SOUTH AFRICAN SOCIETY
OF ANAESTHESIOLOGISTS (SASA)

SASA Arthroplasty Guidelines 2024

South African Society of Anaesthesiologists
Guidelines for Total Hip and Total Knee Arthroplasty in South Africa 2024

Total hip arthroplasty (THA) together with total knee arthroplasty (TKA) are the most common major joint arthroplasties undertaken globally. [1, 2]

Studies looking at utilisation rates for these surgeries, show an increased number of THA and TKA procedures taking place annually, a trend that is expected to continue unabated.[1, 2]

The demands on healthcare services for these surgeries is driven by an ageing population, together with a growing younger group of patients requiring arthroplasty surgery, which will result in a greater number of revision surgeries as well.

Most developed nations can point to osteoarthritis as the primary indication for these surgeries.[2] South Africa is expected to face both osteoarthritis and avascular necrosis as driving forces in the rapidly expanding numbers of patients requiring lower limb arthroplasty.

Arthroplasty teams need to ensure reproducible and consistently safe patient care, while addressing the backlog of arthroplasty surgeries and massive demands placed on our healthcare services, both in the public and private domains.

Healthcare practitioners (HCPs) should consider the benefits of enhanced recovery after surgery (ERAS) protocols in all major surgeries.[43]

As the provision of arthroplasty services increases, involving a diverse range of healthcare facilities, the objective is to improve both short- and long-term patient outcomes, reduce hospital stay and optimise analgesic management, through efficient use of our available resources.

This will ensure this life changing surgery can be equitably offered to as many of our citizens as possible.

Why was this guideline developed?

These guidelines aim to provide evidence-based best practice in our unique environment of resource-rich and resource-limited facilities, to enable the provision of quality anaesthetic care.

Lower limb arthroplasty is associated with significant postoperative pain.[3] Good perioperative pain control allows for early mobilisation, reduced length of stay and improved patient satisfaction. This guideline will aim to implement achievable ERAS principles in the South African setting.

What other guidelines are available?

Several guidelines and systematic reviews have been published on this topic. They address ERAS,[4] anaesthetic techniques,[5] perioperative pain management focussing on single interventions,[3,6,7] perioperative pain management with multimodal components and specific opioid-sparing strategies.[3, 6]

SUMMARY OF RECOMMENDED COMPONENTS FOR TOTAL JOINT ARTHROPLASTY PATHWAYS:

Preoperative

- Patient education and discussion regarding postoperative outcomes and expectations
- Optimization of modifiable risk factors (detect and correct anaemia, smoking and alcohol cessation, nutritional support, cardiopulmonary prehabilitation where feasible)
- Avoid prolonged fasting and encourage clear fluids until 2 hours before surgery
- Pre-emptive analgesia
- Use of validated tools for screening for dementia/delirium

Intraoperative

- Antibiotic administration ≥ 30 minutes prior to incision
- Antifibrinolytic administration for both THR and TKR
- Short-acting anaesthetics agents for both sedation and general anaesthesia. Examples include Propofol (induction/TIVA/sedation) or volatile based general anaesthesia
- Multimodal analgesia
- Maintain euvolemia and normothermia
- Peripheral nerve blocks, intrathecal analgesia
- Local infiltration analgesia for TKR

Postoperative

- Continuation of multimodal analgesia
- Early mobilization
- Early intravenous/arterial line/catheter removal
- Early oral nutrition
- Delirium screening and continuation of a multi-component delirium prevention programme

1) Preoperative recommendations:

Prehabilitation:

This is the process of enhancing an individual's functional capacity to enable them to withstand a forthcoming stressor, e.g. major surgery.[8-11]

This important concept is beyond the scope and focus of these guidelines and there is agreement that this will be difficult to implement universally in our local context.

There are broad principles and specific interventions agreed upon that are supported by the highest level of evidence and by expert consensus. Where the evidence is lacking, these are very unlikely to cause harm.[8-11]

These include, but are not limited to:

1) Timeous preoperative assessment by multidisciplinary teams where possible and appropriate.[4]
2) Preoperative individualised patient education. This should take into account the varying physical, psychological and social needs of a diverse group of patients. [4]
3) Preoperative cessation of smoking. [4]
4) Reduction in alcohol consumption prior to surgery. [4]
5) Increase in preoperative activity level where feasible. [4]
6) Optimisation of medical conditions and measured parameters e.g., control of hypertension, reduction in measured HbA1c level in diabetic patients, correction of preoperative anaemia.[4]

