Guidelines for Bilateral Knee Surgery (Arthroplasty)

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ACKNOWLEDGMENT

The Health Policy and Standards Department (HPSD) developed this Standard in collaboration with Subject Matter Experts and would like to acknowledge and thank these health professionals for their dedication toward improving quality and safety of healthcare services in the Emirate of Dubai.

Health Regulation Sector

Dubai Health Authority

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INTRODUCTION

The Health Regulation Sector (HRS) plays a key role in regulating the health sector. HRS is mandated by the Dubai Health Authority (DHA) Law No. (6) of the year (2018) with its amendments pertaining to DHA, to undertake several functions including but not limited to:

- Developing regulation, policy, standards, guidelines to improve quality and patient safety and promote the growth and development of the health sector;
- Licensure and inspection of health facilities as well as healthcare professionals and ensuring compliance to best practice;
- Managing patient complaints and assuring patient and physician rights are upheld;
- Governing the use of narcotics, controlled and semi-controlled medications;
- Strengthening health tourism and assuring ongoing growth; and
- Assuring management of health informatics, e-health and promoting innovation.

The Guidelines for Bilateral Knee Surgeries aims to fulfil the following overarching Dubai Health Sector Strategy 2026:

- Pioneering Human-centred health system to promote trust, safety, quality and care for patients and their families.
- Make Dubai a lighthouse for healthcare governance, integration and regulation.
- Pioneering prevention efforts against non-communicable diseases.
- Strengthening the economic contribution of the health sector, including health tourism to support Dubai economy.

EXECUTIVE SUMMARY

The aims of knee replacement are relief of pain and improvement in function, and this operation can be very successful for the appropriate patients. A small number of patients who have elective knee replacement experience complications which can be devastating and for this reason patients should not be considered for joint replacement until their condition has become chronic and conservative methods have failed. The initial non-surgical management of knee pain due to osteoarthritis should be provided by a package of care which may include weight reduction, activity modification, patient specific exercise programme, adequate doses of non-steroidal anti-inflammatory drugs (NSAIDs) and analgesics, joint injection, walking aids (contralateral hand), other forms of physical therapies within a package of care.

The guidelines for Bilateral Knee Surgery (Arthroplasty) highlights recommendations based on current best practice and available literature. This guideline will focus on standardizing and improving patient care pathways for total knee replacement.

DEFINITIONS

Arthroplasty (Knee replacement surgery) is an established treatment for people with end-stage arthritis of the knee that have exhausted non-surgical treatment options. The surgery involves replacing a damaged, worn or diseased knee with an artificial joint.

Bilateral Knee Replacement (Bilateral Knee Surgery) Both of a person's knees will be replaced during the same surgery.

DEXA scan (Bone Density Scan) uses low dose X-rays to see how dense (or strong) your bones are. Bone density scans are often used to diagnose or assess your risk of osteoporosis, These scans are more effective than normal X-rays in identifying low bone density.

Preoperative Rehabilitation Preoperative preparation leading up to the operation that can include physical therapy, occupational therapy, nutritional counselling, acupuncture, transcutaneous electrical nerve stimulation, hydrotherapy or education interventions

Total knee replacement Surgery involves the replacement of both sides of the knee joint.

ABBREVIATIONS

BMI : Body Mass Index

DHA : Dubai Health Authority

LIA : Local Infiltration Analgesia

OA : Osteoarthritis

ON : Osteonecrosis

TJA : total joint arthroplasty

TKR : Total Knee Replacement

TXA : Tranexamic Acid

VTE : Venous Thrombosis Prophylaxis

1. BACKGROUND

The most common cause for the need of a knee replacement is arthritis: osteoarthritis, rheumatoid arthritis, or posttraumatic arthritis. Osteoarthritis is the most common form of arthritis. The pathology of osteoarthritis includes radiographic changes such as joint space narrowing, osteophytes and bony sclerosis. Osteoarthritis can be described as progressive loss of hyaline cartilage. Rheumatoid arthritis is the most common autoimmune inflammatory arthritis. Rheumatoid arthritis is a systemic inflammatory disease that can affect multiple joints. The pathogenesis of rheumatoid arthritis includes fibrosis, synovial cell proliferation, pannus formation and erosion of bone and cartilage. The inflammatory response manifests in the synovial membrane of joints causing hypertrophy and chronic joint inflammation. The overgrowth of the synovial cells and activation of endothelial cells then leads to erosions of the cartilage and bones. Posttraumatic arthritis is caused by a physical injury such as vehicle accident, fall, dislocation, or any source of blunt trauma. These injuries damage the articular cartilage and the bone, changing the mechanics of the joint and accelerating the progression toward osteoarthritis. The pathogenesis of posttraumatic arthritis occurs with the injury and progresses over time. Initially there is cell necrosis, collagen rupture and hemarthrosis. Months later, there is apoptosis, leukocyte infiltration, and extracellular matrix degradation. Over the years, the joint tissue will remodel and chronic inflammation will be present.

