

The Enhanced Recovery Programme in Hip and Knee Arthroplasty: A Review Article

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Abstract

Enhanced Recovery Programmes were first developed in Copenhagen by Professor Henrik Kehlet in the 1990s. In hip and knee arthroplasty, especially knee, there is a lot that can be achieved in terms of length of stay and pain relief improvement when compared to standard care.

Keywords: Hip and Knee Arthroplasty, Enhanced Recovery Programme.

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By focusing on the entire patient journey from GP referral to hospital inpatient stay in a critical manner, drawing on a large body of work nationally as well as internationally, the patient experience can be 'enhanced'.

Introduction

The concept of an enhanced recovery programme (ERP) was first introduced in colorectal surgery with focus on a multi-modal approach to reducing peri-operative morbidity and accelerating rehabilitation [2]. The use of these principles has helped to improve patient experience and safely reduce length of stay in hospital across a number of surgical specialities. Economic benefits have also been highlighted in studies of enhanced recovery in lower limb arthroplasty [3]. This may be achieved through re-organisation of existing hospital services around a more patient focussed approach. Interestingly, each enhanced recovery programme is not a specific entity, rather a method that can be applied across different specialities and institutions. Applying an enhanced recovery programme to lower limb arthroplasty starts from GP referral, through outpatient pre-operative management, and finally hospital admission and discharge. This article outlines an example of an enhanced recovery programme developed and applied to hip and knee arthroplasty in an NHS district general hospital.

- Pain Specialist Nurse
- Senior physiotherapist
- Senior Occupational Therapist

By having the relevant people at the initial (and subsequent) meeting(s), positive suggestions may be brought forward and progress made to develop an enhanced recovery programme. Identifiable attributes of the personnel attending the initial meetings are their experience and enthusiasm to help improve patient experience. Inevitably, changes will be required to aspects of the existing infrastructure, and having the appropriate members of the multi-disciplinary team to achieve this is vital. When developing an enhanced recovery program, the combination of a highly structured and standardised approach with multidisciplinary team involvement will certainly lead to improved patient care.

The ERP at Milton Keynes Hospital

A new ERP was introduced in 2010 to improve patient outcomes following hip and knee arthroplasty as well as ensuring a patient centred approach was delivered.

In order to improve patient outcomes and speed up recovery, each aspect of the patient pathway must be analysed and optimised [4]. This begins at the pre-operative phase in the outpatient department, progresses through intra-operative and post-operative care, and finally to discharge of patients home. In order to improve each step in turn, regular meetings involving the main participants of the multi-disciplinary team are vital. Through examining the process, duplications of work can be identified and removed, weaknesses strengthened and discussions had about the possibility of change in practice if required. The key members involved in the care of lower limb arthroplasty patients include:

- Orthopaedic surgeon
- Anaesthetist
- Matron for Surgical Services
- Pre-assessment senior nurse
- Ward senior Nurse
- Senior Pharmacist

Pre-operative

The ERP really starts at GP referral and the first outpatient appointment with the orthopaedic team. Once a decision has been made that all non-operative interventions have been exhausted, and the patient would benefit from a hip or knee replacement, they are listed for surgery. At the same visit, a mini pre-assessment (termed 'health screening') is undertaken including: a health questionnaire, Body Mass Index (BMI), Heart Rate (HR) and Blood Pressure (BP) measurements. By doing so at an early stage, high-risk patients who may need an anaesthetic review are identified early. This process also identifies common problems such as poorly controlled blood pressure, diabetes, or sleep apnoea that may require further optimisation before the patient is put on the list. This saves the problem of late identification and cancellation either on the day or at the time of the formal pre-assessment which is frequently in the 2–3 week run up to the date of surgery. Formal pre-assessment, closer to the date of surgery, includes standardised pre-operative tests.

Patient Education

Patient education and managing each individual's expectation is fundamental to the success of ERP. The provision of standardised information such as leaflets at pre-assessment and learning experiences at 'joint school' can help reduce patient anxiety and manage expectation [5], particularly with regards to length of stay in

hospital and the rehabilitation programme. Joint school is scheduled as a morning or afternoon session run separately for hip and knee patients (in our institution, one Tuesday afternoon is for hips, and the following Tuesday is for knees). It is led by physiotherapists, occupational therapists and also attended by a pain specialist nurse. Each therapist in turn demonstrates what the patient can expect during his or her inpatient stay. In the case of physiotherapy, patients are educated on the progression of mobilisation from frame to crutches, followed by a stairs assessment before discharge when independent. They also demonstrate pre-operative quadriceps strengthening exercises, which have been shown to speed up and ease recovery and have the impact of reducing length of stay [6]. Occupational therapists discuss seat raises, hip precautions, and any modifications required on individual basis. The pain control specialist nurse talks through the different painkillers used during the inpatient stay and on discharge home, as well as what to expect from a pain point of view during their post operative period.

Inpatient Admission

The majority of patients are admitted on the day of surgery to a designated admissions ward. Patients observe standardised fasting regimes with no food 6 hours prior to surgery but clear fluids allowed up to 2 hours prior to surgery. Pre-operative booklets including theatre check lists are completed on the day of surgery and patients visited by the operating surgeon and anaesthetists.

Patients are given premedication with a Fentanyl patch prior to surgery, so that the bioavailable dose increases to a treatment level in the postoperative period when it is needed most [7]. This replaces PCA (patient controlled analgesia) pumps which, in an internal audit, were found to be responsible for a significant incidence of nausea, vomiting and/or postural hypotension, which had the knock on effect of delaying rehabilitation and increasing length of stay. This also replaces oral opiates, an alternative to PCA, which rely upon already busy nurses to administer them on the ward in a timely and pre-emptive manner.

