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ENHANCED RECOVERY AFTER ARTHROPLASTY: A TEAM EFFORT

This article will outline the collaborative approach undertaken between anaesthetic and orthopaedic specialists at Vermont Private Hospital in Victoria to facilitate the successful undertaking of a trial program of enhanced recovery after total joint arthroplasty. The rationale of this approach is that short-stay or outpatient arthroplasty is an emerging model of care that should not be a goal in itself, but rather be the result of specialised multidisciplinary coordination implementing a holistic program that can optimise patient recovery. For enhanced recovery to be achieved in this model, an investment in time and resources is required by healthcare providers to deliver and support a unique skillset and willingness to collaborate closely with relevant team members involved.

Total hip and knee arthroplasty are common orthopaedic procedures, which are continuing to increase in frequency in the setting of rising rates of obesity and osteoarthritis, and an aging Australian population which desires to maintain their functionality.[1,2] Arthroplasty procedures have typically been associated with an average hospital length of stay of 5.4 +/- 1 day duration after which 43% of patients proceed to ongoing inpatient rehabilitation.[3]

Several overseas countries have well-established fast track arthroplasty programs in which patients undergoing elective hip and knee replacements remain in hospital for 1-2 days, and in some instances less than 24 hours, with the bulk of the recovery process occurring in the outpatient setting.[4,5,6] Until recently this approach has not been commonly practiced in Australia due to factors that include lack of familiarity with the process by healthcare providers, particularly in regards to patient safety and outcomes, private health insurance reimbursement criteria, competing interests of specialists and a lack of coordinated processes between the hospital and specialists. To challenge these problems and overcome the barriers to implementation there needs to be a supportive healthcare provider environment, a well-coordinated and specialised multidisciplinary team in place and private health insurance involvement.

When patient care interventions operate in isolation it is unlikely to lead to beneficial healthcare value or improved outcomes for patients. Enhanced recovery protocols are bundled interventions of integrated multidisciplinary care that allows patients to benefit from a variety of evidence-based care targeted at a shared objective – global modulation of the surgical stress response and early mobilisation of the joint to facilitate improved range of movement and patient outcomes.[7] Meta-analyses indicate that patients have the potential to benefit significantly from enhanced recovery after arthroplasty programs.[8] In addition to the psychological benefit and satisfaction of recovering in the home rather than the hospital setting, patients have been shown to experience reduced mortality, reduced morbidity in the form of thromboembolic events, cardiopulmonary complications, delirium and sleep disturbance, and better analgesia with less pain and joint stiffness, all without increasing the risk of readmission or adverse events.[9-13]

The ERAS® Society suggests that there are many components of care that go into the implementation of 'enhanced recovery programs' and as a result the development of our rapid recovery after elective hip and knee arthroplasty trial pathway at Vermont Private Hospital is a multidisciplinary endeavour involving the orthopaedic surgeon, anaesthetist, orthopaedic nurse practitioner, physician, physiotherapists and nursing staff. The anaesthetist has a vital role to play in every stage, from pre-admission to well after discharge, to ensure that patients are able to progress smoothly through this 'novel' model of care and thus facilitate a significant opportunity for patient-centric gains. Whilst an in-depth discussion of every component is beyond the scope of this article, the generic framework is divided into the key three phases of the patient journey: pre-operatively, intra-operatively and post-operatively. The highlights of the trial pathway are as follows:

Pre-operatively:

- Patient selection: Patients are assessed for their appropriateness for this model of care based on the combination of results from an anaesthetic pre-assessment including a risk calculation, and an orthopaedic pre-operative survey constructed to predict discharge disposition after total joint arthroplasty known as RAPT.

- Medical optimisation: This comprehensive screening allows for early physician intervention to address modifiable risk factors and also allows post-operative planning for management of medical co-morbidities in an outpatient setting.
- Patient education: All patients are encouraged to attend a 'joint school' run by an orthopaedic nurse practitioner, where they are taught what to expect at each stage, given advice about the surgical and anaesthetic plan (type of anaesthesia, fasting/diet/aperients and the analgesia plan from PACU to post-discharge), and are provided with hands-on instruction about physiotherapy and post-operative mobilisation. The key aim is active participation of the patient in their own recovery and setting of appropriate expectations.
- Pre-operative fasting/carbohydrate loading: There is limited data in regards to metabolic state and recovery after joint arthroplasty, but given the evidence in other surgery our aim is for well-hydrated patients in a 'fed' state.[14]

Intra-operatively:
The orthopaedic surgeon needs to collaborate closely with the anaesthetist to facilitate a plan that will modulate the surgical stress response and allow early mobilisation. This cooperation is a critical component of enhanced recovery after surgery pathways.

