All the different parts tie in with each other, and are all equally important

Key areas in order of importance:

**Patient buy-in and motivation**
- Starts in pre-admission
- Reinforced by multiple repetition
- Everyone ‘singing from the same hymn sheet’
- Generalized staff positive feedback and encouraging environment (ties in with demedicalization)

**De-medicalization**
- Minimum fasting
- No drains
- No catheters
- Minimised observations
- No post-op fluids
- Early eating/drinking
- Early return to normal activities, such as sitting in a chair
- Nurse/physio led discharge

**Early mobilisation**
- As soon as spinal wears off
- No nerve blocks

**Multimodal analgesia**
- Pharmacological (pre-, intra- and post-op)
- Joint injection
- Joint infusion
- Intrathecal opioids not used
PRE-ADMISSION CLINIC

Seen by pre-admission nurse
Seen by surgeon and anaesthetist
Consent done
Physio class. Demonstrate use of cryo-cuff (if used)
Positive reinforcement from all parties (‘MOT’, ‘60,000 mile service’, ‘need to get up and walking’)
Tell the patient to expect to be standing on day of surgery/morning after, and to expect to go home from day 2 onwards

Pre-op medications
- ACE inhibitors and Angiotensin II receptor blockers (ARBs), should be withheld on the day of surgery where used for hypertension. Where used for cardiac failure, a risk/benefit assessment should be made.
- Diuretics and hypoglycaemic medicines (including metformin) should be withheld on the day of surgery
- Clopidogrel may be withheld from 7 days pre-operatively – discuss with anaesthetist or cardiologist prior to doing so
- Warfarin should be stopped 5 days pre-operatively and an INR checked the day before surgery. The patient may need bridging anticoagulation and may need to be admitted before the day of surgery – discuss with anaesthetist if unsure
- Aspirin and all other cardiac medicines should be given as per Pre-Assessment guidelines
- ACE inhibitors and ARBs (where stopped) should be restarted on post-op day 2-3

Fasting
Morning patients fast from midnight for solids, but should have a drink (clear fluid) at 0600
Afternoon patients should have light breakfast before 0700 and a drink at 1100

ON ADMISSION

Most patients will be admitted on day of surgery
One set of obs done and checklisted/prepared for theatre
Side marked by surgeon
TED stocking on non-operative leg
No routine sedative pre-med (gabapentin has sedative and anxiolytic properties)

2 hr pre-op (or as early as possible), give:

- Gabapentin 600mg
- Dexamethasone 10mg
- Ranitidine 150mg
  - With 300ml water (may need to omit this for first patient on list if day-of-surgery admission)
TOTAL HIP REPLACEMENT: OPERATIVE PROTOCOL

**Operation**
Check-in and pre-op checklist must be complete by the time the anaesthetist is ready to start, with routine monitoring in place.

**In anaesthetic room**
Routine monitoring
Place patient on side (operative side up)
Large bore cannula in ‘upper’ arm. Do not connect to IV fluids
IV midazolam 2mg if required

Spinal: 2.0-2.5ml 0.5% isobaric bupivacaine. No opioids.
Spinal performed in lateral position, operative side uppermost

Leave on the side and position
No urinary catheter (unless clinical indication, such as bladder outlet obstruction)
Give: antibiotics as protocol (flucloxacillin 1g, gentamicin 3mg/kg up to max 320mg)

**Block check before sedation (>T10, unable to SLR)**

Transfer into theatre
Minimise time between spinal injection and start of operation: surgeons to scrub immediately once positioning is complete
Upper body Bair Hugger
Prep and drape

Sedation
TCI propofol CE 1.0-2.0. Aim for light sedation. This may need to be started in theatre owing to lack of space for TCI pump in the anaesthetic room.
Ketamine 0.5mg/kg bolus once target CE reached. Watch for transient apnoea