Anaesthetic Room

IV antibiotics are administered at induction as per trust protocol. Patients undergo either spinal anaesthesia, general anaesthesia, or a combination of the two. Other pre-medication includes dexamethasone, which has pain modulation, antiemetic, and mood enhancing properties. Cyclizine is used for its antiemetic properties, and Tranexamic acid is used to reduce intra operative blood loss, hence reducing the post operative morbidity associated with anaemia and reducing transfusion rates [8].

Intra-Operative

Surgical technique is not standardised but all other processes within the theatre are. A tourniquet is used for all knee replacements with care taken to reduce bleeding.

Optimisation of Theatre Environment

In order to enhance pain relief, peri-articular injection of local anaesthetic is performed with volume based on weight. Ropivacaine (0.2% 200ml bags) is the drug of choice due to a lower cardiac side effect profile than its cheaper alternative Bupivacaine. Large

volume dilute anaesthetics seemed to be the most important factor determining effectiveness [9]. For knee replacements, this is injected into the posterior capsule, the medial and lateral gutters, the medial and lateral femoral periosteal tissue, the quads and patellar tendons, the medial tibial released tissue, and the subcutaneous skin and fat.

For hip replacements, injection is performed into the anterior and posterior capsule, the vastus lateralis, the short external rotators, the gluteus maximus fibres involved in the trans fascia lata incision, and the subcutaneous skin and fat.

Pain Relief Regimen

A standardised analgesia regimen was formulated and is prescribed to all patients unless contraindicated (Table 1). This avoids the use of patient controlled analgesia (PCA), which is associated with the side effects of nausea, vomiting and postural hypotension as well as limiting mobilisation. In place of a PCA, a Fentanyl patch 12 mcg for 72 hours is applied prior to surgery. Intravenous Paracetamol is also preferred given its opiate sparing properties in the first 24 hours post-operative period.

Details of Regimen

Table 1 Post-operative analgesia regimen.

Drug	Dose
Paracetamol	1g IV for first 48hrs followed by PO
Ibuprofen	400mg if <70yrs old, 200mg if <70yrs
Fentanyl patch	12mcg, for 72 hours
Oxynorm (for breakthrough pain)	5mg PRN 4–6hrly
Cyclizine	50mg PRN three times daily
Dexamethasone (antiemetic, mood enhancing and pain modulation)	10mg PO on induction
Gabapentin (pain modulation)	600mg PO on induction
Ranitidine (antacid and antiemetic)	150mg PO on induction

Rehabilitation

Physiotherapy plays an important role in the enhanced recovery pathway [10]. Drains are removed 12 hours after surgery to allow easier and early mobilisation. A dedicated physiotherapy team, working 7 days a week (termed 5+2, at weekends, as a non on-call physiotherapist sees all joint replacement patients and mobilises them as they would a normal weekday), review post-operative joint arthroplasty patients on a daily basis. Physiotherapy treatment focuses on early mobilisation and range of motion. Muscle strengthening exercises are also performed. Knee arthroplasty patients also have continuous passive movement (CPM) machines the night after surgery.

Discharge

Patients are discharged home once their predefined goals have been achieved as outlined above. Arrangements for extra support are made prior to admission if they are required. Standardised discharge medication, including a medium strength painkiller, is prescribed to ensure the patient continues to mobilise and improve their range of motion. Physiotherapy is performed at the operating hospital or performed at home by physiotherapists from the hospital to ensure continuity of care within the Enhanced Recovery Team.

Thromboprophylaxis

All patients are prescribed Pradaxa for 14 days post total knee replacement and 28 days post total hip replacement as per the NICE guidelines.

Follow Up Proms (Patient Reported Outcome Measures) Clinics

All patients are initially followed up by the operating surgeon at the 6 week mark. Thereafter, in our institution, they are followed up at 3 months, 6 months, and 12 months by an extended scope research physiotherapist who performs Oxford Hip and Knee scores as well as a 10m timed walk and a Visual Analogue Score (VAS) for pain. These are compared with the scores measured on the day of surgery pre-operatively. This complies with the national directive to collect PROMS on all patients undergoing elective surgery.

What does the Future Hold?

A new local anaesthetic, Exparel, has been designed with a delayed release system of liposomes surrounding standard bupivacaine. It lasts between 48 and 72 hours when injected peri-articularly, and has obvious benefits in terms of reducing pain and analgesic requirement post operatively [11]. Currently it is only available in the USA as the single company that manufactures does not have the capacity to supply the worldwide market yet.

Further Improvements

In order to allow for continuous improvement of the ERP, regular audits are performed, in particular focusing on pain and efficacy of the prescribed regimen. Feedback meetings with senior members of the multi-disciplinary team are also vital to keep the program moving forward. The continued enthusiasm by a lead surgeon has been key to driving the programme forward and should not be underestimated.

Summary

Enhanced recovery programmes across a wide variety of specialities have all led to improvements in patient experience. In orthopaedics it is mainly applied to joint arthroplasty. Having a large group of senior members of the multidisciplinary team, and an enthusiasm to drive continued improvement has led to a successful implementation of the ERP at Milton Keynes.

Overall, when each step in the patient journey has been scrutinised, one finds savings in terms of length of stay, reduction in cancellations on the day (or during the waiting list time), and perhaps most importantly, that the patients have a more pain free and pleasant post operative period as well as recovery at home.

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