- Anaesthetic technique: In our protocol we prefer a 'low dose' (5-7.5mg bupivacaine) neuraxial technique. Evidence indicates that this provides the optimal attenuation of the surgical stress response and acts as a bridge to early post-operative analgesia, significantly reducing the risk of moderate-to-severe postoperative pain, 15 whilst still allowing resolution of the motor block and ambulation within ≤300 minutes in 95% of patients. This rapid improvement facilitates physiotherapy intervention from PACU onwards, with improved mobility and rehabilitation.[16,17] There is also evidence that it may even reduce in-hospital complications and 30-day mortality.[18,19]
- Anaesthetic adjuncts: There are a number of controversial areas that require further research to clearly elucidate the best outcome for arthroplasty patients, and our pathway will evolve with the results from continued research. Based on currently available evidence we use the following adjuncts: maintaining normothermia,[20,21] prevention of hypertensive anaesthesia with the use of neuraxial anaesthesia, blood conservation strategies with the use of tranexamic acid and cell salvage,[22,23] TIVA and opioid minimisation for sedation/GA,[24] goal-directed fluid therapy with early return of oral intake,[25] weight adjusted cephazolin as anti-microbial prophylaxis to target adequate joint concentration,[26,27] pre-operative pregabalin to reduce opioid consumption and neuropathic pain,[28,29] and peri-operative systemic steroid.[30]
- Surgical interventions: Minimally invasive surgical techniques such as anterior approach hip replacement are usually required to facilitate early discharge. In knee replacement surgery, minimising tourniquet time and using a kinematic alignment protocol to reduce soft tissue trauma may assist in rapid recovery.

Post-operatively:

- Opioid-sparing multimodal analgesia: Paracetamol and NSAID's are the backbone of the analgesia regimen. With respect to advanced analgesic modalities, intrathecal opiates +/- PCEA, peripheral nerve block and peri-articular injection all appear reasonable options. The challenge is that there are few studies which directly compare these modalities, although a recent meta-analysis by Xing et al has demonstrated that there is a synergistic effect between LIA and ACB which resulted in a statistically significant improvement in analgesia and lowered opioid consumption when these two modes of anaesthesia were used in combination rather than individually.[31,32] As such, this is the approach we have implemented within our protocol. Continuous peripheral nerve block

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provides the same efficacy of analgesia as PCEA,[33] allowing reduced subsequent opioid consumption, but with decrease in nausea and vomiting, improvement in mobilisation, reduction in the ongoing surgical stress response and potentially a reduction in morbidity and mortality. With appropriate pre-operative education and follow-up patients can be discharged home with their CPNB in-situ, with no evidence of increased risk of falls,[34,35] thus allowing the same analgesia they would receive within the hospital setting.

- Team-effort and follow-up: From admission to discharge everyone involved in the patient's care needs to be educated on the components of the pathway. Once patients are settled into their own environment at home it is imperative that they have clear guidelines on how to access extra assistance if required, such that there recovery is enhanced rather than hindered.

In order to change the current approach to enhanced recovery after joint arthroplasty, development of process, practice and communication is required. This includes a multidisciplinary team, of which the anaesthetic practices outlined above are integral component. There must be a holistic and targeted approach that works in a coordinated fashion to support improved outcomes for the patient, and as a result facilitate an early discharge from hospital. Overall the implementation of such an approach aims to challenge the status quo model for elective hip and knee procedures with Australasia, but the early results from the implementation of this collaborative approach between orthopaedic surgeon, anaesthetist, nursing staff, allied health practitioners, hospital and health insurer highlights the potential to facilitate early discharge, with improved patient experience and outcomes, without compromising safety.

Mr Daevyd Rodda
Dr Dwane Jackson

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ABOUT THE AUTHORS

Mr Daevyd Rodda is an orthopaedic surgeon with extensive experience in hip and knee arthroplasty. He has a special interest in rapid recovery surgical techniques, and teaches these techniques to surgeons around Australia and internationally. Mr Rodda established the rapid recovery joint replacement program at Vermont Private Hospital and is a strong advocate of value-based health care in orthopaedic surgery.

Dr Dwane Jackson is a consultant anaesthetist with significant experience in arthroplasty surgery. He is actively involved in research, having published articles in peer-reviewed journals and has several research projects underway. With a special area of interest in holistic perioperative medicine utilising enhanced recovery after surgery techniques he has been a key driver in implementing the latest evidence-based techniques into various specialities at both tertiary public institutions and privately such as this current orthopaedic project.