this study can be divided into two groups:

3.4.1 The interventionists

The participating orthopaedic surgeon, and clinical professionals that support him (interventionists) made up the population for this study. In order to conduct this study, the researcher had to find an orthopaedic surgeon who was willing to participate in the study. The orthopaedic surgeon is always supported by a group of professionals who work closely with him during the process of preparation for surgery, surgery, and care and rehabilitation of patients. The members of the multi-disciplinary group who work the closest with the orthopaedic surgeon include an anaesthetist, a physiotherapist and expert nurses. These members constituted the

population for this study. There are other health care professionals who play a supplementary role in the treatment and care of patients that undergo TKA and PKA. They include, radiologists, occupational therapists, physicians and haematologists. As their role is supplementary they have been excluded from this study.

3.4.2 The patient population

The patient population includes all patients who have undergone TKA and PKA at the purposefully selected hospital in one year and performed by the participating surgeon (N = 178).

3.5 Sample

Brink et al (2013), states that sampling refers to the researcher's process of selecting a sample from the population in order to obtain information regarding an intervention in a way that represents the population of interest.

The sample for the first and the third phase of the study was n=40. (Pre and post intervention patient documentation audits). The sample size was determined by a statistician based on the size of the population and the outcomes identified for the study which were, time to mobilisation after surgery, length of stay in hospital and satisfaction with pain management.

All patients who had undergone a primary, unilateral TKA and PKA at the purposefully selected hospital within the time period specified (and performed by the participating surgeon) were included in the study. Patients that underwent bilateral TKA or PKAs, or revision surgery, were excluded as the outcomes would have varied due to the nature of their surgery. The other patients who were excluded were those who lived too far from the hospital to participate in the pre- surgery assessment by the MDT.

With regard to the MDT team, a total sample of those involved in the implementation of the ICP were included i.e. n = 5

3.6 Data collection

The patient files for the pre-intervention patient documentation audit of the study were identified on the patient administration system of the hospital group of the purposefully selected hospital. The first forty (40) patients that had undergone a TKA or a PKA between the period 1 October 2011 until 30 September 2016, and met the inclusion criteria, were selected. The files of the selected patients were received from the hospital in a sealed container, and upon receipt were numbered A1 – A40.

For the third phase of the study, the first forty (40) patients who met the inclusion criteria and agreed to participate, were selected. This selection process took place in the orthopaedic surgeon's consulting rooms. It took from 1 January 2016 to 30 May 2016 to recruit sufficient patients. As with the pre-intervention patient documentation audit, the files of these patients were received from the hospital in a sealed container, and upon receipt, were numbered B1 – B40.

The time lapse between the pre-intervention patient documentation audit to establish current practice and the piloting of the adapted ICP was unforeseen. However, as current practices, apart from the implementation of the ICP, in the hospital had not changed during this time, it is not likely that this time delay had an effect on the results.

Research data can be collected using a varied number of modalities. According to Jolley, (2010) the most popular ones are, questionnaires, focus group discussions, observation of study objects, analysis of data that is available and information extracted for documentations such as patient files and other clinical records.

For this study the data was collected in three phases.

3.6.1 Phase one

Phase one consisted of two steps, in order to meet the objective for this phase which was to establish current practice for TKA and PKA in a purposefully selected private hospital in the RSA. The surgery is done by the participating orthopaedic surgeon supported by the core multi-disciplinary team that usually work with him. (Anaesthetist, physiotherapist and two expert nurses).

3.6.1.1 Step one:

Step one consisted of the development of a patient documentation audit tool to use to audit sets of patient documentation, in order to understand and summarize current practice for TKA and PKA in the purposefully selected private hospital.

Nursing documentation is an essential part of nursing practice as it provides written evidence about the care patients received from the different members of the multidisciplinary team. It provides evidence of the continuum of care from the first contact with the patient until discharge, rehabilitation and follow up. It is generally accepted that if care or treatment has not been recorded it has not been provided. It should provide information about the journey of a patient from the time of diagnosis until discharge and rehabilitation has been concluded. (Staub et al, 2009).

Poortaghi et al (2015), states that to audit patient documentation is to evaluate the care processes and its different elements. There are many reasons why the auditing of patient documentation is an essential tool in the quest to improve quality nursing care. One is to establish the current practice of nurses, and the evidence that care has been provided according to pre-determined standards. The nursing process is a valuable framework that can be used very successfully to audit patient documentation. The care elements of the nursing process include, patient assessment, nursing diagnosis, care planning, implementation of the care plan or plans, regular evaluation of the elements of the care plan and recordkeeping as a last step.

The systematic auditing of patient documentation is widely used to assess the quality of nursing, clinical care provided and the journey of patients. This is often referred as a clinical practice audit or a patient documentation audit. It however, does not only seek to audit nursing and clinical outcomes, but also seeks to confirm to what extent the patient documentation meets legal and professional requirements. Both Bothma et al (2010), and Gregory and Radovinsky, (2010), confirm that the auditing of patient documentation will provide rich data from which many assumptions can be made.

The researcher was able to establish the care process followed and could thus determine what current practice is.

The audit tool that was used for the pre-intervention and the post-intervention patient documentation audit was developed based on the company's nursing record tools which, in turn, are based on the nursing process. In addition, the pre-assessment criteria and the outcome criteria in the UK ICP tool were added to the company audit tools to make them fit for purpose for this study. An expert group of three nurses reviewed the audit tool and approved it for use.

3.6.1.1.1 The nursing process.

The nursing process is often used as the foundation for the recording of all patient care. It consists of six steps: assessment, diagnosis, planning of care, implementation of care, continuous identification when the plan has to be altered, evaluation of the care provided and the last step, the recording component. (Mykkannen et al, 2012). The nursing process is a systematic process that has as its foundation, a problem solving approach. The use of the nursing process allows for interaction with the patient, assist the nurse to organise her work, provides a common language to promote coordination of care and assist in identifying and meeting the patient's individual needs. (Doenges & Moorhouse, 2013). Advantages of the nursing process are described by Amante et al, (2009) as a process that reduces the length of hospitalization, speeds up diagnosis, treatment and care of patients, and is cost effective as plans of care are individualized. Patients participate in these plans, and communication is improved between all role-players who care for, and have input in the care and treatment of patients.

3.6.1.1.2 The company's patient documentation audit system

The current patient documentation that is used in the purposefully selected hospital is also based on the steps of the nursing process, but however only cover the in-hospital stay of patients with no pre-assessment of patients before admission and surgery. The tool has been validated by nursing experts in the group over a number of years of its use in the company. For all the different steps of the nursing process a tick list is provided with spaces to include additional information. For ongoing assessment and evaluation, a sheet is provided, referred to as progress notes. This provided rich information about the patient journey, reaction to treatment and care as well as the variances that might have occurred during the care process.

While the researcher was satisfied that it could be used as a basis for the auditing of the records for the purpose of this study, it was essential to include the missing aspects as described below. This was done while bearing in mind that, while nursing documentation promotes coordination of care and can be used to audit the quality of care received, the quality of the documentation itself influences ones assessment of the actual care that was given (Wang et al, 2011) and that only the care recorded could be assumed to have been given. As the same audit tool was use pre- and post-intervention, it should not have influenced the results of the study.

A group of three nursing experts reviewed the final tool prior to implementation in this study and considered it fit for purpose.

3.6.1.1.3 *The integrated care pathway used in the UK.*

The documentation from the UK ICP was used to supplement the record audit tool used in this study as it covers the care of the patient from the time of referral, preadmission assessment, admission, treatment and care, rehabilitation and follow up.

3.6.1.1.4 *The audit tool*

The audit tool (Annexure 2), consists of eight main sections, each with sub sections. It is preceded by an assessment and recording of demographic and outcomes data which include the following:

- Documentation code: A for pre-intervention patient documentation audit and B for post intervention (pilot) patient documentation audit.
- The procedure that the patient had: Total knee arthroplasty or Partial knee arthroplasty.
- Gender and age of the patients.
- Date and time of surgery
- Date and time of discharge. (interval was used to calculate the length of stay in hospital)
- Time to mobilisation after surgery, date and time from completion of surgery, until the first time of mobilization. (got out of bed)

The eight sections consisted of:

Section one: Patient referral - in this section the focus was on the source of referral for the purposes of feedback, (discharge summary), and to check if any attempts were made to treat the current symptoms conservatively.

Section two: (pre-assessment, first). Consists of the pre-admission assessment by the multi-disciplinary team, of which the main aim is risk assessment, optimization of the patient's health status for surgery and the provision of information.

Section three: (pre-assessment, second). Covers the final session with the orthopaedic surgeon, additional diagnostics can be done if required, informed consent is provided and patient information provided.

Section four: Admission to hospital for surgery. Risk assessment. Physical and psychological preparation for surgery.

Section five: Intra-operative care process and immediate treatment and care following surgery. (In theatre and recovery area).

Section six: Post-operative care. Immediate and post-operative care until discharge.

Section seven: Discharge, planning, and the provision of medication and information.

Section eight: Covers the rehabilitation of the patient.

The above audit tool, and information audited is not exhaustive and many more sections and criteria could have been added, that could be assessed whilst systematically auditing patient documentation and recording information. However, the elements audited represent the most important ones in the patient journey. It provided sufficient information to acquire an understanding of the current care process.

3.6.1.2 Step two

In step two, the record of the pre-intervention patients was audited.

The patient documentation for the pre- intervention phase of the study was systematically examined and audited by the researcher and evidence was searched for against every criteria as reflected in the audit tool.

The following scoring system was used: Yes = 1, (if there was evidence that the criteria in the section were completely met. No = 0, (if no evidence was seen that the criteria had been met). If a criterion or criteria had been only partially met, the score remained zero). Not applicable (N/A), was used in instances where some criteria might not be applicable to a specific patient.

An extra column was added to the audit tool to include comments regarding the specific set of documentation, including issues such as ineffective pain management. This was specifically added to gauge and record issues of pain management, but also includes any other variance or variances in terms of the care process that were noted during the auditing process.

After the audit, the information obtained was captured on an Excel spreadsheet under the same sections and sub-sections as are reflected on the audit tool.

A compliance rate per sub-section was calculated for comparison later with the data collected from the post-intervention patient documentation audit. This will be discussed in chapter four.

3.6.2 Phase two

Phase two consisted of two steps, in order to meet the objective for this phase which was to adapt and refine an ICP for TKA and PKA used in the UK to be fit for purpose for use in the private sector in the RSA.

3.6.2.1 Step one

Step two consisted of a focus group with the orthopaedic surgeon and the core group of health professionals that support him. This group consists of an anaesthetist, physiotherapist and two expert nurses. In this study they are also referred to as the interventionists.

De Vos et al, (2016) explains that focus groups are a method of interviewing groups of people in order to collect data about how they understand a phenomenon, and what they think of it, and whether it might be useful or not. Participants are usually selected for a specific reason, usually because the researcher believes they can contribute to the subject which the researcher is investigating.

Focus groups are structured around a set of carefully predetermined questions and are aimed at stimulating the participants to think about the issues and share their opinions with one another. In the case of this study, this method was thought to be most appropriate as, for the purposes of developing an ICP, the multi-disciplinary team need to agree on what and how things should be done so needed to share ideas and come to a common understanding.

The participants were invited to attend the focus group discussion at a mutually agreed upon time.

The focus group discussion was conducted as follows:

- Each participant was given an information sheet about the study. Time was given to read it and ask questions. (All the participants were give verbal information about the study when they were invited to the focus group).
- The participants then gave written consent to participate in the study, as well as permission to audio-tape the discussion.
- A PowerPoint presentation was done by the researcher following that to confirm the objectives of the focus group.
- Each participant was then given an integrated care pathway (ICP). (Set of documentation). Annexure: 2, and an algorithm to support it. Annexure 3 is an information sheet.
- Time was allowed for the team to study this, and to ask questions.
- The adaptation of the ICP then commenced using a set of pre-determined questions to stimulate thought and guide the discussion – the questions included were based on some of the sections in the patient documentation audit and were:
    - What is the current patient journey in your practice? (Patient contact and referral, pre-admission risk assessment, patient optimization, provision of patient information?).
    - What diagnostic tests are performed during the assessment?
    - Does a mobility and pain assessment form part of the assessment?
    - What happens during the multi-disciplinary assessment (if it happens), and does the team agree on a plan of care for the patient?

- Do the individual team members (orthopaedic surgeon and core team), provide information to the patient about surgery, treatment, care and rehabilitation?

The audio-tape of the discussion was transcribed verbatim afterwards. This information was used to adapt/construct the ICP that can be used locally in a private hospital in the RSA. The ICP was taken back to the individual team members for the purpose of seeking confirmation of what was agreed to during the focus group discussion. This according to Brink et al (2012, is referred to as member checks. The development of the adapted ICP included all the aspects discussed and agreed upon during the focus group discussion. Data analysis of the narrative data from the focus group was analysed by means of a directed content analysis (Hsieh & Shannon, 2005) to establish the boundaries of each aspect of care in the ICP (Ackermann et al, 2016).

3.6.2.2 Step two

Step two consisted of the development of the adapted ICP for TKA's and PKA's.

In this step, the agreed upon pathway was summarised into an algorithm (See annexure 6) and the documentation for the adapted ICP was developed (Annexure 5). The process of developing the documentation and the algorithm was an iterative one by the researcher, in consultation with his supervisor. Current practice, the UK practice and the evidence-based opinions of the MDT all had to be considered.

3.6.3 Phase three

The third phase of the data collection process had two steps in order to reach the research objective for this phase, which was to pilot the adapted and refined ICP for TKA and PKA in the purposefully selected private hospital in the RSA and evaluate its effectiveness against selected outcomes.

3.6.3.1 Step one

The first step of the third phase was to use the ICP to pilot it with a group of patients that underwent TKA and PKA in the period I January 2016 until 30 May 2016.

The contact details of the patients who consented to participate in the study were provided to the expert nurses by the consulting room staff. The two expert nurses

were trained as field workers by the researcher to coordinate the care of the patients in the post-intervention group. They were trained on the purpose of ICPs as well as the details of the requirements for adapted ICP and were able to contact the researcher at any time should they encounter problems. The reason for using field workers was to ensure the ICP was correctly administered and also as it was felt that the researcher should not have direct, or personal, contact with the patients in the pilot group to try to preserve some objectivity and not to influence the care outside that prescribed in the ICP. These patients who agreed to participate and met the inclusion criteria were invited to a pre-admission multi-disciplinary assessment.

At the beginning of the pre-admission assessment the research project was thoroughly explained, an information sheet provided about the study, and written consent obtained that they were willing to participate in the study. If a patient was hesitant or did not want to participate in the study they were not included but their surgery took place as scheduled. Strict privacy and confidentiality was maintained. Patients were seen alone in a consultation room, and nothing on the documentation indicated that the patient was part of a study group.

The ICP documentation developed during phase two was used in conjunction with the normal patient documentation used in the purposefully selected hospital. This was necessary as the hospital had to maintain records for the patients as a normal legal requirement of patient care.

The pre-assessment, included taking of a clinical and other history by the nurse, baseline vital data, mobility and pain assessment by the physiotherapist, an anaesthetic risk assessment by the anaesthetist and final discussion and consent process by the orthopaedic surgeon all took place at this pre-assessment. The assessment was supported by the sharing of comprehensive information, (Annexure 6), and an opportunity was given to the patients to ask questions and clarify issues. Written patient information was provided to all patients at this stage. Discharge planning formed an important part of the pre-assessment process.

The patient was then admitted in the morning of the scheduled day of surgery. Treatment and care was provided by the orthopaedic surgeon and team using the adapted ICP. (Annexure: 3).

3.6.3.2 Step two

The second step of the third phase consisted of a post-intervention patient documentation audit, using the same audit tool that was used in the pre-intervention patient documentation audit.

The aim of this audit was to establish if the utilisation of the adapted ICP had an effect on the identified outcomes. These were, as mentioned before, time to mobilisation after surgery, length of stay in hospital and satisfaction with pain management. These outcomes are not exhaustive and there are many other outcomes such as readmission rates, unexpected return to theatre, unexpected admission to a high care or intensive care unit, blood transfusion rate, pulmonary or deep vein thrombosis rates, which was not considered for this study.

As the main reasons for undergoing TKA and PKA are poor mobility and pain those indicators were selected. Length of stay in hospital is usually an indication of satisfactory recovery. Both the Mayo Clinic (2010) and Rotter et al, (2010) confirm that mobilisation is severely affected by osteoarthritis, and the most important reason for performing TKAs and PKAs thus improving the quality of life of individuals and groups of patients. Length of stay in hospital is usually an indication that the patient met all the objectives of the hospital stay and is discharged without visible complications back to the home environment to fully recover. (Ritzel et al, 2014.

3.6.3.3 Step three

Step three of phase three consisted of an evaluation and comparison of the preselected outcomes i.e. time to mobilisation after surgery, length of stay in hospital and satisfaction with pain management between the pre-intervention patients' outcomes and the post-intervention patients' outcomes as well as comparison of other data such as age and gender to ensure that the samples were well matched. Simple comparisons using descriptive statistics were used.

3.7 Rigour of the study

In this intervention study, multiple methods were used including record audits, a focus group, pre- and post-testing of outcomes and the development of an ICP using iterative process by the researcher.

Allende (2004) states that scientific rigour “implies a structured and controlled way of planning, developing, analysing and evaluating research” and emphasises the importance of taking special care when communicating the results. Both criteria for ensuring rigour in qualitative and quantitative research are relevant to this study.

In phase one, step one an audit instrument/tool was developed based on an existing audit tool that is being used in a private hospital in the RSA. This audit tool was developed and validated by nursing practice experts within the hospital group. For consistency and to facilitate meaningful comparisons this audit tool was used for both the pre and post-intervention patient documentation audits. The content of the audit tool is based on the scientific nursing process, widely used in nursing to support and record the nursing care process in a variety of healthcare settings.

Credibility, which alludes to the confidence others will have in findings of the results of the study was established by means of several techniques. Firstly, the researcher had prolonged engagement in the field and, in so doing, developed an in-depth understanding of the phenomenon (in this case an ICP) as well as the of, and with, the participants, in this case the MDT. The trust and rapport with the MDT was necessary to collect rich data (Brink, 2012). The researcher also employed persistent observation and used member checks to ensure that the participants’ information was correctly recorded and understood. Selection of the participants on a “first come, first served” basis assisted in randomising their selection although it is recognised that all the patients were patients of one participating surgeon. The surgeon had no say in which of the patients was to be used in the study.