Fluids
Limit IV fluid to 500ml where possible, though further 250ml boluses may be given where necessary. Mild hypotension should be treated with a vasopressor such as metaraminol or phenylephrine. A fluid warmer is not necessary due to the small volume of fluid given

THR Joint injection
150-200ml 0.2% ropivacaine

80ml: Deep tissues: gluteus maximus, gluteus medius, rotators
50ml: Anterior capsule
50ml: All other tissues handled during surgery - fascia, subcutaneous tissues, skin

No drains
Sedation off when closing fascia/skin
Handover to recovery nurse, leaving recovery nurse to remove monitors and transfer to recovery
TOTAL KNEE REPLACEMENT: OPERATIVE PROTOCOL

Operation
Check-in and pre-op checklist must be complete by the time the anaesthetist is ready to start, with routine monitoring in place.

In anaesthetic room
Routine monitoring
Place patient on side (operative side up)
Large bore cannula in ‘upper’ arm. Do not connect to IV fluids
IV midazolam 2mg if required

Spinal: 2.0-2.5ml 0.5% isobaric bupivacaine. No opioids.
Spinal performed either in lateral position or sitting
Position by surgeons
No urinary catheter (unless clinical indication, such as bladder outlet obstruction)
Give: antibiotics as protocol (flucloxacillin 1g, gentamicin in 3mg/kg up to max 320mg)

Parecoxib 40mg IV
Ondansetron 8mg IV
Block check before sedation (>L1, unable to SLR)

Transfer into theatre
Minimise time between spinal injection and start of operation: surgeons to scrub immediately once positioning is complete
Bair hugger. Prep and drape. Elevate leg and inflate tourniquet just before knife-to-skin

Sedation
TCI propofol CE 1.0-2.0. Aim for light sedation not general anaesthesia. This may need to be started in theatre owing to lack of space for TCI pump in the anaesthetic room.
Ketamine 0.5mg/kg bolus once target CE reached. Watch for transient apnoea

Fluids
Limit IV fluid to 500ml where possible, though further 250ml boluses may be given where necessary. Mild hypotension should be treated with a vasopressor such as metaraminol or phenylephrine. A fluid warmer is not necessary due to the small volume of fluid given

TKR Joint injection* (after shaping but before prosthesis inserted)
*May not be required for unicompartmental knee replacements
200ml 0.2% ropivacaine
50ml: 5x10ml through posterior capsule
30ml: Percutaneous injection into suprapatellar fossa
intra-articular catheter: insert a 16G epidural catheter around posterior edge of tibial prosthesis and tunnel through skin. Attach the filter and inject 20ml ropivacaine down catheter
100ml: During closure – infiltration of all other tissues handled during surgery - fascia, subcutaneous tissues, skin
Fill a 10ml/hr 250ml elastomeric pump (such as Surefuser) with 200ml ropivacaine 0.2%
Connect to articular catheter at the end of the procedure and open the clip. Tape the flow restrictor to the patient’s skin (otherwise the pump won’t work)
Give **Tranexamic acid 2.5g** as a slow bolus, over 25 mins. This must be given just before deflation of the tourniquet, starting when the surgeons start wound closure

**No drains.** Sedation off when closing fascia/skin

Handover to recovery nurse, leaving recovery nurse to remove monitors and transfer to recovery
POST-OPERATIVE INSTRUCTIONS

Nursing

- Routine observations every 15 minutes for first hour, then hourly for the next 4 hours, then 4 hourly overnight, BD from then on. If any observation is abnormal, then do not step down until the patient is stable.
- O2 only if SpO2 persistently <92%.
- Encourage early eating and drinking.
- May stand, mobilize, transfer or use the commode once the spinal has worn off.

Regular/PRN analgesia

- Paracetamol 1g QDS
- Etoricoxib 90mg at 0800 (unless contraindicated).
  - Consider naproxen as an alternative if at high risk of heart disease.
- Oxycontin 10mg BD for 3 doses, then stepped down to PRN tramadol or dihydrocodeine.
- Oxynorm 5mg 1hrly PRN, increased to 10mg PRN if necessary.
- Gabapentin 600mg nocte for 5 days or until discharge.
- Senna 15-30mg nocte.