2. SCOPE

2.1. Bilateral Knee Surgery Procedures in DHA licensed health facilities.

3. PURPOSE

3.1. The purpose of this guideline is to collate the current available literature to provide best practice information aimed at the continuum of nursing care for the patient undergoing a bilateral knee replacement.

3.2. This guideline will focus on standardizing and improving patient care pathways for total knee replacement.

4. APPLICABILITY

4.1. DHA licensed healthcare professionals and health facilities.

5. GUIDLELINE ONE: PREOPERATIVE ASSESSMENT

5.1. It is recommended that healthcare professionals support shared decision making by discussing treatment options with people offered knee replacement or knee surgery, and their families or carers, as appropriate. Include in the discussions:

5.1.1. The alternatives to joint replacement.

5.1.2. The potential benefits and risks of the available procedures.

5.1.3. The types of implant for joint replacement.

5.1.4. The possible need for more surgery in the future.

5.1.5. The options for aesthesia and analgesia.

5.1.6. The potential benefits and risks of each option.

5.1.7. Mobility and Physical therapy.

5.1.8. Venous thromboembolism prevention.

5.2. Patients are recommended to undergo the following medical assessments prior to the surgery:

5.2.1. Blood tests including HbA1c (for diabetic patients) and coagulation profile.

5.2.2. Diagnostic Imaging such as:

a. X-rays

b. DEXA scan

5.2.3. Cardiovascular assessment for high-risk patients, especially those over 60.

5.2.4. Specialist consultations

a. Preoperative assessment for anesthesia fitness

b. Geriatric assessment for older patients with multiple comorbidities.

5.3. Healthcare professionals should use evidence-based approaches to enhance patient outcomes typically address preoperative optimization to include one or more of these areas:

5.3.1. Dental Issues

5.3.2. Sleep Apnea

5.3.3. Smoking

5.3.4. BMI

5.3.5. Anemia

5.3.6. Hypertension

5.3.7. Hyperglycemia

5.3.8. Nutrition/low albumin

5.3.9. Alcohol/Drug consumption

5.3.10. Catastrophizing (considered a serious risk on outcomes and should be potential grounds for cancellation or delay of surgery.)

5.4. The physician should ensure the Hb level of above 12 in females and above 13 in males,

5.4.1. Ensure 4 blood units as backup in case of transfusion need during and post-surgery.

5.5. The table in appendix 1 was constructed based on the literature for Enhanced Recovery After Surgery (ERAS) for total knee replacements. These options have been utilized successfully for improved outcome.

5.6. Overweight patients Should be classified according to their BMI into 3 groups :

5.6.1. BMI Up to 35 proceed with caution

5.6.2. BMI 35 - 40 relative contraindications

5.6.3. BMI over 40 is an absolute contraindication

5.7. Referral should be considered when other pre-existing medical conditions have been optimised, and there has been evidence of weight reduction to an appropriate weight.

5.8. Patients with an elevated BMI of 30 or more may experience more postsurgical complications including post-surgical wound infection so should be encouraged to lose weight further prior to seeking surgery.

5.9. Equally, patients who smoke should be encouraged to stop smoking at least 8 weeks before surgery to reduce the risk of anaesthetic or operative complications.

5.10. It is recommended to use risk stratification tools, such as:

5.10.1. Risk Assessment and Prediction Tool (RAPT)

5.10.2. Predicting Location after Replacement Nomogram (PLAN)

5.10.3. Morbidity and Mortality Acute Predictor for Arthroplasty (arthro-MAP)

5.10.4. Penn Arthroplasty Risk Score (PARS)

5.11. Patients should be given advice on preoperative rehabilitation which includes but not limited to the following:

5.11.1. Recommended exercises to do before and after surgery that will aid recovery

5.11.2. Changes in lifestyle, including weight management, diet and smoking

5.11.3. Maximising functional independence and quality of life before and after surgery.

5.12. Nutrition screening prior to surgery is simply assessing the patient for nutrition deficiencies in all ages.

5.12.1. Clinical malnutrition is associated with increased surgical complications, morbidity and mortality, prolongs rehabilitation, raises infection rates and delays wound healing especially in patients above the age of 55 years.