As the ICP was only tested as a pilot, it is difficult to predict whether its dependability is sound. However, as the same pre- and post-tests were administered and the ICP was adapted to suit the context of the private sector hospital group rather than being developed from scratch, it is likely that the data is dependable at least for other hospitals in the same private hospital group, and possibly in other private hospital groups.

A great deal of effort went into ensuring confirmability. The data was collected by the researcher personally using the audit tool developed in phase one, step one of the data collection process. Data collected during the focus group was audio-taped and

transcribed verbatim ensuring an audit trail. The use of field workers to recruit patients for the intervention further ensured that the bias of the researcher was eliminated from that stage. An in-depth description of the methods used has been provided to allow for the integrity of the data to be scrutinised.

With regard to transferability, background information has been given to establish the context of the study and a detailed description of the ICP given. It is therefore possible to replicate this study in other contexts and the intention is to do so once this study is complete to enable advanced development and evaluation of the ICP.

3.8 Ethical considerations

There are key ethical principles that all researchers should adhere to at all times during all the phases of the study. These represent fundamental human rights and includes aspects such as self-determination, privacy, anonymity and confidentiality and to be protected from harm or discomfort (Brink et al, 2012). Throughout the three phases of the study the mentioned ethical principles were considered carefully and adhered to. Ethical clearance was obtained from the ethics committee of the University of the Witwatersrand before the study was commenced.

3.8.1 The right to self-determination

Individuals have the freedom to decide if they want to participate in any study and no forceful method may be used to coerce them to do so. (Bless et al, 2013).

All participants - both the members of the expert group and the patients - were given the choice to participate in the study. They were given a comprehensive sheet containing information about the study, the methodology as well as the expected outcomes. In the information sheet it was clearly stated that the participant was free to withdraw from the study at any time.

3.8.2 The right to privacy, anonymity and confidentiality

It is the duty of any researcher to maintain and respect the principles of privacy, anonymity and confidentiality. No personal information about any participants, human or organizational may be disclosed without prior permission. (Bothma & Greeff, 2010).

The right to privacy of all the patients and the health care professionals that participated in the study was vigorously protected. Patients was seen alone in a consultation room for the pre-assessment during the third phase of the study. Nowhere on any of the patient documentation was there any indication that they were part of any study.

The focus group discussion with the orthopaedic surgeon and the expert team was conducted in a private meeting room where only the participants in the study were present.

For the pre-intervention and post- intervention patient documentation audits, the patient files were provided to the researcher in sealed containers by the senior administrator at the purposefully selected hospital. All files were allocated codes to ensure anonymity. In the periods when they were not in use by the researcher, they were kept in a locked cupboard, to which only the researcher had access.

The data that was collected was written up an anonymous manner, with no names or any data that might link the data to specific person being displayed. Nowhere in the report has the names of any of the expert team members or any patients been mentioned. No information has been provided that can link them to any part of this study, and or any specific organization.

3.8.3 The right to fair treatment

The right to fair treatment is also referred to as justice. All persons in a study should be treated in an equal manner. (Bless et al, 2013). During all the phases of this study the researcher took care not to discriminate against any of the participants. For both the pre-intervention and the post-intervention patient documentation audits the patient files and the patients were selected randomly on a first come first served basis. Patients were given appropriate treatment irrespective of their decision to participate or not. It could be argued that participants in the study group received more individualised care than those who did not, but those who did not were managed as patients have been for several years according to existing hospital protocols and the intra-operative care was identical for both groups. The expert team were selected as they work exclusively with the participating orthopaedic

surgeon, however they were given comprehensive information before they agreed in writing that they wish to participate in the study.

The researcher communicated thoroughly with all the members of the MDT and the field workers did the same for the patients. None of them were inconvenienced by their participation. Participants were, at all times, made aware that the data that was being collected during the data collection phase of the study would be used to write up a research report.

3.8.4 The right to protection from discomfort and harm

At no stage during any of the phases of the study have any of the participants been subjected to any form of discomfort or harm. The adapted ICP was implemented by skilled health professionals.

3.9 Conclusion

In this chapter, the research setting, the sampling process and the research design and methodology, including the data collection methods used in all three phases were described. Methods which were employed by the researcher to ensure scientific rigour have also been outlined, and the ethical considerations have also been described. The data analysis methods will be described in the following chapter together with the findings of the various phases and will be done phase by phase as the analysis methods differed in the various phases.

Chapter 4 Data Analysis and Findings

In the first chapter of the study a broad outline of the study was given including the research questions. In the second chapter a review of the literature was described which provided for an in depth understanding of what ICP's are, their value and how they are used including the use of patient outcomes to establish if they have indeed had an effect on quality of patient care. In the third chapter the research design was described, and the data collection methods for the various phases of the study were described. In this chapter the researcher will discuss how the data was analysed and the findings that emerged from the data in an attempt to meet the research objectives for each phase.

The data was captured on an Excel spread sheet using the headings employed in the audit tool, and descriptive statistics were used to analyse the basic features of the data. According to Brink et al (2012), descriptive statistics are used to summarise and describe data, without which, the data would be a 'chaotic mess'. The analysis of the data for this study concentrated on distributions and central tendency including the use of frequencies and means.

The objective for **phase one** was to establish current practice for TKA and PKA in a purposefully selected private hospital in the RSA. An audit tool was developed as described in the previous chapter and the files of forty (40) patients who had their knee replacement surgery after the implementation of the intervention were audited.

In order to provide more meaningful data, the post-intervention data collected during phase 3, step 2 where an identical audit was used as a post-test, will be provided. The objective of **phase 3** was to pilot the adapted and refined ICP for TKA and PKA in the purposefully selected private hospital in the RSA and evaluate its effectiveness against selected outcomes.

4.1 Demographic data

4.1.1 Pre-intervention data

Of the forty (40) patients, 26 (65%) were female and 14 (35%) were male. The average age of the patients was 66 years – both for the female and the male patients. Sixteen (16 or 40%) of the patients had a TKA whereas 24 (60%) had a PKA.

Table 4.1: Demographic data: Pre-intervention

Gender		Age		Procedure	
Male	Female	Male	Female	Total knee arthroplasty (TKA)	Partial Knee arthroplasty (PKA)
14	26	66	66	16	24

4.1.2 Post-intervention data

Of the forty (40) patients, 25 (62.5%) were female and 15 (37.5%) were male. The average age of the patients was 66 for both female and male patients. Thirteen (13 or

32.5%) of the patients had a TKA whereas 27 (67.5%) had a PKA.

Table 4.2: Demographic data: Post-intervention

Gender		Age		Procedure	
Male	Female	Male	Female	Total knee arthroplasty (TKA)	Partial Knee arthroplasty (PKA)
15	25	66	66	13	27

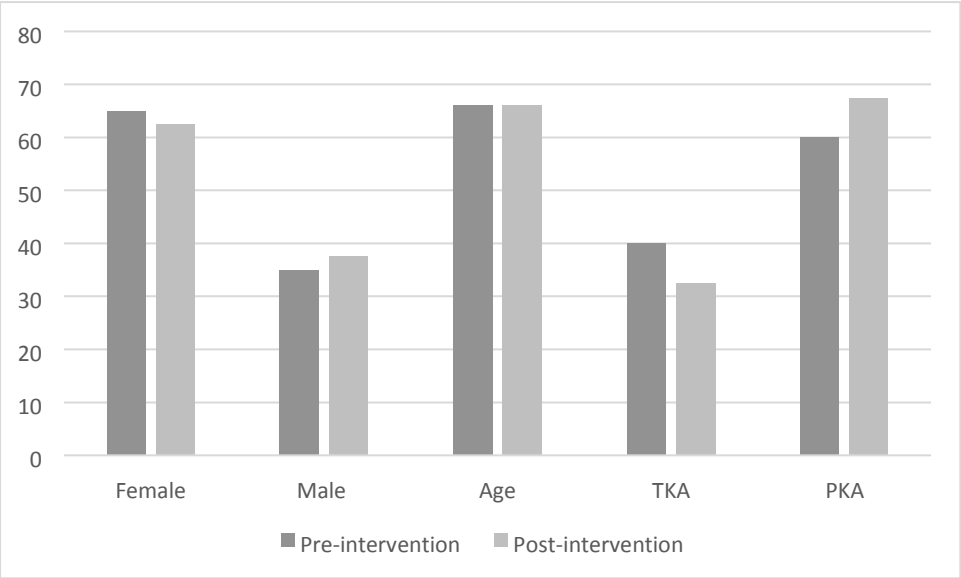

Figure 1: Comparison of demographic data – pre- and post-intervention

4.2 Outcome measures

Time to mobilisation

Time to mobilisation after surgery was measured from the time the patient entered theatre to the time they mobilised for the first time (with assistance of the physiotherapist).

Length of stay in hospital

Length of stay in hospital was measured from the time the patient was admitted to the time they were discharged. Even prior to the intervention, the time of admission is standardised as all patients were admitted at the same time on the day of surgery.

Satisfaction with pain management

This measure presented some initial difficulties as the patients in the pre-intervention group have not been asked to rate their satisfaction. It was therefore decided to use the nursing notes to determine any variances in pain management. These included notes that the patient's pain was not well controlled, comments that they were not mobilising according to normal practices due to their pain, and actual complaints / reports that the patient was experiencing pain.

4.2.1 Pre-intervention data

In the pre-intervention patients, the average time to mobilisation was thirty-one hours and twenty minutes (31 hours and 20 minutes), the length of stay was 145 hours and 6 minutes, and the notes of four (4) of the 40 patients indicated that they had or were experiencing pain that interfered with their mobilisation. By implication, or assumption, 36 (90%) were satisfied with their pain management.

Table 4.3: Outcomes data: Pre-intervention

Time to mobilization after surgery	Length of stay in hospital	Satisfaction with pain management
31 hours & 20 minutes	145 hours & 6 minutes or Six days, one hour and six minutes (6 days 1 hour and 6 minutes)	90%

4.2.2 Post-intervention data

The data revealed that, post-intervention, the time to mobilisation was twenty-two hours and forty-two minutes (22 hours and 42 minutes), the length of stay was 108 hours, and the notes of seven (7) of the post-intervention patients indicated that they had or were experiencing pain that interfered with their mobilisation. By implication, or assumption, 33 (82.5%) were satisfied with their pain management.

Table 4.4: Outcomes data: Post-intervention

Time to mobilisation after surgery	Length of stay in hospital	Satisfaction with pain management
Twenty-two hours and forty-two minutes (22 hours and 42minutes)	108 hours or Four days and twelve hours (4 days and 12 hours)	82.5%

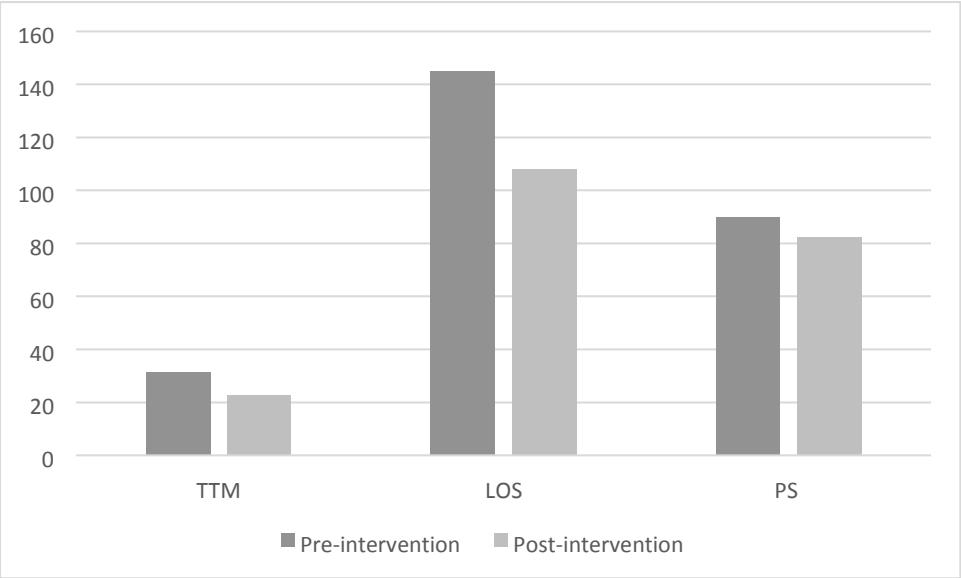

Figure 2: Comparison of outcome measures – pre- and post-intervention

Key: TTM = Time to mobilisation

LOS = Length of stay

PS = Patient satisfaction (with pain management)

The difference between pre- and post-intervention time to mobilisation was 8 hours and 38 minutes. The difference for length of stay was 37 hours and 6 minutes. The difference in patient satisfaction was 7.5%. The first two indicators showed a positive score post-intervention and the pain satisfaction showed a negative score.

4.3 Results of patient record audit

The audits carried out on the patient records are a recognised way of assessing the quality of care given to patients (Parsons et al, 2012). The analysis was done by transferring each patient's data to the relevant section of the audit tool form and comparing each element of the audit as depicted in table 4.5 to table 4.12. The percentage compliance to each element was calculated and compared with the pre-intervention results. The tables below show both the pre- and post-intervention data to facilitate comparison. The description of the intervention is provided in section 0 which, although it was implemented after the pre-intervention audit it is only

described in section 0 to allow more meaningful comparison of the pre- and post-intervention data.

Table 4.5: Results of the record audit – pre- and post-intervention: ***Patient contact and referral***

Audit element and sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**
Patient contact and source of referral: • Self-referral? • By a nurse? • By a physiotherapist? • By another Doctor, or health professional?	No evidence was found of source of referral. 0 % compliance	No evidence was found of source of referral. 0 % compliance

The majority of the patients in this study were elderly, and were more likely to have complex health care needs than younger patients and are therefore dependent on integrated health care (Goodwin et al, 2014). Unless the patient records indicate who referred the patient, and that health professional is given information on the patient's health status after operation, the chances of them receiving post-operative care, other than the post-operation follow up by the orthopaedic surgeon are poor.

Table 4.6: Results of the record audit – pre- and post-intervention: ***First Pre-assessment***

Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**
By a nurse.	No evidence of a pre assessment having been done by either a nurse, a physiotherapist or an anaesthetist. 0% compliance	36/40 (90 %) of the patients were seen by a nurse and a nurse assessment was done 90% compliance
Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**

By a physiotherapist	No evidence 0% compliance	36/40 (90 %) of the patients were seen and assessed by a physiotherapist. 90% compliance
By a doctor, other than the orthopaedic surgeon	0% compliance	0% compliance
By an anaesthetist.	No evidence 0% compliance	35/40, (87.5%) of the patients was seen during the first visit by an anaesthetist. 87.5% compliance
A full history is obtained. Patient information provided. Risk assessment done.	No evidence 0% compliance 0% compliance	35/40 (87, 5 %), of patients had a history taken 87.5% compliance 36/40 (90 %) of patients, had information provided. 90% compliance 33/40, (82, 5 %) of the sets of documentation, show risk assessment done. 82.5% compliance
A discharge plan has been agreed.	0% compliance	32/40 (80 %) of all the patient files audited showed evidence of a discharge plan 80% compliance

The first pre-assessment refers to a patient assessment which should be carried out before the patient is admitted to hospital. The purpose of such a pre-assessment is to obtain a history of the patient's social and health care status, and to perform a risk assessment in order to plan for intra-hospital care and to plan appropriately for the discharge of the patient. McDonald et al (2014) state that such a pre-operative assessment, which includes an opportunity for patient education assists greatly in

reducing anxiety and improves important clinical outcomes such as pain, function, health-related quality of life, anxiety, length of hospital stay and the incidence of adverse events.

As stated above the pre-assessment by various health professionals assists in reducing anxiety and improving clinical outcomes. The history, patient information, risk assessment and discharge plan are all aspects of care that should be rendered during the pre-assessment visit.

Table 4.7: Results of the record audit – pre- and post-intervention: ***Second Pre-assessment***

Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**
Seen by orthopaedic surgeon	No evidence in patient record. Records kept in surgeons' rooms. Not part of hospital patient record.	No evidence in patient record. Records kept in surgeons' rooms. Not part of hospital patient record.
Additional diagnostic interventions requested.		
Consent obtained		
Information provided		

Information about the second visit to the orthopaedic surgeon is important as, at this stage, surgery has been confirmed and final plans are made for the operation. The informed consent is traditionally obtained during this visit but, as the notes are retained by the orthopaedic surgeon in his rooms, this information was not made available the researcher.

Table 4.8: Results of the record audit – pre- and post-intervention: ***Admission records***

Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**

Nursing assessment done.	25/40 (62, 5%) of the patients' records showed evidence of a comprehensive assessment. 62.5% compliance	36/40/ (90%) of the patients' records showed evidence of the comprehensive assessment. 90% compliance
Risks identified	23/40 (57, 5 %), of the files audited showed all risks identified. 57.5% compliance	33/40 (82, 5 %) of the files showed all risks identified. 82.5% compliance
Pressure sore prevention score done	28/40 (70%) of all sets of patient documentation audited recorded pressure sore prevention score. 70% compliance	35/40 (87, 5 %), of the files audited recorded pressure sore prevention score. 87.5% compliance
Patient orientated to environment.	14/40 (35%) patients orientated to environment. 35% compliance	36/40 (90%) patients orientated to the environment. 90% compliance
Pre-operative care plan in place.	27/40 (67.5%) of patients had a clear and concise preoperative care plan in place. 67.5% compliance	38/40 (90 %) of patients had a clear and concise preoperative care plan in place. 90% compliance
Patient physically and emotionally prepared for surgery.	27/40 (67.5%) showed an indication that patients had been physically and emotionally been prepared for surgery. 67.5% compliance	38/40 (95%) showed an indication that patients had been physically and emotionally been prepared for surgery. 95% compliance
Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**

Medication given as prescribed	30/40 (75%) of records showed evidence that medication has been given as prescribed. 75% compliance	33/40 (82%) of records showed evidence that medication has been given as prescribed. 82% compliance
Pre-operative checklist completed.	38/40 (95 %) of the patients the pre-operative checklists had been completed. 95% compliance	40/40 (100%) of the patients the pre-operative checklists had been completed. 100% compliance
Handover to theatre, risks communicated.	32/40 (80%) of the handover to theatre checklists were completed in full	40/40 (100%) of the handover to theatre checklists were completed in full

The admission records are the sole responsibility of the nursing team in the unit. Evatt et al (2014) indicate that "assessment data obtained by nurses upon patients' hospital admission forms the basis for knowledge of their physiologic and psychological health, well-being, living circumstances, and changes in health status that prompted the admission". The rest of the multi-disciplinary team therefore depends on this information in order to provide adequate care.