- Parenteral PRN antiemetics.
  - TKR only - Catheter infusion of ropivacaine 0.2% 10ml/hr for 20 hr.

If already on slow release strong opioid this is continued at the same dose in place of oxycontin. Add a reasonable dose of Oxynorm or Oramorph for breakthrough analgesia.

If already taking an antineuropathic agent (such as gabapentin or pregabalin) then continue at the same dose. Do not prescribe gabapentin as stated above.

Please prescribe a single bolus of gelofusine 250ml, and a single dose of ephedrine 15-30mg, both ‘to be given if required as per protocol’ (see section on hypotension).

Pain action plan

1. TKR - inject 20ml 0.2% ropivacaine down articular catheter.
2. Oxynorm PRN as charted.
3. Morphine IV titrated to effect. A PCA may be used if required.
4. For severe pain uncontrolled with morphine, consider nerve block (lumbar plexus/femoral as appropriate). Severe pain may represent a post-operative complication and the patient should be reviewed by a surgeon prior to sitting nerve block.

The pain team will follow the patients up for 2-3 days post-operatively.

DVT prophylaxis

- INTERIM PLAN: Enoxaparin 40mg at 2200, aspirin post discharge. TEDs to be worn in hospital and post-discharge.
- POTENTIAL FUTURE PLAN: Enoxaparin 40mg SC daily, started 6-12 hours post-surgery. This must be continued for 35 days (hips) or 14 days (knees). Could use rivaroxaban post-op/post discharge.
- TED stockings to be worn from admission until discharge, but not after.
- If history of renal failure (GFR<30ml/min), reduce enoxaparin dose to 20mg SC.

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Fluid

- **No routine post-op IV fluid** unless bleeding/clinical need
- Encourage the patient to drink plenty
- Treat hypotension in the immediate post-operative period initially with a single gelofusine 250ml bolus, then ephedrine 15-30mg PO if persisting. If hypotension persists despite these measures then call anaesthetist/surgeon. If systolic is less than 80mmHg, then give ephedrine 6-9mg IV
- Treat hypotension on standing/mobilising with a single gelofusine 250ml bolus. If hypotension persists then give ephedrine 15-30mg PO. If the patient remains hypotensive despite these measures then call anaesthetist/surgeon
- A stat dose of ephedrine 15-30mg and gelofusine 250ml should be written up by the anaesthetist to be given as per protocol

Please prescribe a single bolus of **gelofusine 250ml**, and a single dose of **ephedrine 15-30mg**, both ‘to be given if required as per protocol’

Urine output

Patients do not require routine urinary catheterisation, and should be able to pass urine once the spinal has worn off. This may be assisted with mobilisation/standing. Urinary catheterisation is not required for not having passed urine post-operatively, unless the patient is in urinary retention (discomfort and/or residual volume >500ml on bladder scan). If the patient is >12 hours post-op, antibiotic cover may be required

Blood tests and transfusion

- Check FBC and U+E at 0800 of morning following surgery
- No need to check bloods on day of surgery unless large blood loss/other clinical need
- If Hb <8g/dl then transfuse 1 unit of red cell concentrate over 1 hour. Recheck and record FBC or Hemocue Hb on completion of transfusion
- If Hb <6g/dl then transfuse 2 units of red cell concentrate over 1 hour each. Recheck and record FBC or Hemocue Hb on completion of transfusion
- If Hb <10g/dl and the patient is symptomatic of anaemia (fatigue, breathlessness, resting tachycardia), then transfusion can be considered. Please discuss with medical staff before doing so
- Record routine blood transfusion observations

Physio/OT

Can start as soon as spinal has worn off (as defined by complete regression of sensory level, normal motor power and normal proprioception)
Standing/transfers/mobilisation to toilet etc. as able