5.12.2. Some of these tools are:

a. Malnutrition Screening Tool (MST)

b. Short Nutritional Assessment Questionnaire (SNAQ)

c. Nutrition Risk Index (NRI), and

d. Malnutrition Universal Screening Tool (MUST)

6. GUIDLELINE TWO: PATIENT ELIGIBILITY

6.1. The decision to proceed with total joint arthroplasty (TJA) in patients with symptomatic, moderate-to-severe radiographic osteoarthritis (OA) or advanced symptomatic osteonecrosis (ON) with secondary arthritis, and for whom nonoperative therapies have been ineffective, should involve both the physician and the patient.

6.1.1. This decision should be made through a shared decision-making process, where the risks and benefits are carefully considered for the individual patient.

6.2. For patients with moderate-to-severe symptomatic osteoarthritis (OA) or advanced symptomatic osteonecrosis (ON) with secondary arthritis, who are candidates for total joint arthroplasty (TJA), and for whom nonoperative treatments have been ineffective, we recommend proceeding directly to surgery.

6.2.1. Furthermore, It is conditionally advised against further nonoperative treatment of the joint issue in these patients and suggest moving forward with surgical intervention without delay.

6.3. For patients who have obesity and moderate-to-severe symptomatic OA or advanced symptomatic ON with secondary arthritis who are indicated for TJA, we conditionally recommend against delaying surgery to meet a rigid weight or body mass index threshold.

6.4. Patients should be educated on the increased risk of medical and surgical complications due to their obesity as well as counselled on how to lose weight.

6.5. In patients with diabetes mellitus and moderate-to-severe symptomatic OA or advanced symptomatic ON with secondary arthritis who are indicated for TJA, we conditionally recommend delaying surgery to allow for improved glycaemic control.

6.6. In patients with nicotine dependence and moderate-to severe symptomatic OA or advanced symptomatic ON with secondary arthritis who are indicated for TJA, we conditionally recommend delaying TJA to achieve nicotine cessation or decreased use of nicotine products.

6.7. Patients aged 60+ are generally prioritized for knee replacement surgeries to ensure long-term benefits due to implant durability.

6.8. For younger patients (<60) they may qualify if their condition severely limits mobility, though non-surgical treatments are typically exhausted first.

6.9. Healthcare professionals place stricter criteria and medical fitness evaluations for Patients aged 80 and above to reduce the risk of complications.

6.10. Use of regional anaesthesia in combination with local infiltration analgesia (LIA) or general anaesthesia in combination with LIA.

6.11. Consider adding a nerve block that does not impair motor function to either of the options above, provided it does not delay surgery significantly.

6.12. While all recommendations in this guideline are conditional based at least in part on the quality of evidence, we have systematically reviewed all the evidence available to date, which can be used to make treatment decisions, and the consensus was high among the expert panel.

7. **GUIDLELINE THREE:** VENOUS THROMBOSIS PROPHYLAXIS PLAN

7.1. Risk factors associated with Venous Thrombosis Prophylaxis (VTE) include inactivity, dehydration, hospitalization, trauma, clotting disorders with previous clot, varicose veins with phlebitis, pregnancy, oral hormonal contraceptives, malignancy, obesity, smoking, and age.

7.2. Average risk patients should receive pharmacological anticoagulation therapy and mechanical VTE prophylaxis therapy after surgery.

7.3. Pharmacological VTE prophylaxis should begin within the medication-specific timeframe, typically within 24 hours of surgery, with timeframes varying based on the drug and recommendations.

7.3.1. Pharmacologic prophylaxis should be continued for at least 14 days, with newer recommendations suggesting it may be beneficial for up to 35 days.

7.4. Mechanical VTE prophylaxis such as compression stockings or sequential compression devices should be implemented upon admission, prior to surgery, and continued until full mobility is returned after discharge from the inpatient setting.

7.5. Early mobilization and routine mobilization are critical to achieve personal outcomes and prevent many complications including VTE.

7.6. Tranexamic Acid (TXA) is recommended for all Bilateral Knee Replacement (BTKR) patients to reduce blood loss and transfusion needs, with specific dosing, precautions for thromboembolic risk, renal monitoring, and contraindications including active thromboembolic disease, hypersensitivity, and severe renal impairment.

7.6.1. Refer to **appendix 2** for uses and dosage of tranexamic acid.

8. GUIDLELINE FOUR: POSTOPERATIVE CARE

8.1. A physiotherapist or occupational therapist should offer rehabilitation, on the day of surgery if possible and no more than 24 hours after surgery, to people who have had a primary elective knee replacement. Rehabilitation should include:

8.1.1. Advice on managing activities of daily living and

8.1.2. Home exercise programmes and

8.1.3. Mobilisation for people who have had knee replacement

8.2. For a short explanation of why the committee made this recommendation and how it might affect practice, see the rationale and impact section on inpatient rehabilitation.