Table 4.9: Intra-operative care

Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**
Orientation to theatre	33/40 (82. 5 %) of the records showed evidence that the patients have been orientated to the theatre environment. 82.5% compliance	36/40 (90 %) of the records showed evidence that the patients have been orientated to the theatre environment. 90% compliance

Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**

Pre-operative checklist completed	38/40 (95%) of patient files had completed pre-operative checklists. 95% compliance	36/40 (90 %) of patient files had completed pre-operative checklists. 90% compliance
Skin preparation done	40/40 (100%) of patients had skin preparation recorded 100% compliance	40/40 (100%) of patients had skin preparation recorded 100% compliance
Operation site indicated	35/40 (87.5%) of files recorded the site of operation 87.5% compliance	36/40 (90%) of files recorded the site of operation 90% compliance
Position of patient on theatre table recorded	25/40 (62.5 %) of the intra operative tick lists audited showed the patients position of the theatre table. 62.5% compliance	35/40 (87, 5 %) of the intraoperative sheet audited showed the patients position of the theatre table. 87.5% compliance
Type of anaesthetic recorded	In 36/40 (90 %) of the files the type of anaesthetic given to the patient was recorded. 90% compliance	In 36/40 (90%) of the files the type of anaesthetic given to the patient was recorded. 90% compliance
Record of fluid balance management	21/40, (52.5 %) of patients had their fluid balance management recorded were recorded. 52.5% compliance	31/40 (82.5%) of patients had their fluid balance management recorded were recorded. 82.5% compliance
Other-intra-operative procedures recorded.	In 39/40 (97.5 %) of the intra operative sheets audited the other intra operative procedures were recorded. 97.5% compliance	In 38/40 (95 %) of the intra operative sheets audited the other intra operative procedures were recorded. 95% compliance
Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**

Documentation about prosthesis used.	29/40 (72.5%) of records had details of the prosthesis used recorded. 72.5% compliance	39/40 (97.5%) of records had details of the prosthesis used recorded. 97.5% compliance
All variances recorded.	23/40 (57.5%) of records had noted whether variances had occurred during surgery or not. 57.5% compliance	35/40 (87.5%) of records had noted whether variances had occurred during surgery or not. 87.5% compliance

The multidisciplinary team is responsible for recording intra-operative care. Singh et al (2012) emphasise the importance of accurate documentation of surgical operations saying that it facilitates the post-operative management of patients and is essential to defend any medico-legal claims. For these reasons, 100% compliance is a requirement.

Table 4.10: Post-operative care

Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**
Care plan in place (outcomes indicated).	6/40 (15 %) of the sets of patient documentation audited complied. 15% compliance	27/40 (67.5%) of the sets of patient documentation audited complied. 67.5% compliance
Variance identification done and recorded.	3/40 (7.5%) of records recorded data regarding variances or deviations from the care plan 7.5% compliance	34/40 (15%) of records recorded data regarding variances or deviations from the care plan 15% compliance

Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**

Comprehensive progress notes	6/40 (15%) of the patient documentation audited complied. 15% compliance	13/40 (32.5%) of the patient documentation audited complied. 32.5% compliance
Daily acuity assessment.	3/40 (7.5%) of records showed evidence of patient acuity 7.5% compliance	14/40 (35 %) of records showed evidence of patient acuity 35% compliance
Continuous vital signs monitoring.	33/40 (82.5%) showed continuous monitoring and recording of vital signs. 82.5% compliance	36/40 (90 %) showed continuous monitoring and recording of vital signs. 90% compliance
Mobility report in notes	8/40 (20%) of the sets of patient documentation audited showed evidence of mobility progress 20% compliance	22/40 (55%) of the sets of patient documentation audited showed evidence of mobility progress 55% compliance
Risks identified and managed.	12/40 (30%) of records indicated risks on the postoperative care plan	19/40 (47.5%) of records indicated risks on the postoperative care plan
Medication given as prescribed.	38/40 (95%) of records showed evidence of medication having been given as prescribed. 95% compliance	35/40 (87.5%) of records showed evidence of medication having been given as prescribed. 87.5% compliance
Pain managed.	33/40 (82.5%) of records had recorded pain management. This appeared on the medication administration sheet. 82.5% compliance	32/40 (80%) of records had recorded pain management. This appeared on the medication administration sheet. 80% compliance
Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**

Wound care and management recorded in progress notes.	29/40 (72.5%) of records reflected wound care on the care plans. 72.5% compliance	28/40 (70 %) of records reflected wound care on the care plans. 70% compliance
Psychological support, education and discharge planning.	8/40 (20%) of the files audited showed that psychological support, education and discharge planning had been done. 20% compliance	26/40 (65 %) of the files audited showed that psychological support, education and discharge planning had been done. 65% compliance
Activities of daily living met	14/40 (35%) of the sets of patient documentation had any record of how activities of daily living needs were met. 35% compliance	22/40 (55%) of the sets of patient documentation had any record of how activities of daily living needs were met. 55% compliance
Discharge plan in place	A discharge plan was noted in 13/40 (32.5%) of the care plans. 32.5% compliance	A discharge plan was noted in 30/40 (75 %) of the care plans 75% compliance

The professional nurse is responsible for assessing, developing an individual plan of care, implementing and evaluation of the plan of care and for teaching patients on discharge after surgery (Lewis et al, 2017). This role is vital in preventing the many postoperative complications that may occur. Bozic et al (2012) established that the risk of patients following hip arthroplasty developing peri-prosthetic joint infections were increased in this group of patients due to the many co-morbidities they may have related often to age. These included rheumatological disease, obesity and coagulopathy. If a nurse assesses the patient adequately and manages all the aspects in the table above, many complications can be prevented, hence the importance of quality post-operative care. In addition to this, it is known (Kibler et al 2012) that early ambulation of post-surgical patients not only to decreases clinical complications but also improves the relationship between the patient and the nurse, and to improve patient documentation, possibly because patients felt more in control

of their own progress. Liu et al (2012) discuss the issue of post-operative pain in patients with knee replacements and state that the pain from TKAs is more than in those patients who have a hip replacement. Other interesting findings were that women were more likely to suffer from post-operative pain than men and that younger patients experienced more pain than older patients following the same TKA procedures. Obese people also suffered more post-operative pain than those patients who were not obese. All these issues need to be noted in the post-operative period and are covered in the sub-elements above.

Table 4.11: Discharge management

Audit sub-element	**Pre-intervention patient documentation audit**	**Post-intervention patient documentation audit**
	Degree of compliance	**Degree of compliance**
Targets for discharge met.	No discharge targets were recorded on the patient documentation audited. 0% compliance	No discharge targets were recorded on the patient documentation audited. 0% compliance
Patient assessed by full team before discharge.	No evidence found 0% compliance	No evidence found 0% compliance
All take home and other medication given to patient	25/40 (62.5%), of the records indicated patients had been given their take home medication 62.5% compliance	30/40 (80 %) of the records indicated patients had been given their take home medication 80% compliance
Home care arrangements in place.	7/40 (17.5%) of records indicated that home care arrangements had been made. 17.5% compliance	31/40 (77.5%) of records indicated that home care arrangements had been made. 77.5% compliance

While efforts are made by the multidisciplinary team to enhance recovery including earlier discharge amongst patients following TKA as it decreases morbidity and mortality (McDonald et al, 2014) this puts a bigger burden on the team to ensure the patients and their home carers, often relatives are adequately prepared for discharge. **Table 4.12: Rehabilitation**

Audit sub-element	Pre-intervention patient documentation audit	Post-intervention patient documentation audit
	Degree of compliance	**Degree of compliance**
Rehabilitation plan as part of the daily care plan.	2/40 (5%) of the sets of patient documentation audited showed evidence of a rehabilitation plan as part of the daily care plan. 5% compliance	In 26/40 (65%) of the sets of patient documentation audited showed evidence of a rehabilitation plan as part of the daily care plan. 65% compliance
Progress recorded.	6/40 (15%), of the care plans recorded progress with rehabilitation. 15% compliance	20/40 (50%) of the care plans recorded progress with rehabilitation. 50% compliance
Variances indicated.	3/40 (7.5%) of the sets of patient documentation recorded whether variances related to rehabilitation had taken place 7.5% compliance	4/40 (10%) of the sets of patient documentation recorded whether variances related to rehabilitation had taken place 10% compliance
Rehabilitation plan included in the discharge plan.	3/40 (7.5%) had a rehabilitation plan noted on the discharge sheet. 7.5% compliance	In 28/40 or 70% had a rehabilitation plan noted on the discharge sheet. 70% compliance

Ramos et al (2014) point out that patients who are discharged directly to their own homes rather than any type of step down facility have fewer readmissions, indicating that their rehabilitation period is less problematic. All efforts must therefore be made to maximise the possibility of discharging patient home which means that their rehabilitation must start immediately after surgery and expedited in the ward before discharge.

4.4 Overall results

Table 4.13: Summary of the average compliance per section (and sub-sections), of pre- and post-intervention patient documentation audit for comparative purposes

Sections	Pre-intervention patient documentation audit	Post-intervention patient documentation audit	Difference
Patient contact and referral	0%	0%	0
Pre-Assessment (first)	0%	76%	+76%
Pre-Assessment (second)	0%	0%	0
Admission	71 %	91 %	+20%
Surgery (intra-operative sheet)	78 %	91 %	+13%
Post-operative care	49 %	60 %	+11%
Discharge	20 %	39 %	+19%
Rehabilitation	9 %	49 %	+40%

The table above is a summary of the main findings of the sections audited in the pre - and post intervention patient documentation audits. In both the pre- and post-intervention audits there were no evidence of the source of referral. A + indicates an improvement between the pre- and the post-audit results.

A pre-assessment was done only for the patients during the intervention phase. In current practice the patient is seen for the first time by all the members of the multidisciplinary team (or as is referred to in this study, the core team) on the day of surgery.

A second pre-assessment which should be devoted to a final check by the orthopaedic surgeon, additional diagnostic tests, informed consent and the provision of extensive information provided to the patients. In both the pre- and the post-

intervention patient documentation audit there was no evidence of a second pre-assessment.

For the sections admission, surgery, post-operative care, discharge and rehabilitation the scores were higher in the post - intervention patient documentation audit. This shows improved compliance to the sections and sub-sections of the audit. For the sections discharge and rehabilitation the scores were low in the pre-intervention patient documentation audit. Although this was higher in the post intervention audit it was in both instances lower than 50% (discharge 39 %, and rehabilitation 49 %).

The sections of admission, surgery and post-operative care in both the pre and post intervention documentation audits showed improved compliance. Overall it was better in the post-intervention patient documentation audit.

4.5 Development and implementation of the intervention

4.5.1 Data analysis

Phase two of the study consisted of the analysis of the data that was collected during the focus group discussion. The aim of this phase was to use the input from the orthopaedic surgeon and the expert team (anaesthetist, physiotherapist and two expert nurses), to adapt the integrated care pathway used in the UK, in order to use it in the purposefully selected hospital.

The data collected were analysed using directed content analysis. Hsieh & Shannon (2005) explain that content analysis using a directed approach is guided by a more structured process than other forms of content analysis. In this method, an existing framework, or previous research is used as a starting point to provide more information about variables of interest. They further explain that if data are collected primarily through interviews, the researcher might start with open ended questions and move to more targeted questions in order to explore specific existing categories.

In this study the existing framework referred to above was the UK version of the ICP and open ended questions were first asked relating to the understanding and

potential use of the aspects of care in the ICP in the selected hospital. In this way, directed content analysis was used to adapt the ICP and expand information that already exists. (Lee et al, 2014). The adaptation in this instance was necessary to meet local private healthcare context in the RSA.

The focus group was directed by the following initial questions:

- What is the current patient journey in your practice? (Patient contact and referral, pre-admission risk assessment, patient optimization, provision of patient information?).
- What diagnostic tests are performed during the assessment?
- Does a mobility and pain assessment form part of the assessment?
- What happens during the multi-disciplinary assessment (if it happens), and does the team agree on a plan of care for the patient?
- Do the individual team members (orthopaedic surgeon and core team), provide information to the patient about surgery, treatment, care and rehabilitation?

The verbatim transcripts were read thoroughly, which provided an overview of the data. The aspects of care referred to in the questions above were used as the themes and sub-themes were developed during the analysis process. This process consisted of identifying words and phrases that described the theme or aspects of the theme. These words and phrases were highlighted using predetermined codes. Any text that did not fit the initial coding scheme was then given a new code (Hsieh & Shannon, 2005). The coding was initially done by the researcher and discussed and confirmed by the research supervisor.

The themes and sub-themes which emerged are shown in the table below.

Table 4.14: Themes and sub-themes from focus group interview

Themes	**Sub-themes**
Current practice	Fragmentation of care Alignment of objectives Preparation

Assessment	Multi-disciplinary assessment Timing of the assessment
Patient information	Benefits of comprehensive patient information Patient participation

Current practice

When asked about the team's current practice in terms of the patient's journey, the group provided frank responses which included strengths and weaknesses of the system that was current prior to the intervention. Many aspects in the ICP were missing from the current practices such as a multi-disciplinary pre-assessment risk assessment. It was clear that the team worked independently of one another, despite all caring for the same patient, and often under a fair amount of pressure.

Fragmentation

The group members stated that the patient has contact with the orthopaedic surgeon initially but the other members of the team only meet the patient on the day of admission. There is therefore no opportunity for a multi-disciplinary approach.

This was illustrated by participant 4 who said, "Look, I think our biggest fall (sic) is the second pre-assessment, because pre-admissions fell away completely, so they bring their pack with their documentation, but no registered nurse actually assessed the patient."

Alignment of objectives

When asked the question about current practice, the participants noted the objectives in the UK ICP and were of the opinion that current practice does not meet these requirements. Current care is therefore not aligned to those objectives.

This was illustrated by participant 1 who said: "I think it is very important to identify everybody's special needs and that everybody should be treated as an individual. We get pieces of paper to fill in but that is not actually telling us who and what the

patient is." By implication this participant was saying that it was not possible to meet the daily objectives that are required in the ICP.

Participant 3 said, "Goals and objectives for individual patients are not known by all the members of the team that care for them."

Preparation

Due to the fact that members of the team do not meet them before admission there is not time to prepare the patients. Time is taken to organise authorisation from the funder for payment but little effort is made to provide comprehensive information.

Participant 2 said: "I think a lot of patients are not psychologically prepared as you said … for what is going to happen to them and that they will be out of hospital in five days. They do not understand the rehabilitation period of up to 3 months."

This was confirmed by participant 2 who said, "…discharge planning is a foreign concept."

Assessment

The members of the focus group were asked, specifically, to think about pain and mobility assessment, diagnostic tests and multi-disciplinary assessment. It was clear that the latter did not exist in current practice but the team members recognised their importance.

With regard to the mobility assessment, participant 3 said, "I think our problem sometimes is we don't know how mobile the patient is before, because we only see them for five minutes and they go to theatre. If they are battling to mobilize…they might be mobilizing much better that what they have been but because we have not seen them before, we cannot actually judge."

The timing sub-theme arose from the comments made by all the participants that due to the fact that the funders do not allow, or refuse to fund, patients admitted the day before admission, they do not have time for a comprehensive assessment to be done. The surgeon may well have 4 to 5 patients on the list, all of whom arrive at the same time. Nurses try to prepare the patient first on the list first.

This aspect was illustrated by participant 4 who said, “There is no time at all, not enough nurses on the floor to admit the patients” referring to the fact that patients are admitted on the day of surgery, with no pre-assessment.

Patient information

Participants agreed that the aim of patient information is to prepare them for surgery prior to being admitted as well as for the operation itself, the immediate post-operative care and rehabilitation. By doing this, patients are adequately prepared for discharge and early and successful rehabilitation. Participant 1 said, “Patients are not prepared for admission, surgery and discharge, only seen by all the members of the multidisciplinary team on the morning of the surgery.

Benefits of comprehensive patient information

Participant 2 illustrated the benefits of patient information by saying, “I think if we can give them as much information as possible, coming from this side (the nursing side) and the orthopaedic surgeons side, and from our side (physiotherapist) – if the patient knows and are more prepared, I think they will actually recover so much better.” The issue of patient participation in relation to patient information was also raised by the same participant who stated in answer to a question as to whether the group thought the UK ICP could be adapted and whether they would be able to use it “Yes, I am sure because you see, my problem is the more you talk to the patient the more you learn about the patient.”

Patient participation

Members of the focus group were of the opinion that the more patients are involved in their preparation, treatment and care, the more likely it is that they will be satisfied.

Also, by knowing what to expect from the different phases of the process, they did not have any surprises and patients feel more in control of their own destiny and are not left on the periphery.

With reference to patient participation, participant 1 said, “I think it is very important to identify everybody’s special needs and that everybody should be treated as an individual. So we get pieces of paper to fill in but that is not actually telling us who

and what the patient is. By doing a study such as this we actually become intimately knowledgeable and involved with the patient, and as a nurse, it is so important”

4.6 Discussion

The aim of clinical pathways is to improve the quality of care of patients. The quality of care is measured both according to standards developed for a specific purpose and also by outcomes, both clinical and non-clinical. Deciding whether the introduction of an integrated clinical pathway has been successful or not needs to be measured according to these elements which has been done in this study. A lingering concern expressed early on in the days of the development of clinical pathways by Campbell, Bradshaw & Porteous, 1998) and which may well apply to this study, is whether the commitment and enthusiasm of the team developing and piloting the intervention is not a major determinant of the success of the pathway.

The outcome measures that were chosen for this study were satisfaction with pain management, time to mobilisation and length of stay. The latter two measures worked well in the study and were objective and easy to measure. The results from these two measures indicate a marked improvement between pre- and post-intervention with the difference for time to mobilisation being 8 hours and 38 minutes, and the difference for length of stay being 37 hours and 6 minutes.