Clinicians are encouraged to incorporate as many interventions as are possible, prior to arthroplasty surgery. [4]

The immediate preoperative period commonly causes anxiety for patients and counselling regarding the surgical and anaesthetic plan should include information for realistic expectations post-operatively. [4]

Recommendations on the day of surgery:

1) Avoid routine anxiolysis with benzodiazepines or premedication with gabapentinoids.[1, 12] The impact of preoperative anxiety should not be underestimated however, and if deemed in the best interests of the patient should be provided.
2) Reduce fasting times in keeping with the latest guidelines on preoperative starvation. [13]

3) Most patients presenting for major lower limb arthroplasty should have a preoperative full blood count and baseline urea and electrolytes. [48] The requirement for preoperative tests should be guided by patient comorbidities.[48]
4) Preoperative cognitive assessment e.g. Mini-cog assessment © in elderly patients, >65 years of age.[45, 46, 47, 49]
5) Pre-emptive administration of paracetamol and non-steroidal anti-inflammatories can commence prior to the surgery [3, 4, 6]

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.

3) Postoperative recommendations:

The postoperative period requires a collaborative approach with effective communication between surgeon, nurse, physiotherapist and anaesthetist. Most of the recommendations below are readily achievable even in low resource settings.

1) Patients should be encouraged to eat and drink as soon as they feel ready.[40]
2) All patients should be mobilised at least once in the first 24 hours post-surgery.[3, 4, 14, 40]
3) If a urinary catheter was inserted during surgery, it should be removed as soon as is practically possible.[4]
4) Multimodal analgesia including paracetamol and NSAIDS where appropriate should be continued to reduce opioid consumption. The oral route is preferable.[3, 4, 24]
5) Postoperative nausea and vomiting prophylaxis should be continued.
6) Opioids can be considered for rescue analgesia e.g. oxycodone or fentanyl. Patient-controlled analgesic pumps are not recommended. [3, 4]
7) Mechanical thromboprophylaxis should be instituted as soon as possible, with the addition of pharmacological prophylaxis at a later stage, as per current local guidelines for venous thromboembolism prevention. [41, 42]
8) Non-pharmacological interventions for preventing delirium should be instituted. Examples include repeated orientation for patients, cognitive aids, early return of hearing aids and spectacles, and encouraging family visits. [50]

The effectiveness and success of the arthroplasty team will be dependent on successfully incorporating as many components as possible from well described arthroplasty and ERAS pathways. ERAS has been shown to improve outcomes in almost all major surgeries. [4]

Data collection to allow for objective assessment and continual audit is paramount to implementing an arthroplasty programme. The following parameters have been consistently shown to benefit such programmes.

1) Clinical outcomes e.g. length of stay, readmissions, major complications, adverse events
2) Non-clinical outcomes e.g. patient satisfaction scores
3) Overall cost of care to allow for effectiveness of treatment to be measured

More specifically, long term functional assessments like the Oxford Hip and Knee Scoring systems are also needed. [53, 54]

The measures above will allow for arthroplasty surgery in different scenarios to be compared effectively, and allow for this multimodal intervention to be dynamic, guided and modified by new evidence as it emerges.

Anaesthesiology has a significant role to play when patients present for THA/TKA surgery. The major focus for anaesthetists should be on providing modern anaesthesia techniques with optimal pain management until discharge from hospital, whilst facilitating as many of the components of holistic care that fall within their domain.

To achieve quality of care, we will need to focus on both the individual and population at large, so that the provision of health services achieves the desired clinical outcomes, consistent with current best practice.

From a patient perspective, we need to make sure that quality care is accessible to as many of our citizens as possible, is effective once they have engaged with health care structures and meets both the expectations of the clinicians and those receiving the treatment.

This guideline will hopefully play a part in achieving this.

