2) Intraoperative recommendations and anaesthetic techniques:

Modern anaesthesia presents clinicians with different options regarding anaesthetic technique and combinations thereof. Regardless of the technique, there are principles that should guide intraoperative management.

These principles emphasise the rapid return of the patient to their preoperative physiological state with minimal procedural and anaesthesia related side-effects, optimal pain control and early mobilisation and discharge from hospital. All drugs and techniques used should ideally support the rapid reversal of anaesthesia, reduction in haemodynamic instability, fast tracking of recovery, reduction of postoperative nausea and vomiting and adequate pain management.

Elderly, frail patients with multiple co-morbidities are likely to derive the most benefit from a personalised anaesthetic regimen.
This can be achieved by using pharmacodynamic feedback provided by electroencephalographic monitoring to avoid unnecessary deep hypnosis and burst suppression, whilst undergoing general anaesthesia, which has been shown to reduce post-operative delirium.[50, 51]

General Recommendations:

Normothermia should be maintained with prewarming where feasible and active warming devices during surgery.[3, 4, 8, 14]

Blood and fluid management protocols should be in place to guide both intraoperative fluid replacement and transfusion where necessary. The use of cell salvage should be considered for high- or medium-risk surgery in adult patients where blood loss > 500 ml is likely. [52]

Please refer to ***The South African Society of Anaesthesiologists Perioperative Patient Blood Management Guidelines 2020***. [52]

Intraoperative Drug Recommendations:

Antibiotic prophylaxis

Appropriate antibiotic prophylaxis (1st or 2nd generation cephalosporin) should be given intravenously 30 – 60 minutes before surgery and adjusted according to weight. [15-18] Clindamycin or Vancomycin are recommended as alternatives when penicillin/cephalosporin allergy is suspected.[15-18]

Tranexamic acid

Tranexamic acid should be given to all patients, preferably intravenously and prior to the surgical incision. A single dose of 10-20mg/kg is advised.[19-22] The current evidence base suggests no greater risk of venous thromboembolism, arterial thrombotic events, myocardial infarction and cerebrovascular accident when TXA was compared to placebo even in susceptible patients.[19-22]

Analgesic drugs

Multimodal analgesia should be initiated if not started preoperatively. Multimodal analgesia[3] is a core component that synergistically targets multiple areas of the pain pathway and affords improved pain control with a reduction in opioid use and side effects. Paracetamol, non-steroidal anti-inflammatory drugs (NSAIDS) or cyclo-oxygenase-2-selective (COX2) inhibitors and glucocorticoids are typically used together when there are no contraindications. [3, 4] Administration can commence preoperatively and should be continued intra- and postoperatively.[3, 4] Oral analgesics are preferred to the intravenous (IV) route.[4] Paracetamol should be regularly prescribed perioperatively to reduce pain and 24-hour postoperative opioid consumption.[4, 23] The role of magnesium sulphate has not been clearly defined but may be used on an individualised basis.[4]
Gabapentinoids are not recommended.[4]

Dexamethasone

A single intraoperative dose of IV dexamethasone, 8-10mg for THR[3] and >10mg for TKR,[24] is an effective analgesic and anti-emetic[2] and has been shown to be associated with decreased pain scores and reduced rescue opioid consumption.[3, 4] Recent reviews and trials provide reassurance that the risk of postoperative infection is not increased, and that initial increases in blood glucose levels are clinically insignificant.[25-32]

Opioids

Opioids should be reserved for rescue analgesia and used in the immediate postoperative period.[3, 24] They may assist in bridging from NA to a non-opioid technique.[4] Oxycodone can be used as part of a multimodal strategy[4] and is equivalent to PCA morphine.[3]

Anaesthetic techniques for THA and TKR:

The PROSPECT group[3, 24] does not support a specific anaesthetic technique for intraoperative or postoperative analgesia.

The ICAROS Group[14, 33] recommend neuraxial anaesthesia (NA) over general anaesthesia (GA) for THA and TKA as NA was associated with a decrease in perioperative complications. In both THA and TKA, the following perioperative complications were reduced: pulmonary complications including pneumonia, acute renal failure, acute thromboembolic events, all-cause infections and blood transfusion requirements. All-cause mortality, neurological complications and postoperative falls were reduced in THA with NA.