The improvement in shortage of stay was an even bigger improvement than a similar study carried out by Mertes et al (2013) where they achieved a 0.8 reduction in length of stay i.e. from 6.4 days to 5.6 days.

The shorter length of stay of more than a day has a significant impact in terms of cost for the patient and/or the medical aid funder as patients are charged for hospitalisation in terms of the time they remain in hospital. When one considers the number of knee replacements being performed in the research site alone (258 per annum), this would translate into a saving for the funder of approximately 400 days of hospitalisation. The hospitals themselves might not view this figure as favourably as it is a loss of income. However, it enables a larger turnover of patients and also reduces the chances of patient acquiring hospital acquired infections is the chance of

these increases with the length of stay in hospital. Patrick & Kohn (2010) demonstrated that by extending the LOS by one day increases the probability of catching an infection by 1.37 percent and the onset of infection increases average LOS by 9.32 days. Rahmqvist et al (2016) showed that the acquisition of hospital acquired infections is significantly related to mortality, readmission, cost and length of stay. If, therefore patients can be saved a day in hospital by the introduction of an ICP they are, in turn, less likely to acquire an infection and all the consequent problems.

The success in reducing the time to mobilisation has similar benefits and also prevent knock-on-effects associated with longer bedrest. While Ibrahim et al (2013) point out that there are many reasons why the time to mobilisation after TKA has reduced. Factors that influences this, includes new methods of analgesia, preoperative nutrition, modern wound dressings, and different standard surgical techniques, including minimally invasive surgery, it should be born in mind that the same team of health professionals were responsible for both the pre- and the post-operative intervention. These aspects are thus unlikely, in themselves, to have accounted for the improvement in this study. The major differences were the pre-operative education and the multidisciplinary assessment and rehabilitation that the post-intervention patients experienced.

Early mobilisation also impacts on the length of stay and the costs incurred by this and the increased use of hospital resources which occur if the patient stays in hospital longer (Tayrose et al, 2013). It could be argued, on the basis of the association between length of stay and mobilisation that it would be justified, when repeating this study or rolling it out to other sites, that it would be sufficient to monitor the length of stay alone.

The method used to determine satisfaction with pain management was less successful than the length of stay and time to mobilisation indicators. Due to the fact that a retrospective audit had to be done for the pre-intervention analysis, it was not possible to ask the patients to rate their pain or their satisfaction with pain management. It would have been possible to contact the patients but at least a month would have elapsed since their surgery by the time this was possible which

means that their perceptions would have differed from those immediately after surgery. The only method available was to establish from the nursing notes if patients had complained of pain or experienced undue pain. This was not an accurate method due to the fact that it relied on the nurses to report this. If there was no reference to pain it may have been that the patient had not complained but equally it could have meant they had, and the nurse had not made any reference to it. Clement et al (2014) tested the Oxford knee score and the Short form (SF-12) to establish patient relief and functional outcome as anchor questions and concluded that they were "the best available estimate and can be used to power studies and ensure that a statistical difference is also recognised by a patient." Should this study be repeated, or rolled out, this would be an improved method of calculating the pain relief outcome.

The audits showed that the patient satisfaction was better in the pre-intervention phase. This could be due to the difficulty in assessing this aspect from the records as explained above. Alternatively, because the patients were better informed and empowered, they may well have asked more frequently for pain relief than those who did not know what and how often pain relief was available. It is also possible that early mobilisation could have affected the post-intervention's pain levels.

With regard to the audits that were carried out, as the same tool was used for pre- and post-intervention assessment, it proved to be a useful way of assessing the quality of nursing care, and certainly, in almost all areas there was an improvement post-intervention period. There is a chance that, as this study was a pilot test of the intervention, the staff may have made a special effort to improve their care during the duration of the study which is common when subjects know they are being observed (the Hawthorne effect). While all researchers are aware of the Hawthorne effect, and consequences of participation do exist, MacCambridge et al (2014) concluded after their study that "conditions under which they operate, their mechanisms of effects, or their magnitudes" are not known and they suggested finding new concepts to guide empirical studies in this regard.

The intervention itself was adapted for use in the research site and this study showed that it is useful and effective in reducing length of stay and time to mobilisation and

also appears to demonstrate an improvement in the quality of nursing care. One of the biggest challenges was co-ordinating the multi-disciplinary team. The team in the study had cooperated with one another for a long time but had not previously worked as a true multi-disciplinary team. In the private sector the doctors and physiotherapists are self-employed but have practising rights in the hospital. It is only the nurses that are employed by the hospital group. In the public sector where all members of the multi-disciplinary team are employed by the hospital, it may be easier for hospital management to insist on the use of specific protocols. In the private sector, the group with the most influence to implement ICP's are the medical aid companies who fund the surgery and hospital admissions. Should they see the obvious cost-benefit in the implementation of this ICP, they could agree only to pay for patients who are managed according to the ICP. Another method of encouraging doctors and physiotherapists to use the ICP is to levy higher co-payments should the health professionals not adhere to the ICP.

The main reason, in the opinion of the researcher that this particular pilot study worked in terms of getting multi-disciplinary buy-in was that two nurses were trained by the researcher to implement the ICP and to coordinate the project. They therefore continually encouraged all members of the team to work to the requirements of the ICP.

This study piloted the ICP and it was outside its scope to do a full roll out to other facilities in the private and public health sector. It showed potential for adapting an existing ICP that had been developed for another context, in fact, another country. This raises the question of the wisdom of trying to develop an ICP from scratch. Many ICPs have been developed all over the world for various medical conditions and it would seem wise, based on the results of this study, to locate such ICPs and adapt them to the local context. It should be born in mind that the researcher did have personal experience in implementing the UK version of the ICP so this may have had a favourable effect on the success of implementing it for the research site.

In healthcare the use of ICPs has been increasing in the last twenty years, particularly in the USA and UK as the demand for more care in all healthcare

disciplines increases, and as a result of limited resources, it is expected that the use of ICP's will increase. (Barbieri et al, 2009).

In a healthcare system such as the private sector in the RSA the use of ICPs will be hugely beneficial to improve the fragmentation of all aspects of treatment, care and rehabilitation as the private hospitals provide the facility, equipment and nursing service. The health professionals are all private practicing in the hospitals by means of practicing privileges granted supported by a service level agreement.

In both the pre and post intervention patient documentation audit the patient documentation was noted to be very poor, a slight improvement was noted in the post intervention patient documentation audit. This is of concern to the nursing profession generally as quality record keeping is essential to provide good care and to avoid litigation and adverse events.

Anecdotal evidence showed that the patients valued the provision of patient information in written format during this study. This should therefore be considered as a norm for all surgical procedures. Patients are generally better informed than a few years ago thank to access to the internet but they are not always able to discriminate between useful and misleading information provided in this manner. By producing written pamphlets specific to procedures in the hospital group, this would obviate this problem.

4.7 Conclusion

The use of the ICP in the purposefully selected private hospital proved that the interventions, such as assessment, planning, and provision of treatment, care and rehabilitation can be coordinated and standardized amongst the most significant health professionals that participate in the care of patients that underwent TKA and PKA.

This chapter has described the analysis and findings of the data. In the next and final chapter, a summary of the findings will be provided, together with limitations and recommendations for further research, for nursing education and nursing practice.

Chapter 5 Conclusion, Summary of Findings and Limitations

5.1 Introduction

In chapter one an overview of the study has been provided. Chapter two was devoted to a comprehensive literature review. The main themes for the literature review included. In chapter three the research methodology has been described in detail, it includes the research design, setting, sampling process, the population studies, how the data was collected and the ethical principles are described at the end of this chapter. Chapter four shows the data analysis proves and a discussion of the findings, and lastly chapter five brings together the conclusions, summary of the main findings, the limitations of this study and the recommendations for nursing education, nursing research and nursing practice.

5.2 Summary of main findings

The average age of the patients, both male and female in the pre and post intervention study was 66 years old. In the pre intervention patient documentation audit the 65% of the patients was female whilst in the post-intervention phase 62, 5 % were female. Males in the pre intervention phase represented 35 % of the sample, and in the post intervention audit 32, 5 %. The demographic data in the pre- and post-intervention stages showed a strong similarity in the gender and age distribution. In a prospective study undertaken in Sweden by Nilsdotter et al, in 2009 to evaluate patient related outcomes after total knee arthroplasty was concluded that out of a sample of n=125, 63 were female and 39 male. The average age of both male and female patients was noted to be 71. This shows strong similarities to this study.

In relation to current practice versus the practice using an adapted integrated care pathway (ICP) for total knee arthroplasty (TKA) and partial knee arthroplasty (PKA), the main differences can be summarized as follows:

- The inclusion of a multi-disciplinary pre-assessment (assessment of the patient before admission to hospital for surgery, care and treatment)
- The provision of comprehensive patient information, written patient information material.
- Comprehensive discharge planning.
- Alignment of the objectives of the members of the multidisciplinary team (core team), or also referred to in this study as interventionists.

In relation to the outcome data:

- Time to mobilization after surgery

The time to mobilization after surgery in the pre-intervention phase was forty-three hours and thirty-one minutes. In the post intervention phase the time was Twenty-nine hours three minutes. The implementation of an ICP has reduced the time to mobilization after surgery.

- Length of stay in hospital

The length of stay in hospital in the pre-intervention phase was six days, one hour and six minutes, whilst in the post intervention phase it was four days and twelve hours. The length of stay was thus also reduced significantly in the patients where the adapted ICP was used.

- Satisfaction with pain management

The satisfaction with pain was assessed based on the records. The audits showed that the patient satisfaction was better in the pre-intervention phase. In 4/40 of those files a variance with pain management was noted, whilst in the post intervention patient documentation audit in 7/40 of the patients a variance was noted.

5.3 Limitations

- This study was, in effect, a pilot study. As such, it was undertaken with one participating orthopaedic surgeon at one purposefully selected hospital, in the private sector in the RSA. A small team of professionals who work

regularly with the participating orthopaedic surgeon, including an anaesthetist, a physiotherapist and two expert nurses were selected to adapt an ICP, and to pilot its implementation. A study where more orthopaedic surgeons and a wider group of supporting professionals would need to be conducted to ensure the ICP was feasible in other settings although every indication is that this would be so. A wider study will provide deeper insight into the ICP's its use, and benefits.

- The assessment of, satisfaction with pain management by means of a patient documentation audit provided some results, however using a patient questionnaire could have improved the feedback from patients regarding the management of pain.
- Only one focus group was held with the participating team. In hindsight, more information might have been obtained had one-on-one interviews been conducted as it is likely that the members would have been less inhibited about talking about problems and potential or real deficits in their current care. The data yielded from this focus group did, however, yield data about how the UK ICP needed to be adapted which was the main purpose of the exercise.
- The choice of indicators could have been widened to include readmission rates within 7 and 21 days of discharge, wound infections and unexpected return to theatre. This would, however, have enlarged the study beyond the scope of a Master's degree but should be included in any subsequent study.
- The researcher had to rely a great deal on the quality of the nursing records, both in the pre- and post-intervention audit. Unfortunately, the quality of the recording was not always adequate which limited the amount of information the researcher could obtain.

5.4 Recommendations

5.4.1 Nursing education

- In view of the poor quality of the nursing documentation, it is recommended that additional efforts be made to improve this aspect of care. Apart from covering it in the nursing curriculum for all levels of nursing education,

special workshops showing the implications of poor record keeping should be offered on a compulsory basis and at regular intervals.

- Specific evaluation tools to assess the competency of nurses in documenting care need to be developed and used. As nurses learn from each other and habits of poor recordkeeping are transferred from one generation to the next, all levels and categories of nurse should be included in this exercise.

- The concept of integrated clinical pathways should be introduced into the post graduate courses and the in-service education programmes for nurses as they are likely to be the way of the future.
- Multi-disciplinary education sessions should be offered at all health care institutions to encourage the implementation of ICPs.

5.4.2 Nursing research

- Studies related to the use of ICPs in other disciplines such as midwifery, critical care, oncology and paediatrics should be conducted to test their usefulness and adapt their use to local contexts.
- Existing tested tools should be used for assessing satisfaction with pain management. In addition, the measurement of patient satisfaction when using integrated care pathways needs to be explored in depth, particularly as patients participate in the planning of, treatment, care and rehabilitation process for any intervention.
- Before piloting a complex tool such as the ICP in this study, a small pre-test should be carried out to check the feasibility of the tools and the methods used to gather data.
- All candidates for higher degrees who use qualitative methods of data collection should role play a session with a group of volunteers before embarking on the actual data collection in order to gain skills and anticipate potential problems.
- This intervention should be rolled out to other hospitals and hospital groups to further test and modify the ICP. This should include state hospitals where the dynamics differ to those in the private sector and where cost-savings are also most important.

5.4.3 Nursing practice

- ICPs are not widely known and used in the RSA, particularly in the private sector. It is recommended that their use be explored widely with regard to TKAs and PKAs as they improve the quality of care, by means of shorter length of stay in hospital, as well as earlier mobilization after surgery. Quality of care improved as care is standardized, patient participation as comprehensive patient information is provided throughout the ICP, enhanced collaboration of

  the multi-disciplinary team, patients make informed decisions about their treatment and care and are active participants during the whole ICP.
- Their use in other disciplines needs to be encouraged as successful implementation depends on a multi-disciplinary approach.
- Patients need to be involved actively in the implementation of the ICP and comprehensive patient information should be provided to encourage compliance and a feeling for the patients of being in control of their own destiny.

5.5 Conclusion

This chapter has provided a summary of the study, made recommendations for practice, education and research and discussed the limitations of the study.

This study has shown that it is possible to adapt an ICP from another environment and successfully implement it in a private hospital in South Africa. The study however was limited to one hospital and one orthopaedic surgeon and needs to be tested further in other private and public hospitals. The successful implementation of the ICP is dependent on good multi-disciplinary cooperation and patient participation.

Implementation cannot take place without first orientating staff to its use but has the potential to save a great deal of money and to substantially improve the quality of a patient’s stay in hospital and their successful discharge and rehabilitation, as well as preventing some of the complications that occur through longer hospitalisation.

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Annexure 1 - Human Research Ethics Committee (Medical) Clearance Certificate No. M130918

R14/49 Mr Petrus J Smith

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M130918

NAME: (Principal Investigator)	Mr Petrus J Smith
DEPARTMENT:	Nursing Life Wilgeheuwel Hospital
PROJECT TITLE:	An Integrated Care Pathway for Total Knee Arthroplasty in a Purposefully Selected Private Hospital in the Republic of South Africa
DATE CONSIDERED:	27/09/2013
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr Sue Armstrong
APPROVED BY:	Professor PE Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	18/10/2013

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**

Principal Investigator Signature

Date 10|10|2013.

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Annexure 2 - Letter of Permission from Life Wilgeheuwel Hospital

Life HEALTH CARE Wilgeheuwel Hospital

Life Wilgeheuwel Hospital
Amplifier Road, Radiokop Ext.13, Roodepoort 1724
Private Bag X11, Honeydew 2040
Telephone +27 11 796 6500
Telefax +27 11 796 6724
www.lifehealthcare.co.za

11 October 2013

The Chairperson
Ethics Committee
School of Health Sciences
University of the Witwatersrand
Johannesburg

RE: RESEARCH: MR PETRUS J SMITH: "AN INTEGRATED CARE PATHWAY FOR TOTAL KNEE ARTHROPLASTY IN A PRIVATE HOSPITAL IN THE REPUBLIC OF SOUTH AFRICA"

Dear Sir/Madam,

I hereby give permission for the above study to be done at Life Wilgeheuwel Hospital. I do understand that the study includes a retrospective and prospective patient documentation review.

I am aware that I can stop the study at any time if I have any concerns.

Yours Sincerely,

Jacques De Klerk
Life Wilgeheuwel Hospital Manager
Tel : +27 11 796 6516
Mobile : 082 701 8888
Email : jacques.deklerk@lifehealthcare.co.za

Annexure 3 - Information Sheet: Participating Health Professionals (Expert Team)

Information Sheet: Participating Health Professionals (Expert Team)

Dear Colleague's,

My name is Fasie Smith (P.J.), a student at the University of the Witwatersrand pursuing a master's degree in nursing. It is my intention to conduct a research project with the title: "an integrated care pathway (ICP) for total knee (TKA) in a private hospital in the Republic of South-Africa" (RSA)

I would like to invite you to participate in my study as I believe it could lead to improved patient care, outcomes and satisfaction. The study will be conducted in three phases. The first phase is to establish your current practice. Two methods will be used for this, one a retrospective patient documentation review of patients that have undergone TKA form 1 April 2011 – 30 April 2012. Two to obtain your expert pinion to adapt and refine the ICP used in the UK fit for purpose in the private healthcare context in the RSA, and then during phase three I would like to pilot the agreed ICP. I will then evaluate the outcome and the criteria that have been selected to evaluate it include length of stay, time from surgery to mobilization and pain management.

An ICP is a complex intervention for the mutual decision making and organization of care processes for a well-defined group of patients. (In this instance patients that have undergone and that will undergo TKA during a specific period). Defining characteristics for ICP,s include: (1) an explicit statement of the goals and the key elements for care based on evidence, best practice , and patients expectations and their characteristics; (2) the facilitation of communication among multi-disciplinary team members and with patients and families; (3) the coordination of the care process by coordinating the roles and sequencing the activities of the multi-disciplinary team, patients and their relatives; (4) the documentation, monitoring, and evaluation of variances and outcomes and; (5) the identification of appropriate resources. The aim of an ICP is to enhance the quality of care across the continuum by improving risk-adjusted patient outcomes, promoting patient safety, increasing patient satisfaction and optimizing the use of resources. (Massimiliano and Van Hecht, 2010)

The researcher was involved and has extensive experience in the utilization of ICP's for TKA. He was the Clinical Lead in a project in the United Kingdom (UK) form 20032007. The aim of the project was to deliver care to patients on the waiting lists of the National Health Service (NHS). Most of the patients were orthopaedic patients and a significant number were TKA. The contract stipulated that the care must be delivered with pre agreed bespoke ICP's. The ICP showed high levels of patient satisfaction and the outcomes that were significantly better than that in the NHS. The

question came to mind: “Can this ICP be adapted to be fit for purpose for the private healthcare context in the RSA and can the same improvements in outcomes be achieved?” Once you have agreed to participate in the study I will meet with you for one hour to present the ICP used in the UK, get your input and feedback to adapt it for use here in the RSA. To assist our discussion, I will use a semi-structured interview format and will use a questionnaire with pre-determined questions. I will audio tape our conversation to ensure accurate analysis and adaptation of the ICP. It might be necessary to meet with you separately to finalize and complete information.