8.3. Outpatient rehabilitation For the following:

8.3.1. People who have had primary elective knee replacement:

a. A member of the physiotherapy or occupational therapy team should give advice on self-directed rehabilitation.

b. The advice should be given before the person leaves hospital.

8.3.2. For people who have had primary elective shoulder replacement:

a. A member of the physiotherapy or occupational therapy team should give advice on:

i. Self-directed rehabilitation or

ii. Supervised group rehabilitation or

iii. Individual rehabilitation

iv. The advice should be given before the person leaves hospital

8.4. Ensure that people who are undertaking self-directed rehabilitation have:

8.4.1. A clear understanding of their rehabilitation goals and the importance of doing the exercises prescribed to achieve these goals

8.4.2. A point of contact for advice and support.

8.5. Offer supervised group or individual outpatient rehabilitation to people who:

8.5.1. Have difficulties managing activities of daily living or

8.5.2. Have ongoing functional impairment leading to specific rehabilitation needs or

8.5.3. Find that self-directed rehabilitation is not meeting their rehabilitation goals

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APPENDICIES

APPENDIX 1 – STRATEGIES THROUGH THE CARE CONTINUUM FOR ENHANCED RECOVERY AFTER SURGERY (ERAS) FOR TOTAL HIP AND TOTAL KNEE REPLACEMENTS

Optimal Timing	Intervention	Outcome
Preoperative Care	• Through assessment by qualified healthcare professional. • VTE prophylaxis risk assessment and planning. • Education • Anesthesia consultation • Case Management consultation • Nutrition Assessment • Minimal fasting time • Neuromuscular electrical stimulation • PreHab • HgbA1C • Multimodal analgesia pre and post op • Staph prophylaxis, nares	• Optimize general health and co-morbidities • Manage expectations and decrease anxieties about stay • Meet discharge requirements • Optimized pre-operative care • Improved would healing • Improved glycemic control
Intraoperative Care	• Warming systems • Tranexamic acid • Avoid drains • Minimally invasive surgery techniques • Optimized anesthetic techniques	
Postoperative Comfort Needs	• Pulsed electromagnetic fields • Local anesthetic around joints • Regular and effective analgesia • Prophylaxis for nausea	• Reduced pain and allow for earlier mobilization • Enhanced comfort
Postoperative Care		• Reduced VTE • Speed recovery • Optimize independence • Optimized postoperative care

APPENDIX 2 – THE USE OF TRANEXAMIC ACID

1. Indications for Use

- TXA is recommended for all patients undergoing BTKR unless contraindications exist.
- Indicated to reduce intraoperative and postoperative blood loss.

2. Contraindications

- Active thromboembolic disease (e.g., deep vein thrombosis, pulmonary embolism within the past 6 months).
- History of hypersensitivity to TXA.
- Severe renal impairment (risk of drug accumulation).
- Subarachnoid hemorrhage (risk of cerebral edema and infarction).

3. Dosage and Administration

a. Intravenous (IV) Administration

- **Standard Dose**:
  - 1 gram of TXA administered intravenously 10–15 minutes before the surgical incision.
  - A second dose of 1 gram can be administered 3 hours later.
- **Weight-Based Dose**:
  - 10–15 mg/kg administered before incision, followed by a repeat dose 3–4 hours later.

b. Topical Administration (if IV administration is not feasible or preferred in specific cases):

- Dilute 1–3 grams of TXA in 100 mL of normal saline and apply to the surgical site after wound closure but before the tourniquet is released. Allow the solution to remain for 3–5 minutes before suction.

c. Combined Administration

- Combining IV and topical administration can be considered in high-risk patients or those undergoing simultaneous bilateral procedures to maximize efficacy.

4. Timing of Administration

- Administer the first dose just prior to surgical incision.
- Administer subsequent doses intraoperatively or postoperatively as needed (typically within 3–4 hours).

5. Precautions

- Ensure adequate hydration to reduce the risk of thromboembolic complications.
- Monitor renal function in patients with pre-existing renal impairment.
- Use cautiously in patients with a history of thromboembolic disorders.

6. Monitoring

- Monitor for signs of thromboembolic events (e.g., swelling, pain in extremities, shortness of breath).
- Check renal function in patients with a history of kidney disease.
- Assess hemoglobin and hematocrit levels preoperatively and postoperatively.

7. Evidence-Based Benefits

- TXA has been shown to reduce blood loss by 30–50% in BTKR procedures.
- It significantly decreases the need for blood transfusions without increasing the risk of thromboembolic events when used appropriately.