However, there were no differences identified in cardiac, gastrointestinal or wound complications, critical care admissions, hospital re-admissions and the incidence of nerve injuries in THA when NA was compared to GA.[14, 33]

In TKA, NA was associated with reduced urinary tract infection, critical care admission and hospital readmission. [14, 33]

ERAS Society[4] recommendations highlight modern GA techniques together with NA and local infiltration analgesia for TKA. [4]

Epidural anaesthesia is not recommended for routine use in THA and TKA due to an unfavourable side-effect profile.[3, 4, 14, 24]

Anaesthetic techniques for THA

1) Neuraxial anaesthesia is recommended with a combination of local anaesthetic and short acting lipophilic opiates.[3, 4, 14]
2) Low dose intrathecal morphine (50 µg – 100µg) provides excellent prolonged analgesia. The decision to make use thereof should be made on a patient-by-patient basis and where the benefits are felt to outweigh any potential side effects or risk. These include urinary retention and pruritus.[34-37,51,52] A dose of 100 µg is a 'ceiling' dose for analgesia and a threshold dose for increased risk of postoperative nausea and vomiting.[34-37,51,52]
3) If NA is not possible for technical reasons, or contraindicated, GA together with regional anaesthesia is recommended.[3, 14, 33]
4) Ultrasound-guided regional anaesthesia should be utilised. Single-shot fascia iliaca block, lumbar plexus block, pericapsular nerve group block and femoral nerve blocks are all suitable for THA. The potential benefit of nerve blocks should be balanced against the side-effects, which include delayed mobilisation, motor block and increased risk of falls.[3, 4, 6]

5) NA should be combined preferentially with appropriate sedation where the clinical scenario allows. [3]

Anaesthetic techniques for TKA

1) NA is recommended with a combination of local anaesthetic and short acting lipophilic opiates [3, 4, 14]
2) Low dose intrathecal morphine (50 µg – 150 µg) provides excellent prolonged analgesia. The decision to make use thereof should be made on a patient-by-patient basis and where the benefits are felt to outweigh any potential side effects or risk. These include urinary retention and pruritus [34-37,51,52] Intrathecal morphine may be considered in situations where an adductor canal block and local infiltration techniques are not possible.[24] A dose of 100 µg is a 'ceiling' dose for analgesia and a threshold dose for increased risk of postoperative nausea and vomiting.[34-37,51,52]
3) If NA is not possible for technical reasons, or contraindicated, GA together with regional anaesthesia is recommended. [4, 14]
4) Ultrasound-guided regional anaesthesia is preferred. Distal femoral nerve blocks are advantageous due to decreased proximal muscle motor block and improved quadriceps muscle function in the immediate post-operative period.[24] Single-shot adductor canal blocks are recommended over femoral and sciatic nerve blocks.[8, 24] The potential benefit of nerve blocks should be balanced against the side-effects, which include delayed mobilisation, motor block and increased risk of falls. [4, 6, 8, 24]
5) Peri-articular and wound infiltration is recommended together with the primary anaesthetic technique.[39] Long-acting local anaesthetics can be combined with several additives.[24, 39, 44]
6) NA should be combined preferentially with appropriate sedation where the clinical scenario allows. [3]

Peri-articular and wound infiltration preparations aim to have their greatest effect at the sites of injection. The literature is unclear on the most suitable or effective combination of medications. Histological studies have shown the knee joint to contain a high concentration of nociceptors and confirmed the presence of peripheral opioid receptors as well.[39]

NSAIDS/Glucocorticoids/Magnesium are most likely to be beneficial via reduction in pro-inflammatory mediators, although there is evidence for a peripheral effect as well. The addition of adrenergic agonists is well described to enhance the duration and intensity of these cocktails through vasoconstriction and prolonged absorption.[39]

Bupivacaine/Ropivacaine/NSAIDS/Morphine/Adrenaline/Magnesium/Dexamethasone have all been used in this regard.[39]

The anaesthetic components chosen for any given arthroplasty program will be dependent upon and influenced by the drugs, equipment, monitoring and staff contingent available at one's facility.