For the pilot you will be expected to use the ICP documentation to record the care process of assessment, planning implementation and evaluation.

Participation in this study is voluntary, there will be no coercion, should you wish to withdraw from the study you will be free to do so and there will be no consequences. If you any questions you will be free to ask at any time and the researcher will ensure confidentiality, anonymity, justice and privacy throughout our interactions.

All the data gathered will be written up in an anonymous research report. All patients and any other data will be dealt with confidentially. For the retrospective and prospective patient documentation audit codes and numbers will be used in a manner so that no patient or health professional can be identified. Appropriate permission will be obtained from patients that will participate in the study. The researcher is a senior member of the hospital group management team and as part of has a signed employment contract which include a confidentially clause.

The research and ethics committees at the University of the Witwatersrand, Hospital Manager, and Research Committee of the hospital group approve and gave permission for the study.

Thank you for your kind cooperation in this study. Should you require any further information please contact my study leader or myself.

Researcher: Fasie (P.J.) Smith. 27 17th Street, Parkhurst, 2193, Johannesburg. Telephone: 011-4422491, Mobile: 0798606015, Work: 011-219 9552.

Study Leader: Doctor Sue Armstrong. Department of Nursing, University of the Witwatersrand, 7 York Road, Parktown, 2193, Johannesburg. Telephone: 011-717 2745.

Annexure 4 – Information Sheet: Patients that are participating in the study

Information sheet: patients that are participating in the study: “An Integrated Care Pathway (ICP) for Total Knee Arthroplasty (TKA) in a Private Hospital in the Republic of South Africa. (RSA)

Hello, my name is Fasie Smith (P.J.) and I am student at the University of the Witwatersrand where I am pursuing a master's degree in nursing science. The title of my study is reflected above and my interest to do this study came about when I was seconded to work for seven years in the United Kingdom (UK) where I gained good experience in the utilization of ICP's. I noticed that patients that have to undergo total knee replacements (the other name for total knee arthroplasty) have very good outcomes and the patients were very happy with the care received surgery and care in this structured manner. (Referring to the pathway).

I will conduct the study in three phases, firstly I will establish what the current practice is through a retrospective documentation audit, secondly I will ask for the input of an expert team that regularly perform this kind of surgery to provide input into the ICP that was used in the UK and give input as to how I should adapt it for use it here in a private hospital in the RSA. And then thirdly I would like to use this pathway with a sample of patients to see if the same benefits can be achieved here. The outcomes will be evaluated against specifically selected outcomes which include length of stay, time from surgery to mobilization and pain management.

After the study I will write a research report in an anonymous manner and no names will be published in any part of the report. All the information that I will collect will be kept strictly confidential. Codes and numbers will be allocated to patient files and pathway documentation during audit procedures and no names of any patients or names of the expert team, hospital or hospital group will be revealed.

Participation in the study is voluntary and there will be no direct benefits to the participants in this study. The main aim of the study is to examine if a specific ICP get TKA will improve outcomes and satisfaction ratios for patients. If you wish to withdraw from the study you may do so at any time.

Permission to do this research was obtained from the hospital and hospital group, University of the Witwatersrand research and ethics committee as well as the hospital group Research Committee. Summaries, notes and audio tape records made during the semi-structured interviews will be destroyed after the completion of the research report.

I will be happy to answer any question of questions that you might have about this study. If you have any questions about your rights as a study participant, or concerns about any aspect of the study you may contact the ethics office of the University of the Witwatersrand on (011) 717 1234.

Alternatively, you may contact my study leader or me. The contact details are:

Fasie Smith: 27 17th Street, Parkhurst 3193, Johannesburg.

Annexure 5 – Consent Form for focus group with a member of the Multidisciplinary team

Consent Form for Focus Group with a Member of the Multi-Disciplinary Team. (Doctor, Anaesthetist, Physiotherapist or a Nurse)

I have been given an information sheet on the research project: "*An integrated Care Pathway for Total Knee Arthroplasty in a Private Hospital in South Africa."* I have read and understood the information sheet and all my questions have been answered satisfactorily.

I understand that it is up to me whether or not I would like to participate in the semi structured interview and that there will be no negative consequences if I decide not to participate. I understand that the interview will be audio taped after the report has been completed the tapes will be destroyed. I also understand that I do not have to answer any questions that I am uncomfortable with and that I can stop the interview at any time.

I understand that the researcher involved in this project will make every effort to ensure confidentiality and that my name will not be used in the study reports, and that comments that I make will not be reported back to anybody else. I consent voluntarily to participate in the interview for this study. I have been given telephone numbers that I may call if we have any questions or concerns about the research.

Participant's signature: …….. Date: ……..

Interviewer's signature: …… Date: ……..

Annexure 6 – Informed Consent for audiotape-recording of focus group discussion

Informed Consent for Audiotape-Recording of Focus Group Discussion

I hereby confirm that I have been informed by the researcher; Mr Fasie Smith about the nature of his study entitled "An integrated care pathway for total knee arthroplasty in a private hospital in South Africa."

I have received, read and understood the written information sheet regarding the study.

I understand that information form the tapes will be transcribed ad transcripts will be given codes and my name will not be mentioned. I understand that the semi-structured interviews are to be recorded, and that the recording will be destroyed two years after publication of the findings.

I understand that I can ask the person interviewing me to stop recording at any time.

I consent voluntarily for the researcher to record the interview.

Participant: …….. ……...

Signature: …… Date: ……

Interviewer's signature: …….. Date: ……

Annexure 7 - Questionnaire: Focus Group with participating health professionals

Questionnaire: focus group with participating health professionals (orthopaedic surgeons, anaesthetist physiotherapist, expert team)

1. Do you follow a standardised patient journey/guide with every patient that under-go a total knee arthroplasty?	
2. Do all members of the team assess the patient?	
3. Does the team use a tool such as the "Oxford Assessment" tool to assess mobility and pain?	
4. Does the team use integrated patient documentation to record the findings of the assessment?	

5. Are the findings of the assessment and possible variables discussed to agree a plan of care?	
6. Does the patient receive comprehensive information about: 6.1 Preparation for surgery including the environment? 6.2 The surgery and its possible limitations and complications? 6.3 The immediate post-operative period including pain management? 6.4 Rehabilitation and care?	
7. Does the whole team assess the patient post-surgery at: 7.1 6 weeks? 7.2 6 months? 7.3 1 year?	
8. Is there a process by which the outcome of every patient is assessed and discussed by the team?	
9. Do you think that an integrated care pathway as presented will add value to patients?	
10. If your answer to question 10 is yes: what value?	

Annexure 8 - Consent for Post Intervention patient documentation review

Consent For Post Interview Patient Documentation Review

I hereby confirm that I have been informed by the researcher, Fasie Smith (P.J), about the nature of his study entitled “An integrated care pathway for total knee arthroplasty in a private hospital in the Republic of South Africa.

I have received, read and understood the written information sheet regarding the study. I am aware that the results of the study, including personal details and answers I give will be anonymously processed into a report and all information will remain confidential and there will be consequences from my responses and participation.

I may at any stage, without prejudice, withdraw consent and participation in the study.

I have had sufficient opportunity to ask questions and of my own free will give permission that the documentation kept by the team that recently performed a total knee arthroplasty on me be examined by the researcher.

Participant Name: ……

Signature: …… Date: ……

Interviewer’s signature: …….. Date……

Annexure 9 – Audit Tool: Pre-intervention and post intervention patient documentation audit

- Demographic and outcomes data:

Section/Sub Section	Yes	No	N/A	Comment

1. Patient contact, referral 1.1 Patient referred by general practitioner. 1.2 Self-referred 1.3 Other – i.e. physiotherapist, other health professional. 1.4 Is this a first referral, if not note the number of times the patient has been seen. 1.5 Was attempts made to treat the presenting problem conservatively – physiotherapy, pain control or both.				
Section/Sub Section	Yes	No	N/A	Comment
2. Pre-Assessment (First) 2.1 Has the patient been assessed by: 2.1.1 A nurse – clinical Assessment. 2.1.2 Physiotherapist – mobility and muscle strength. 2.1.3 A doctor, other than the orthopaedic surgeon – evidence available. 2.1.4 An anaesthetist – fit for surgery. 2.2 Has a full history of the current problem been obtained? Family and past medical history recorded? 2.3 Is there evidence that comprehensive patient information has been provided to the patient?				

2.4 Has a comprehensive risk assessment been done. 2.5 Evidence that a discharge plan have been discussed/agreed.				

Section/Sub Section	Yes	No	N/A	Comment
3. Pre-Assessment (Second) 3.1 Patient assessed by the orthopaedic surgeon. 3.2 Additional diagnostic interviews requested i.e. MRI. 3.3 Consent obtained. 3.4 Evidence that information has been provided, questions answered.				
Section/Sub Section	**Yes**	**No**	**N/A**	**Comment**
4. Admission 4.1 A comprehensive nursing assessment has been done. 4.2 Risk's identified. 4.3 Pressure sore prevention score done. 4.4 Evidence that patient has been inducted to environment. 4.5 A pre-operative care plan in place. 4.6 Evidence that the patient has been physically and emotionally been prepared for surgery. 4.7 All medication given as prescribed. 4.8 Pre-operative checklist completed. 4.9 Evidence of handover to theatre – risk's communicated.				
Section/Sub Section	**Yes**	**No**	**N/A**	**Comment**
5. Surgery (intra-operative sheet) 5.1 Anaesthetics:				

5.2 Orientated to theatre environment. 5.3 Pre-operative check list completed. 5.4 Skin preparation done. 5.5 Position indicated. 5.6 Patient position recorded. 5.7 Anaesthetist records completed in full. 5.8 Type of anaesthetic indicated. 5.9 Record of fluid balance management in place. 5.10 Other intra-operative procedures recorded. 5.11 All documents about prosthesis used in place. 5.12 All variances recorded.				
Section/Sub Section	Yes	No	N/A	Comment
6. Post-operative care 6.1 Comprehensive care plan in place – outcomes per day indicated. 6.2 Variance identification done and recorded. 6.3 Comprehensive progress notes in place. 6.4 Daily acuity assessed, recorded and care plan added according to need. 6.5 Evidence of continuous vital signs monitoring. 6.6 Mobility report in notes. 6.7 Evidence that risk have been identified and managed. 6.8 All medication given as prescribed. 6.9 Pain managed - variance recorded. 6.10 Evidence of wound care and management in notes. 6.11 Evidence of psychological support, education and discharge planning.				

6.12 Evidence that activities of living needs met daily – i.e. hygiene. 6.13 Discharge planning in place.				
Section/Sub Section	Yes	No	N/A	Comment
7. Discharge 7.1 All targets for discharge met? 7.2 Evidence that patient have assess by the full team – comprehensive notes in place? 7.3 All medication given. (to take home) 7.4 Home care arrangements in place?				
Section/Sub Section	Yes	No	N/A	Comment
8. Rehabilitation 8.1 Evidence of a rehabilitation plan as part of the daily care plan? 8.2 Progress recorded? 8.3 All variances indicated? 8.4 Rehabilitation plan included in discharge plan?				

Annexure 10 – Completed Patient Documentation Audit

Example: Completed Patient Documentation Audit

• Demographic and outcomes data:

A1: Demographic Data: Female, Age: 63, Date of surgery: 5 May 2012.

Admitted: 5 May 2012 @ 05H45, Discharged: 9 May 2012 @ 10H00, LOS:

No complaints in nursing notes, patient did not make the discharge criteria, noted in the notes that she is “not good on crutches, only 70 degrees bent” (target 90 Degrees).

Element	Yes	No	N/A	Comment
1. Patient contact, referral. 1.1 Patient referred by general practitioner. 1.2 Self-referred. 1.3 Other – i.e. physiotherapist, other health professional. 1.4 Is this a first referral, if not note the number of times the patient has been seen. 1.5 Was attempts made to treat the presenting problem conservatively – physiotherapy, pain control or both.		 X X X X X		No evidence in documentation about referral No information in documentation about the treatment of the condition before the decision made for surgery.
	Yes	No	N/A	Comment
2. Pre-Assessment (First) 2.1 Has the patient been assessed by: 2.1.1 A nurse – clinical assessment. 2.1.2 Physiotherapist – mobility and muscle strength.		 X X X		No evidence of an assessment by all members of the multidisciplinary team. Orthopaedic Surgeon see patient in practice rooms. Refer for assessment by a Physician if co-morbidities is present.

2.1.3 A doctor, other than the orthopaedic surgeon – evidence available. 2.1.4 An anaesthetist – fit for Surgery. 2.2 Has a full history of the current problem been obtained. Family and past medical history recorded. 2.3 Is there evidence that comprehensive patient information has been provided to the patient. 2.4 Has a comprehensive risk assessment been done. 2.5 Evidence that a discharge plan have been discussed/agreed.		X X		No patient information, no discharge plan – or any evidence of it. No evidence of a clinical risk assessment. No evidence that a discharge plan has been agreed and is in place.
	Yes	No	N/A	Comment
3. Pre-Assessment (Second). 3.1 Patient assessed by orthopaedic surgeon. 3.2 Additional diagnostic interviews requested i.e. MRI. 3.3 Consent obtained. 3.4 Evidence that information has been provided, questions answered.	 X	X X X		 The nurse in the ward confirm that the patient has given consent. No evidence that any information has been given.
	Yes	No	N/A	Comment

4. Admission. 4.1 A comprehensive nursing assessment has been done. 4.2 Risk's identified. 4.3 Pressure sore prevention score done.	 X X	 X		A nursing assessment has been done, incomplete. Risk assessment tools, falling, waterlow score done. Notes are not very clear.

4.4 Evidence that patient has been inducted to environment. 4.5 A pre-operative care plan in place. 4.6 Evidence that the patient has been physically and emotionally been prepared for surgery. 4.7 All medication given as prescribed. 4.8 Pre-operative checklist completed. 4.9 Evidence of handover to theatre – risk's communicated.	 X X X X	 X X		No evidence of physical and emotional preparation for theatre, surgery. Pre-operative checklist completed evidence of handover at theatre in place.
	Yes	No	N/A	Comment

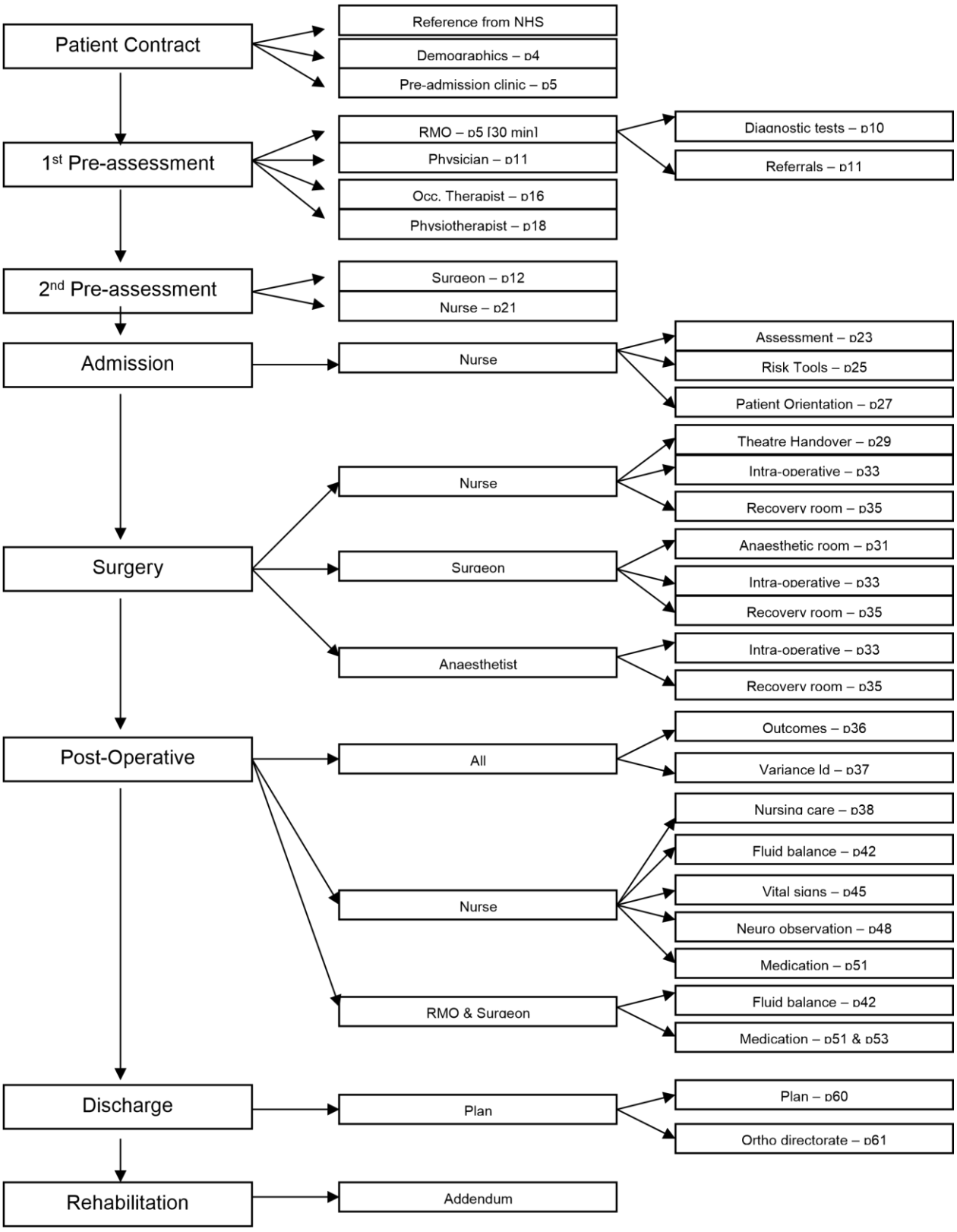
5. Surgery (intra-operative sheet)				
5.1 Anaesthetics.		X		
5.2 Orientated to theatre environment.	X			
5.3 Pre-operative check list completed.	X			
5.4 Skin presentation done.	X			
5.5 Position indicated.	X			
5.6 Patient position recorded.	X			
5.7 Anaesthetist records completed in full.	X			
5.8 Type of anaesthetic indicated.	X			
5.9 Record of fluid balance management in place.		X		
5.10 Other intra-operative procedures Recorded.	X			
5.11 All documents about prosthesis used in place.	X			
5.12 All variances recorded.				Appear to be no variances.
	Yes	No	N/A	Comment

6. Post-operative care 6.1 Comprehensive care plan in place – outcomes per day indicated. 6.2 Variance identification done and recorded. 6.3 Comprehensive progress notes. 6.4 Daily acuity assessed, recorded and care plan added according to need. 6.5 Evidence of continuous vital signs monitoring. 6.6 Mobility report in notes. 6.7 Evidence that risk have been identified and managed. 6.8 All medication given as prescribed. 6.9 Pain managed - variance recorded. 6.10 Evidence of wound care and management in notes. 6.11 Evidence of psychological support, education and discharge planning. 6.12 Evidence that activities of living needs met daily – i.e. hygiene 6.13 Discharge planning in place.	X X X X X X X	X X X X		A tick list type of care plan is used. Handwriting not very clear. Assessments are performed using a section on the care plan – evaluation of care plan, progress report.
Element	Yes	No	N/A	Comment

7. Discharge 7.1 All targets for discharge met. 7.2 Evidence that patient have assess by the full team – comprehensive notes in place. 7.3 All medication given. (to take home) 7.4 Home care arrangements in place.	 X	 X X		Some targets have been identified on discharge – these include advice re TED stockings, advice if wound is bleeding, told to keep wound clean and dry. TTO, to take home medication have been given to patient. No evidence of advice regarding the
				indications, contraindications for the use of medication noted.
Element	Yes	No	N/A	Comment
8. Rehabilitation 8.1 Evidence of a rehabilitation plan as part of the daily care plan. 8.2 Progress recorded. 8.3 All variances indicated. 8.4 Rehabilitation plan included in discharge plan.	 X X X X			No evidence that a postoperative care plan has been given to patient ,evidence in clinical notes of the patients general progress (progress/multidisciplinary clinical record

Annexure 11 Integrated Care Pathway Algorithm

Integrated Care Pathway Algorithm


Patient Contract
Reference from NHS
Demographics – p4
Pre-admission clinic – p5
1st Pre-assessment
RMO – p5 [30 min]
Physician – p11
Occ. Therapist – p16
Physiotherapist – p18
Diagnostic tests – p10
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Surgeon – p12
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Nurse
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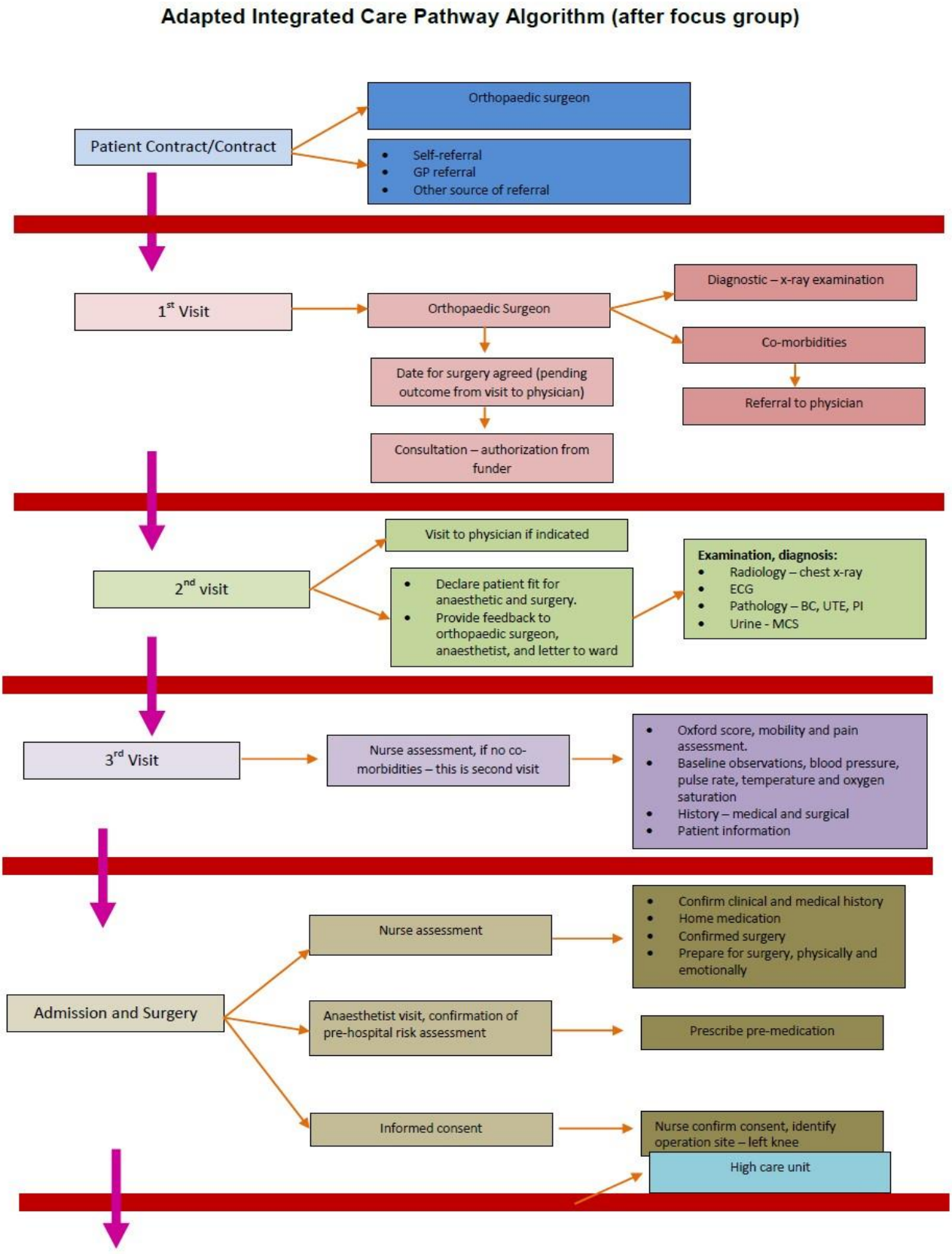
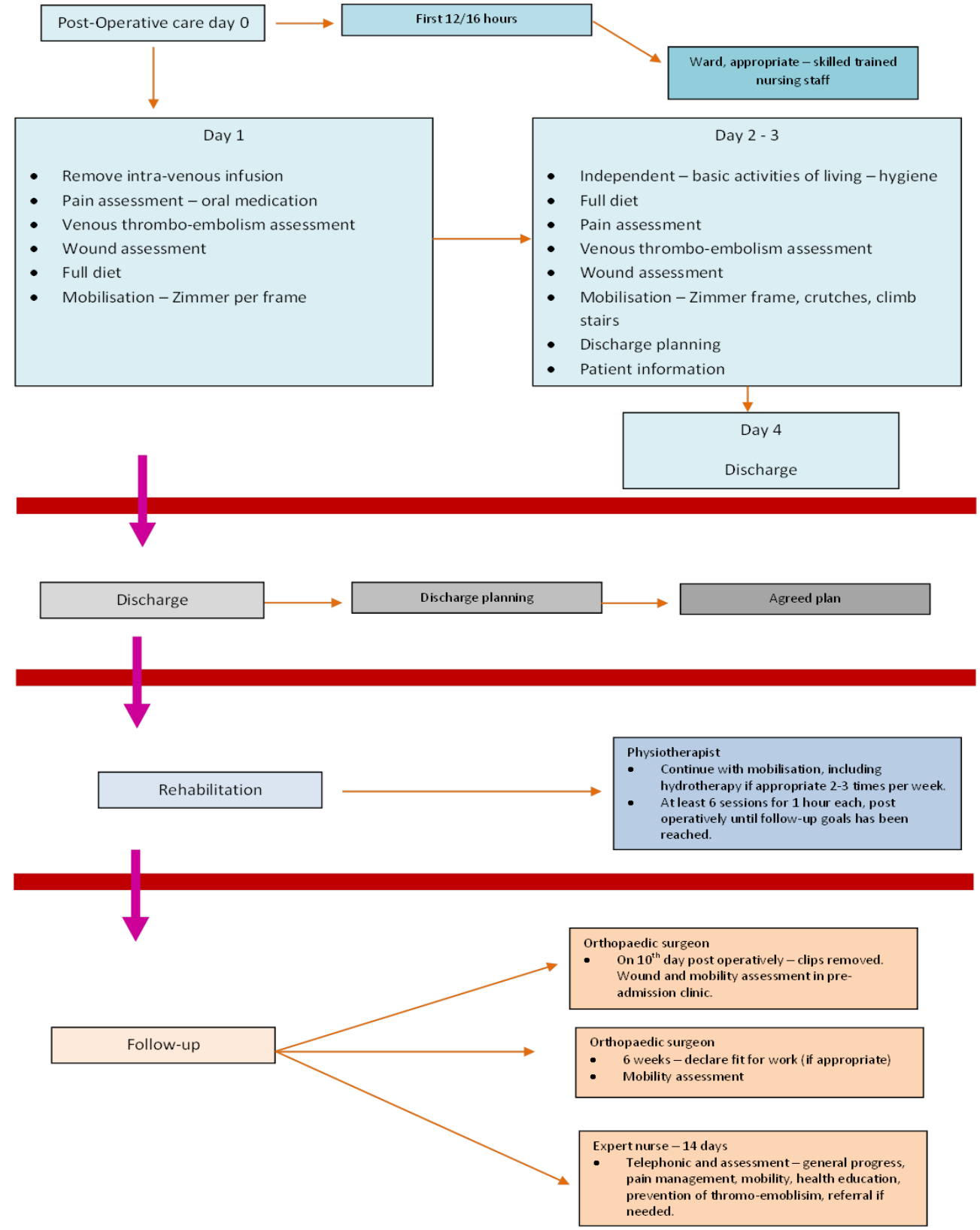
Rehabilitation
Addendum

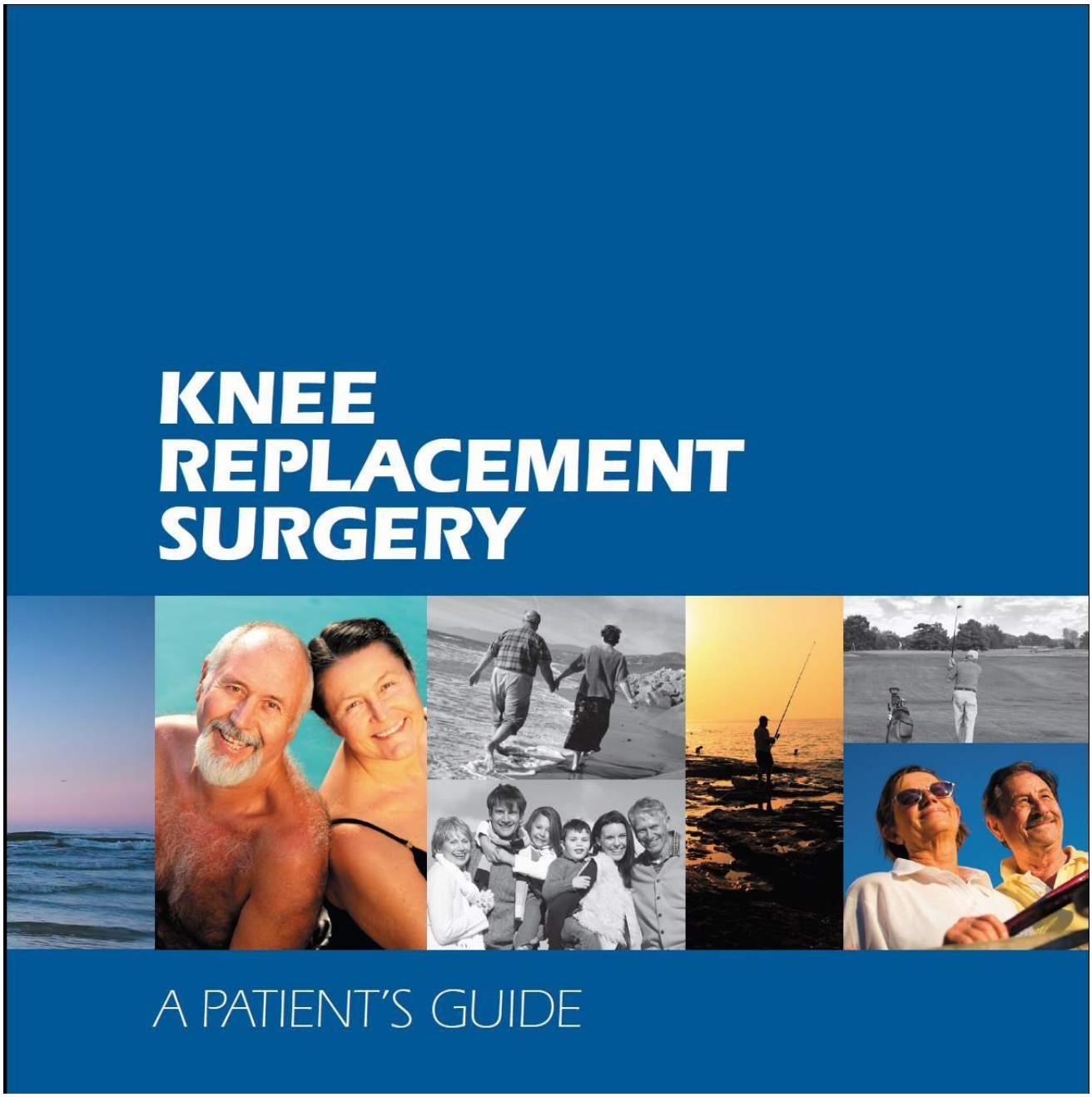
Annexure 12 Adapted Integrated Care Pathway Algorithm (after focus group)




Post-Operative care day 0
First 12/16 hours
Ward, appropriate – skilled trained nursing staff
Day 1
Remove intra-venous infusion
Pain assessment – oral medication
Venous thrombo-embolism assessment
Wound assessment
Full diet
Mobilisation – Zimmer per frame
Day 2 - 3
Independent – basic activities of living – hygiene
Full diet
Pain assessment
Venous thrombo-embolism assessment
Wound assessment
Mobilisation – Zimmer frame, crutches, climb stairs
Discharge planning
Patient information
Day 4
Discharge
Discharge
Discharge planning
Agreed plan
Rehabilitation
Physiotherapist
Continue with mobilisation, including hydrotherapy if appropriate 2-3 times per week.
At least 6 sessions for 1 hour each, post operatively until follow-up goals has been reached.
Follow-up
Orthopaedic surgeon
On 10th day post operatively – clips removed. Wound and mobility assessment in pre-admission clinic.
Orthopaedic surgeon
6 weeks – declare fit for work (if appropriate)
Mobility assessment
Expert nurse – 14 days
Telephonic and assessment – general progress, pain management, mobility, health education, prevention of thromo-emoblisim, referral if needed.

Annexure 13 Patient Information - Knee Replacement Surgery

(Patient information developed as part of the intervention, adapted to ICP. - Permission granted by Care UK Afrox Healthcare to use the diagrams).



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Introduction

The information is provided as a guide and has been designed to give you a better understanding of your procedure. You will learn how to prepare yourself and make your home ready following your knee surgery.

You are encouraged to read this information prior to your admission to hospital. If you have any questions, please feel free to speak to xxxxxxxxxxx or any member of the team working.

It is hoped that this information will assist in alleviating some of your anxieties about surgery.

This information presented in this guide is of a general nature only; it is not intended to form the basis of informed consent for knee surgery. It is designed to help you make a list of questions to ask a member of the team looking after you.

Expert Team

The participating doctor is an Orthopaedic Surgeon registered with the South African Medical and Dental Council. He is supported by an expert team of other Health professionals such as Physicians, Anaesthetists, Physiotherapists and Nurses. Please feel free to ask any questions that you may have at any time.

Once you have seen the doctor, appropriate diagnosis (X-rays), have been done he will discuss your surgery with you, a date will be agreed. The practice staff will assist you with the necessary authorization from your medical aid. If you have any underlying medical conditions and are using chronic medication it might be necessary for you to see a physician for a comprehensive assessment to declare you fit for surgery, anaesthesia and smooth recovery. The doctor will refer you. The results of this will be forwarded to him automatically.

Knee anatomy and function

The knee joint

The knee joint is the largest gliding hinge joint in the body. It is required to rotate, and flex and extend like a hinge. It can also slide backward, forward and side to side. The knee is actually made up of two joints, the tibiofemoral and the patellofemoral joint.

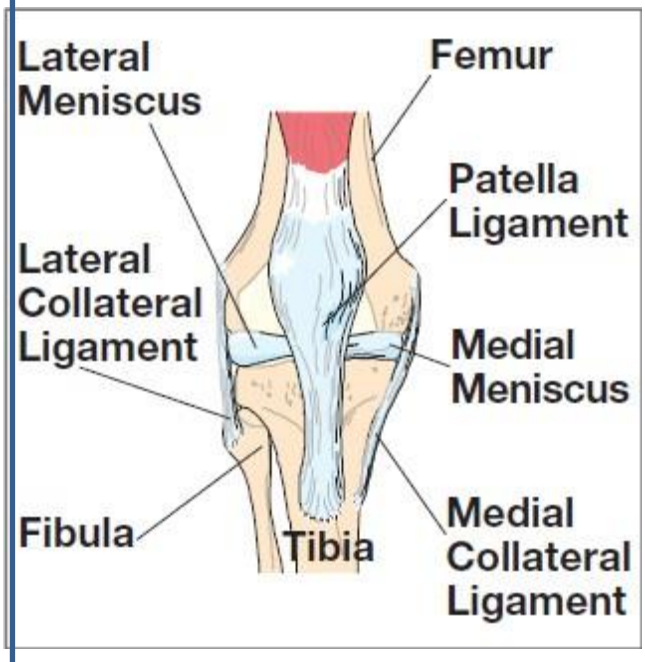
Tibiofemoral joint

The tibiofemoral joint is a meeting of the femur *[fee-mer]* (thigh bone) and the tibia *[tibb-e-ah]* (shin bone).

Patellofemoral joint

At the lower end of the femur (thigh bone) is a groove. The patella [*pah-tell-ah*] (kneecap) contacts this groove forming the patellofemoral joint.

The patella (a button shaped bone with cartilage on it's under surface) sits at the front of the knee and slides down and up the trochlear groove when the knee bends and straightens. The patella protects the knee and gives leverage to the muscles.



Courtesy of: Care UK Afrox Healthcare

Shock absorption to the joint is provided by:

Cartilage

The moving surfaces of the knee, when healthy, are covered with a smooth surface called articular [are-tick-u-lar] cartilage. The cartilage acts as a cushion between the two bones and allows the knee to move. Because the cartilage is smooth, it provides a slick, low friction surface.

Meniscus

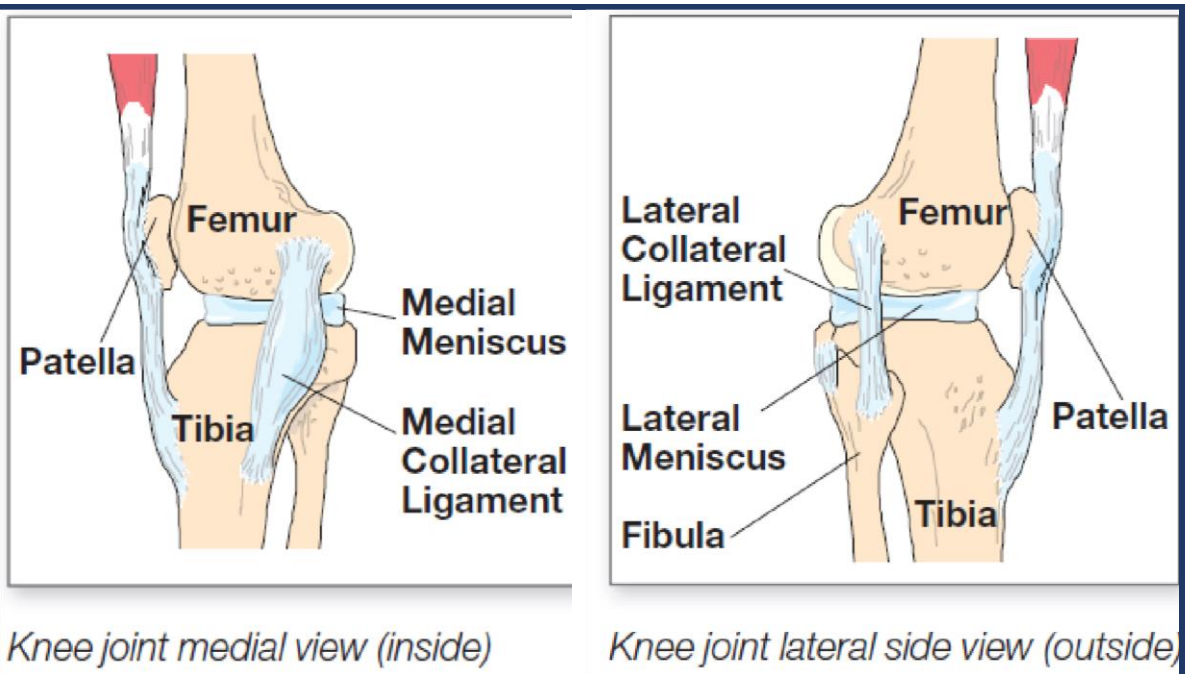
Meniscus [men-is-kuss] (the cartilage-like material, colloquially and incorrectly known as 'the cartilage') acts as a cushion between the ends of bones.

Ligaments

Ligaments (a strong band of fibrous connective tissue that joins bones to other bones).

These combined structures of bone, cartilage and muscle allow for smooth, painless motion as you walk, bend and straighten your knee.

As the knee degenerates; the articular cartilage wears away, the meniscus may tear and the ligaments can rupture or become unstable. This leads to pain, joint instability and lack of function.



Knee joint medial view (inside) *Knee joint lateral side view (outside)*

Courtesy of: Care UK Afrox Healthcare

Healthy joint versus osteoarthritis

Healthy joint

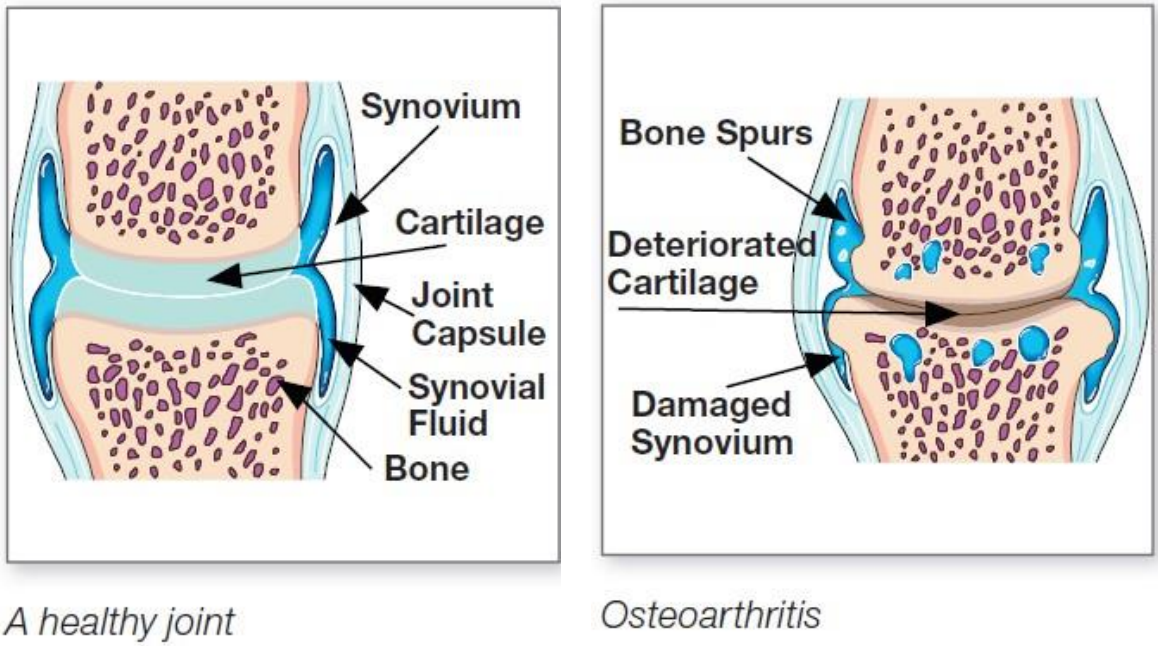
A normal joint is enveloped by a fluid filled sac called a joint capsule. The fluid in this capsule is called synovial fluid which is produced in a thin membrane called the synovium. In a healthy joint, the ends of the bones are encased in smooth articular cartilage. The synovial fluid functions to lubricate the joint and also provides nutrients to the cartilage and connective tissues within the joint capsule.

Osteoarthritis

Is also known as 'degenerative arthritis'. Osteoarthritis can be a result of excessive wear and tear, but it has been postulated that there may be a genetic predisposition to the condition. The cartilage in your joints deteriorates causing your bones to contact each other directly. This will feel like soreness and stiffness of the joint. Knees, wrists and hips are common areas to experience this condition.

Severe osteoarthritis

With osteoarthritis, the cartilage becomes worn away. Spurs grow out from the edge of the bone, and synovial fluid increases. Altogether, the joint feels stiff and sore.



A healthy joint

Osteoarthritis

Courtesy of: Care UK Afrox Healthcare

Partial or Total Knee Replacement Surgery

Total knee replacement (TKR) has evolved from humble beginnings in the 1960's to a precise, reproducible procedure using tried and tested surgical techniques and state of the art instrumentation. Total knee replacement has been found to be a

safe, cost-effective treatment for alleviating pain and restoring physical function in patients who do not respond to non-surgical therapies.

Knee replacement surgery is a surgical procedure for relining of the bone end surfaces of the knee joint with artificial parts called prosthesis [pros-thee-sis]. This commonly occurs as the end result of severe osteoarthritis.

- This is due to the gradual deterioration and loss of the articular cartilage on the joint surface. This many occur due to progressive wear and tear as we age, or form the effects of a previous injury to the knee.
- The patella (kneecap) may no longer glide smoothly over the trochlear groove in the joint, because of the worn cartilage surface.
- The tibiofemoral joint is often unevenly worn down on the inner or outer component, with no cushioning space between the femur and tibia. This is called 'bone on bone contact' and is very painful.
- Another form of arthritis is caused by inflammatory conditions of the joint, known as 'rheumatoid arthritis. This destroys the surface cartilage of the joint.
- With mild arthritis there is joint stiffness and some degree of discomfort. As the disease progresses and the cartilage surface deteriorate, the pain will increase and permanent joint stiffness develops. At this point it may be difficult to carry out normal daily activities. Walking may become difficult because of the pain and stiffness. You may have difficulty going up and down stairs and may need assistance getting out of a chair or a car.
- Generally, partial or total knee replacement is considered only in those cases where more conventional treatments have either failed or been deemed impractical.



Above: Anterolateral view of knee where the bones that comprise the hinge joint have been replaced with a prosthesis.

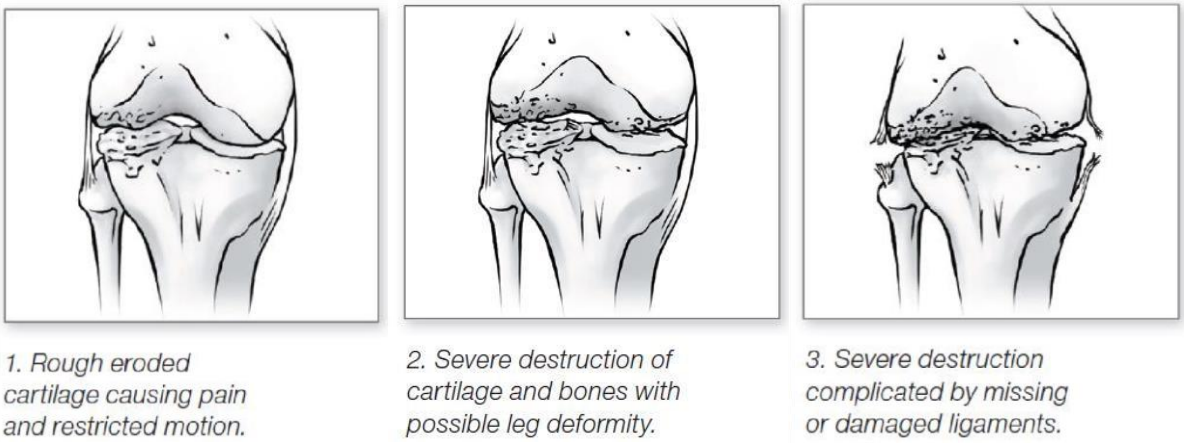
Courtesy of: Care UK Afrox Healthcare

Types of knee damage

There are three types of knee damage generally considered treatable by knee replacement surgery. They are shown on the right in the order of their severity.

On completion of surgery, over time your ligaments and muscles will heal, stabilise and mobilise your knee, allowing you to resume most activities. The successful total knee replacement will generally provide nearly complete relief of pain after the initial healing stages. Motion in the affected limb will generally be improved and in most cases, canes and crutches can be discarded within a few months after surgery.

In some situations, however, where there are other disabilities and the patient may not become completely mobile again, there is generally a significant improvement brought by the relief of pain alone.



1. Rough eroded cartilage causing pain and restricted motion.

2. Severe destruction of cartilage and bones with possible leg deformity.

3. Severe destruction complicated by missing or damaged ligaments.

Courtesy of: Care UK Afrox Healthcare

Partial or Total Knee Replacement Surgery

Knee implants

There are two basic types of knee implants in general use today – partial and total. The implant selected for a particular patient is usually determined by the particular kind and severity of damage which your surgeon sees in your joint.

Both types of implants are similar in that their main purpose is to replace damaged bone and cartilage with new surfaces which slide freely upon each other to relieve pain and restore motion.

Such implants have an upper component of metal and a lower component of plastic.

Each part of the implant is installed separately with no mechanical connection to the other.

For this reason, at least some of the natural ligaments of the knee must be present and intact to give the joint stability. These are known as ‘Unicondylar’ (partial) and ‘Bicondylar’ (total) knee implants.

You can see that their main difference lies in the fact that one (the Unicondylar) is designed to replace one part of the joint, while the other (Bicondylar) replaces both sides at once.

Another type of implant is designed to replace the surfaces of the patellofemoral joint. The under surface of the patella (kneecap) is resurfaced with plastic, whilst the trochlear groove on the femur is replaced with metal. This is called a PatelloFemoral Resurfacing Implant.



GRU™ Unicondylar front & side view *RBK™ Bicondylar front & side view* *RBK™ Patello-Femoral Resurfacing System front & side view*

Courtesy of: Care UK Afrox Healthcare

Potential risks and complications

No surgery is without risks. It is necessary for you to have an understanding of the risks of surgery in order to make an informed decision about your desire for surgery.

General anaesthesia

General Anaesthesia during surgery places an increased stress on the body. The most common side effects from a general anaesthetic are usually minor and temporary.

Following surgery, you may experience hoarseness, sore throat, headaches, nausea and even temporary confusion or memory loss.

Serious complications from general anaesthesia can include heart problems, pneumonia and lung problems, stroke, organ failure (i.e. kidneys) and even deaths have been reported.

Fortunately, these only occur in a very small percentage of patients undergoing surgery. A thorough medical evaluation prior to your surgery can minimise these risks.

DVT (deep vein thrombosis)

DVT (deep vein thrombosis) is the formation of blood clots, commonly in the leg veins.
It is important to prevent this from occurring. The following measures will help you to prevent DVT:

- Perform gentle ankle and toe exercises every hour when awake. This will stimulate your blood circulation (like the airline exercises).
- Apply TED (thrombo embolic deterrent) compression stockings postoperatively and wear them continuously for at least 6 weeks after surgery.
- Following surgery, you may be given an injection of anticoagulant daily to thin your blood. A pulmonary embolism is a rare complication, but may occur if a blood clot detaches and becomes caught in the lungs. This is a serious complication, causing sudden breathlessness, collapse or, very rarely, death. Should you experience any chest pain or shortness of breath, or both whilst in hospital or once you have been discharged you must tell the staff immediately. If at home call to take you to the ambulance immediately to take you to the nearest accident and emergency unit (casualty).

Infection

Infection is a serious complication. Precautions are taken by administering antibiotics and using other strict measures to prevent an infection from occurring, however the risk cannot be completely eradicated. If your wound is red, swollen and there are oozing of fluid or pass from it, please consult the doctor immediately. He will arrange for you to see him immediately.

Nerve damage

Damage can occur to the nerves around the knee area. The most common cause of nerve injury is through the use of the tourniquet during surgery. A tourniquet is sometimes used during surgery to give a bloodless field for the surgeon to view the operative field and minimise blood loss. The use of a tourniquet is not without risks. The extent of damage may be a mild transient loss of function to permanent, irreversible damage. Symptoms of nerve injury include the inability to detect pain, heat, cold or pressure over the skin along the course of the nerve, or, rarely, weakness of foot movement.

Damage to nearby blood vessels

Bleeding may occur once the tourniquet is removed. Massive blood loss can rarely occur if a major blood vessel in the knee is damaged.

Tourniquet pain

Tourniquet pain is a common complication and is often described as a dull aching pain in the leg that may develop following tourniquet use. Post-tourniquet syndrome can occur and be pronounced at times, with prolonged postoperative swelling of the limb, stiffness, pallor, weakness without paralysis, as well as numbness. It is your

surgeon’s responsibility to inform you of all the relevant potential risks of surgery, no matter how uncommon some may be. Please discuss any concerns with your surgeon, who can specifically address the likelihood of complications in your individual case. This should be done before you sign any form giving consent to the surgery.

Preparation for surgery

Physical health

As with any surgery, you have to prepare yourself. Maintaining good physical health is important. Smoking is associated with a significant increase in risks, including heart attack, lung collapse, wound breakdown and infection. If you are a smoker, you should not smoke for at least two weeks prior to surgery.

Activities to increase your upper arm strength would be helpful, as you will be using your upper arms more than you realise following surgery.

Examples:

- Using a monkey bar to pull yourself up in the bed as well as helping yourself getting in and out of a chair.
- Using a walking frame when you first start to walk after surgery, then using crutches when you are mobile.

Lose excess weight

Excess weight places strain on an already damaged joint, and may be associated with an increased risk of infection.

Losing weight can help ease the condition of your knee and optimise the results of your surgery. Please consult with your doctor before commencing a weight reduction plan.

Dental work

If you need dental work, this needs to be completed before your operation. An infected tooth or gum could be a possible source of infection in the new knee.

Medications

Your surgeon may recommend that you cease taking anti-inflammatory medication and any aspirin based medicines 7–14 days before surgery. If your cardiologist has prescribed the aspirin, please check with him before discontinuing the medication.

Start making arrangements for going home

Your stay in hospital could be 3-5 days, depending on your surgeon's preference. Some patients may first go to a rehabilitation hospital prior to going home.

When you are discharged, you will need someone to assist you at home. You may need help to dress, bath and with meals for a short time.

Start getting your home ready

- If you live in a double storey house, you may wish to prepare somewhere to rest downstairs during the day, to avoid using the stairs too much.
- Remove all scatter rugs, or tape down their edges.
- Keep walkways clear of furniture as well as all telephone or electrical cords. If necessary tape the cords down so you can manoeuvre freely, to prevent you from having a fall if the stick or crutch should get caught up in the cords.
- Have a good firm chair with solid arm supports, and place a table near your chair, with telephone, TV remote, and anything you may need to save you from getting up and down all the time.
- You may need a chair in the shower for the first couple of weeks. Put your soap into a stocking and tie it to the cold water tap. If you drop the soap it makes it easy to retrieve.



Remove all scatter rugs, or tape down their edges.

Courtesy of: Care UK Afrox Healthcare

Day of surgery

- You should be able to take your routine medications (unless instructed not to take them).
- **BRING ALL YOUR X-RAYS WITH YOU TO HOSPITAL.**
- You will be instructed when to stop eating and drinking.
- Your hospital will advise you of your admission time and schedule on arrival.
- About one hour before surgery, you will be required to change into a hospital gown, paper pants and a cap. If you have drug allergies you may be required to wear a red label on your arm.
- You may be requested to mark your operated limb with a black marking pen.
- You may be measured and fitted with TED stockings on the un-operated limb.
- Remove all jewellery (except your wedding ring which will be taped on). No nail polish or makeup is allowed.
- You will be asked several times, by several different people to confirm which leg is to be operated on. Please be aware of the importance of this, and treat it as you would security questions at the airport.



Bring all your X-rays with you to hospital.

Courtesy of: Care UK Afrox Healthcare

Immediately after surgery

Immediately following your surgery, you will be taken to the recovery ward for a period of monitored observation.

- You will have an oxygen mask on your face with continuous flow of oxygen. A blood pressure cuff will be on your arm and a probe on your finger to check your oxygen saturation. Your blood pressure and pulse will be taken frequently.
- Checks of your circulation, sensation and pulses in your feet called ‘neurovascular observations’ are also recorded. It is important that you tell the nurse if you feel numbness, tingling or pain in your legs or feet.

Circumstances vary from patient to patient. You will likely experience some or all of the following after surgery.

- A crepe bandage may be wrapped around your operated leg to maintain cleanliness and to absorb any blood loss.
- Once you are fully awake and the anaesthetist is satisfied with your condition, you will be transferred to the high care unit.
- An intravenous (IV) drip, started before or during surgery will continue until you are drinking adequate amounts of fluids and ready to have oral antibiotics, usually for 24 hours.
- PCA (patient controlled analgesia) – this is a method of pain control for the first day or two after surgery where you can self-administer IV pain medication as needed.



An intravenous (IV) drip, started before or during surgery will continue until you are drinking adequate amounts of fluids and ready to have oral antibiotics. This usually lasts for 24 hours.

Courtesy of: Care UK Afrox Healthcare

Postoperative hospital stay

Use of heat and ice postoperatively

Ice

This may be used during your hospital stay and at home to help reduce the swelling in your knee. Pain and swelling may slow your progress when doing exercises. An ice pack or a bag of crushed ice should be placed in a towel over your knee for 1020 minutes. At intervals, check skin integrity when using the ice, as you may experience a decrease in sensation around your knee following the surgery.

Heat

If you knee is not swollen or painful, you may be able to use heat before you start to exercise to assist in gaining range of motion. A warm, damp towel may be used for 10-20 minutes. Please take care when using heat as you may have decreased sensation around your knee and if the heat pack is too hot, you may get burns. Do not use a heat pack unless you are advised to do so by your surgeon or physiotherapist.

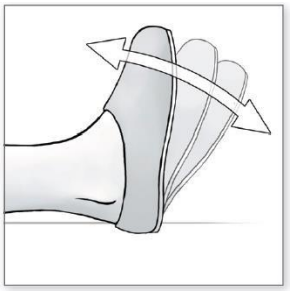
Movement following surgery

You may have your white TED stockings as well as calf compressors. Plastic sleeves are attached to a machine which circulates air into the sleeve and massages your leg. This is another method of promoting blood flow and decreases the chances of DVT. You may be given an injection of an anticoagulant and encouraged to do your ankle exercises hourly. If you experience nausea postoperatively from the pain medication (PCA), you may need medication to minimise the nausea and vomiting, so please inform the nursing staff.

Deep breathing and coughing exercises are important to help prevent complications, such as lung congestion or pneumonia. Inhale deeply through your nose, and then slowly exhale through your mouth. Repeat the deep breaths 3 times, and then cough twice every hour.

Ankle pumps

Slowly push your foot up and down. This exercise can be done several times a day.



Courtesy of: Care UK Afrox Healthcare

Lying in bed

- It is best for you to lie on your back. Your bed needs to be a good height and you need a firm mattress.

Getting out of bed

- Get out of bed on the operated side.
- Move buttocks to the edge of the bed.
- Stretch out the operated leg until it touches the floor.
- Keep operated leg in front until standing.

Getting into bed

- Sit down on edge of bed, reaching back with one hand at a time.
- Enter the bed by supporting your upper body with your arms and bringing your legs into the bed. (This is why you need to build up your upper arm muscles).



Figure (a)



Figure (b)



Figure (c)



Figure (d)

Courtesy of: Care UK Afrox Healthcare

Sitting in a chair

- Sit in a firm, straight back chair with arm rests to help support you when getting in and out of the chair.
- Back up slowly until you feel the chair against the back of your legs.

- Slide your operated leg forward and lower yourself slowly into the chair using the armrests.

Going from sitting to standing

- Slide forward in the chair with the operated leg extended in front of you.
- Use both your arms and your un-operated leg to push yourself up to the standing position. You may then reach for the walker or crutches.



Figure (a)



Figure (b)



Figure (c)



Figure (d)

Courtesy of: Care UK Afrox Healthcare

Walking

Proper walking is the best way to help your knee recover. At first, you will need a walker or crutches.

Your surgeon or physiotherapist will advise you how much weight to put on your leg.

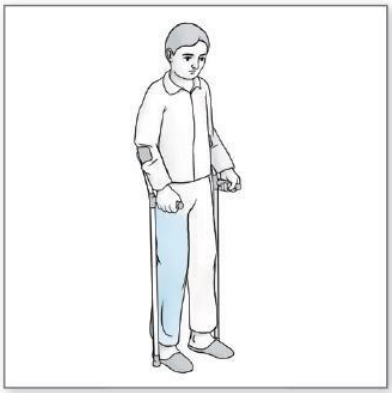
Using crutches or a walker

When walking the sequence is always:

- Move walking aid forward.
- Step with the operated leg.
- Step with your un-operated leg.
- When turning around you must not twist your new knee. Take small steps and turn toward your un-operated leg.



Walking frame



Crutches



Walking sticks

Courtesy of: Care UK Afrox Healthcare

Using the stairs with crutches

Use your crutch to support your operated leg going up one step at a time.

Upstairs

- Step up with un-operated leg.
- Step up with operated leg.
- Move crutch or aid.
- Use a handrail if possible with your free hand.

Downstairs

- Down with walking aid first.
- Step down with operated leg.
- Step down with un-operated leg. Remember “up with the good and down with the bad”.



Upstairs



Downstairs

Courtesy of: Care UK Afrox Healthcare

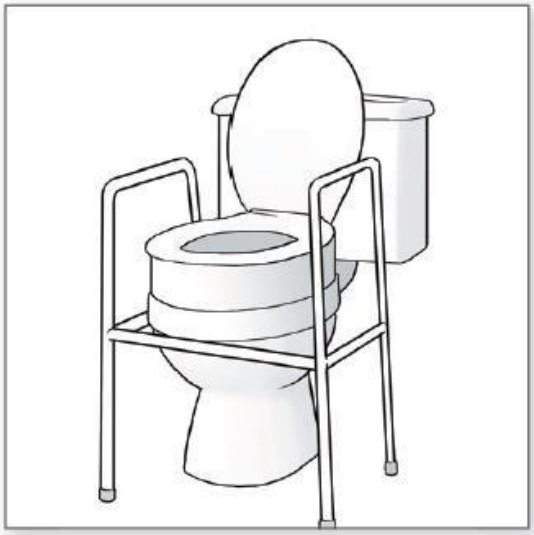
Toileting

Most toilets are too low for comfortable postoperative use. You will need to use a raised toilet seat or an over toilet aid for safety. A toilet surround or metal handrail will help you raise yourself off the toilet.

- Place toilet paper within easy reach before you sit.
- Back up slowly until you feel the toilet press against the back of your legs. Slide your operated leg forward and lower yourself slowly onto the toilet, using handrail or surround to help support you.



Using handrail for support



Toilet surround or metal handrail

Courtesy of: Care UK Afrox Healthcare

Postoperative physiotherapy

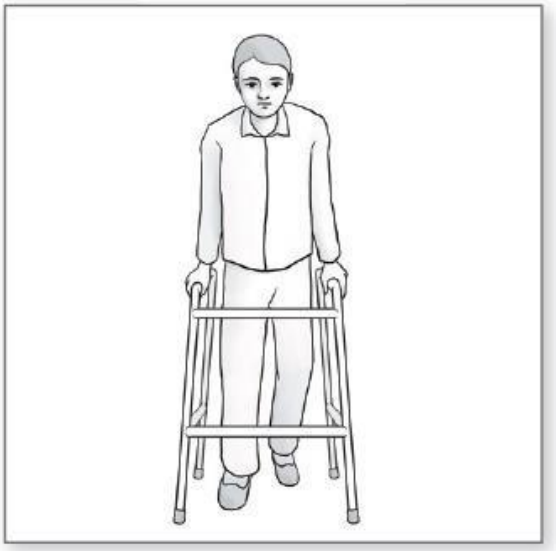
The physiotherapist will visit daily in the first couple of days to show you how to do your exercises as well as assist you in and out of bed for the first time.

Before you start your exercises, it is important that you take pain medication at least 20–30 minutes before you start your exercises. Why is this important? If the exercises are painful, you may not do the exercises to your best advantage, thus making you reluctant to bend and straighten your knee. Your pain will gradually lessen, making exercising and movement much easier as time progresses.

- The aim of the exercises is to straighten your knee and also to bend to 90° of flexion (bend). How well you regain strength and motion depends upon how well you follow your physiotherapy.
- On some occasions your surgeon may request that your knee be placed on to a CPM (continuous passive motion) machine. This is a mechanical device that is put on the bed with your leg placed in position. When turned on, this machine will slowly move your knee, bending and straightening it through a controlled range of motion. The machine can be adjusted to increase the bend of your knee. The aim is for 90º of flexion.
- You will walk with crutches until your surgeon or physiotherapist allows you to walk with a stick or frame. The physiotherapist will supervise you walking up and down the stairs using the crutches before you are discharged.



Physiotherapy



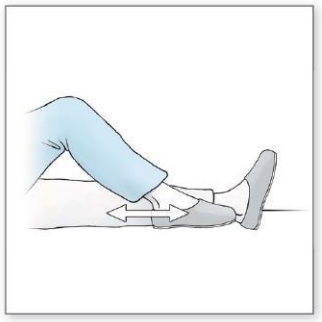
Using a walking frame

Courtesy of: Care UK Afrox Healthcare

Exercises for the Knee

Knee bends

Slide your heel toward your buttocks, bending your knee and keeping your heel on the bed. Do not let your knee roll inward.

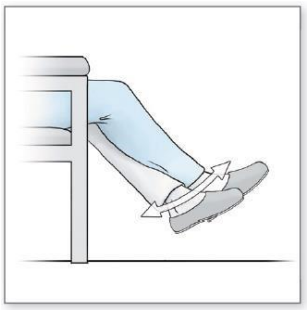


Knee bends

Courtesy of: Care UK Afrox Healthcare

Sitting supported knee bends

While sitting with your thigh supported, place your un-operated foot behind the foot of the operated knee side for support. Bend your knee as far as you can until your foot rests on the floor, then slowly raise it again.

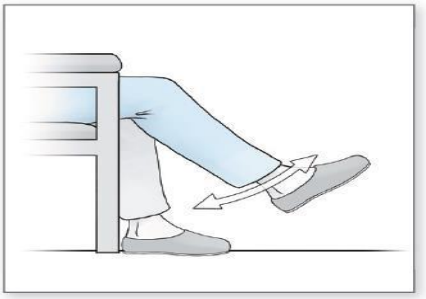


Sitting supported knee bends

Courtesy of: Care UK Afrox Healthcare

Sitting unsupported knee bends

While sitting with your thigh supported, bend your knee as far as you can until your foot rests on the floor, then slowly raise it again.



Sitting unsupported knee bends

Courtesy of: Care UK Afrox Healthcare

Stair climbing without crutches

The ability to go up and down the stairs requires strength and flexibility. At first you will require the use of a handrail for support.

Always lead up the stairs with your un-operated knee and down the stairs with your operated knee.



Stair climbing without crutches

Courtesy of: Care UK Afrox Healthcare

Standing knee bends

Standing erect with the aid of a walker or crutches, lift your thigh and bend your knee as much as you can, then straighten.

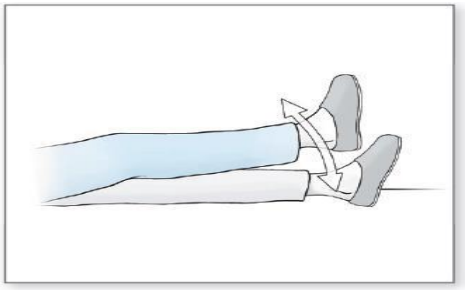


Standing knee bends

Courtesy of: Care UK Afrox Healthcare

Straight leg raises

Tighten your thigh muscle with your knee fully straightened on the bed. As your thigh muscle tightens, lift your leg several inches off the bed, hold, and then slowly lower



Straight leg raises

Courtesy of: Care UK Afrox Healthcare

Guidelines at home

Upon discharge from hospital you will have achieved some degree of independence in walking with crutches or a stick, climbing stairs, getting in and out of bed, and going to the bathroom without assistance. You will need someone at home to assist you for the next 6 weeks or until your energy has improved. You may need assistance in dressing and showering.

Medication

You will continue to take your medications as prescribed by your surgeon. You may still be taking prescribed medication for pain. You may wish to take your pain medication 30 minutes before commencing exercises. If pain becomes unbearable please call your doctor.

Activity

- Continue to walk with your crutches or stick as directed by the physiotherapist.
- Bear weight and walk on the leg as much as is comfortable, unless your doctor directs you otherwise. Walking is one of the better kinds of therapy for muscle strengthening.
- Continue to do your exercises that you were doing in hospital. Walking is excellent therapy; however, it does not replace the exercise programme which you were taught in hospital.
- Avoid doing any strenuous housework or gardening for the first 12 weeks after surgery.
- Avoid kneeling.

White (TED) stockings

- You may be required to wear your white stockings until you visit your surgeon for your 6 weekly check-up.

Your incision

- Keep the incision clean and dry. Be alert for certain warning signs. If there is any swelling, increased pain, tenderness, redness or drainage from the incision site or if you have a high temperature, report this immediately to your doctor.

Toileting at home

- Most toilet bowls are too low and for comfort you may still need to use a raised toilet seat or toilet surround.
- A metal handrail can also assist you to get off the toilet.

Remember to place toilet paper in easy reach before you sit, and use the rail or surround to help support you on and off the toilet.

Showering

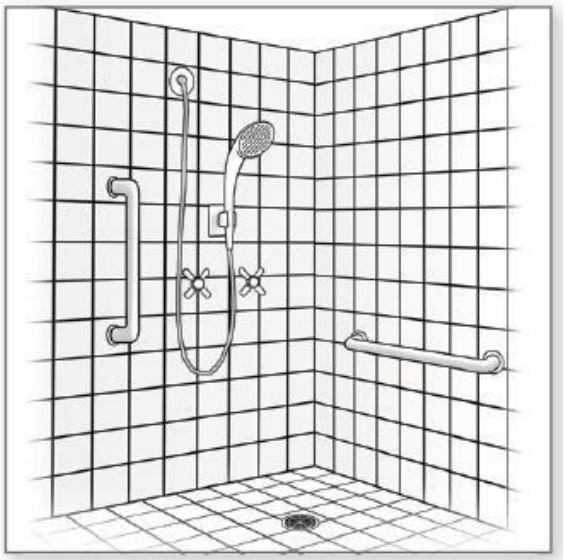
- You may find it safer to have a shower chair when showering. Please use a purpose built chair that will not slip on the tiles. Plastic garden chairs may slip on the tiles and cause you to have a fall.
- Place shampoo, soap and other equipment within easy reach.
- Use soap on a rope or place a bar into a stocking and tie it to the cold water tap. If it drops, you don't have to bend down to pick it up.

Using a bath

- It is best not to use a bath if possible. A bath chair with a handheld shower may be used as an alternative.



Shower seat



Place shampoo, soap and other equipment within easy reach.

Courtesy of: Care UK Afrox Healthcare

Dressing

- You may find it more comfortable to sit while dressing.
- Long handled equipment can assist you to dress i.e. easy grasper, sock or stocking aide and a long handled shoe horn.
- Dress and undress your operated side first.



Dressing 1



Dressing 2



Dressing 3

Courtesy of: Care UK Afrox Healthcare

Housework

- Avoid heavy housework tasks for at least 6 weeks.
- Put items frequently used within easy reach, to reduce bending and reaching.
- It is better to slide items along the bench top rather than carry them.
- Use long handled graspers to pick up items from the floor. *(Figure a)*
- A high stool may be useful when preparing food, washing up or ironing. *(Figure b)*



Figure (a)



Figure (b)

Courtesy of: Care UK Afrox Healthcare

Getting in and out of the car

DO NOT drive until you have clearance from your surgeon. If you drive without permission and have an accident, your insurance will not cover you.

- Use the front passenger seat.
- Have the seat pushed back as far as it can go, recline the seat back to give as much room as possible.
- Back up to the car seat and slide your operated leg forward. Reach back to support yourself with one hand on the back of the seat with the other on the dashboard. *(Figure a)*
- Slowly lower yourself onto the seat. *(Figure b)*
- Gently swing your legs into the car. *(Figure c)*



Figure (a) Figure (b) Figure (c)

Courtesy of: Care UK Afrox Healthcare

Sexual activity

- Let your partner take the active role.
- You may find some positions more comfortable than others.

Dental work

- If you need any dental work please inform your dentist that you have had a joint replacement.

Public transport

- Try not to stand on moving public transport.
- Use the aisle seat whenever possible.
- DO NOT run for buses or trains.
- DO NOT get on or off any moving vehicle.

Air travel

Your new joint may activate metal detectors at airport security and some venues. Tell security that you have had a knee replacement. Ask your surgeon about an implant ID card from the manufacturer, or take a small X-ray of your knee with you (this is useful as it has your name and a date on it).

Resuming lifestyle activities

Your health and wellbeing is a worthwhile investment. You can play an important role in the postoperative healing process.

Whether it is playing golf, bowling, swimming, cycling, walking, gardening, fishing or generally leading a full life, your Australian designed and manufactured implant system is designed to enhance your lifestyle and enable you to successfully resume your chosen activities.