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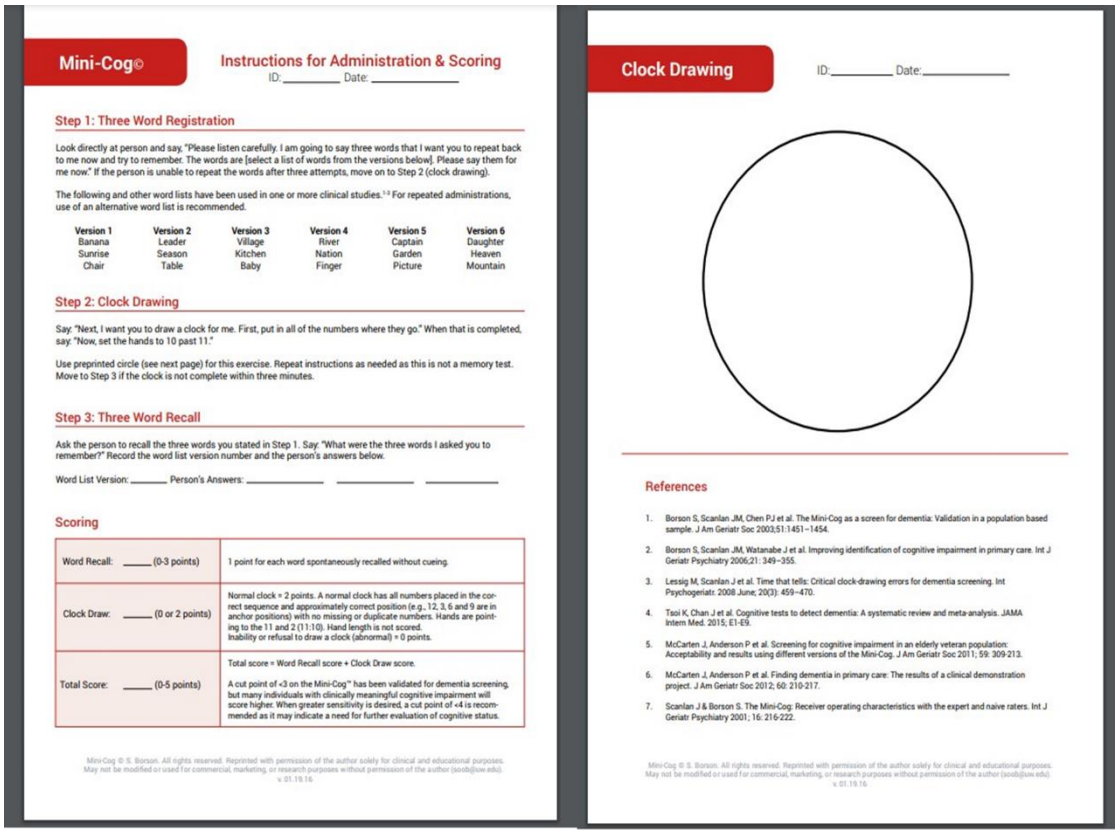
Appendix A:



Mini-Cog©

Instructions for Administration & Scoring

ID: _____ Date: _____

Step 1: Three Word Registration

Look directly at person and say, "Please listen carefully. I am going to say three words that I want you to repeat back to me now and try to remember. The words are [select a list of words from the versions below]. Please say them for me now." If the person is unable to repeat the words after three attempts, move on to Step 2 (clock drawing).

The following and other word lists have been used in one or more clinical studies.[1-3] For repeated administrations, use of an alternative word list is recommended.

Version 1	Version 2	Version 3	Version 4	Version 5	Version 6
Banana	Leader	Village	River	Captain	Daughter
Sunrise	Season	Kitchen	Nation	Garden	Heaven
Chair	Table	Baby	Finger	Picture	Mountain

Step 2: Clock Drawing

Say: "Next, I want you to draw a clock for me. First, put in all of the numbers where they go." When that is completed, say: "Now, set the hands to 10 past 11."

Use preprinted circle (see next page) for this exercise. Repeat instructions as needed as this is not a memory test. Move to Step 3 if the clock is not complete within three minutes.

Step 3: Three Word Recall

Ask the person to recall the three words you stated in Step 1. Say: "What were the three words I asked you to remember?" Record the word list version number and the person's answers below.

Word List Version: _____ Person's Answers: _____ _____ _____

Scoring

Word Recall: _____ (0-3 points)	1 point for each word spontaneously recalled without cueing.
Clock Draw: _____ (0 or 2 points)	Normal clock = 2 points. A normal clock has all numbers placed in the correct sequence and approximately correct position (e.g., 12, 3, 6 and 9 are in anchor positions) with no missing or duplicate numbers. Hands are pointing to the 11 and 2 (11:10). Hand length is not scored. Inability or refusal to draw a clock (abnormal) = 0 points.
Total Score: _____ (0-5 points)	Total score = Word Recall score + Clock Draw score. A cut point of <3 on the Mini-Cog™ has been validated for dementia screening, but many individuals with clinically meaningful cognitive impairment will score higher. When greater sensitivity is desired, a cut point of <4 is recommended as it may indicate a need for further evaluation of cognitive status.

Clock Drawing

ID:_____ Date:_____

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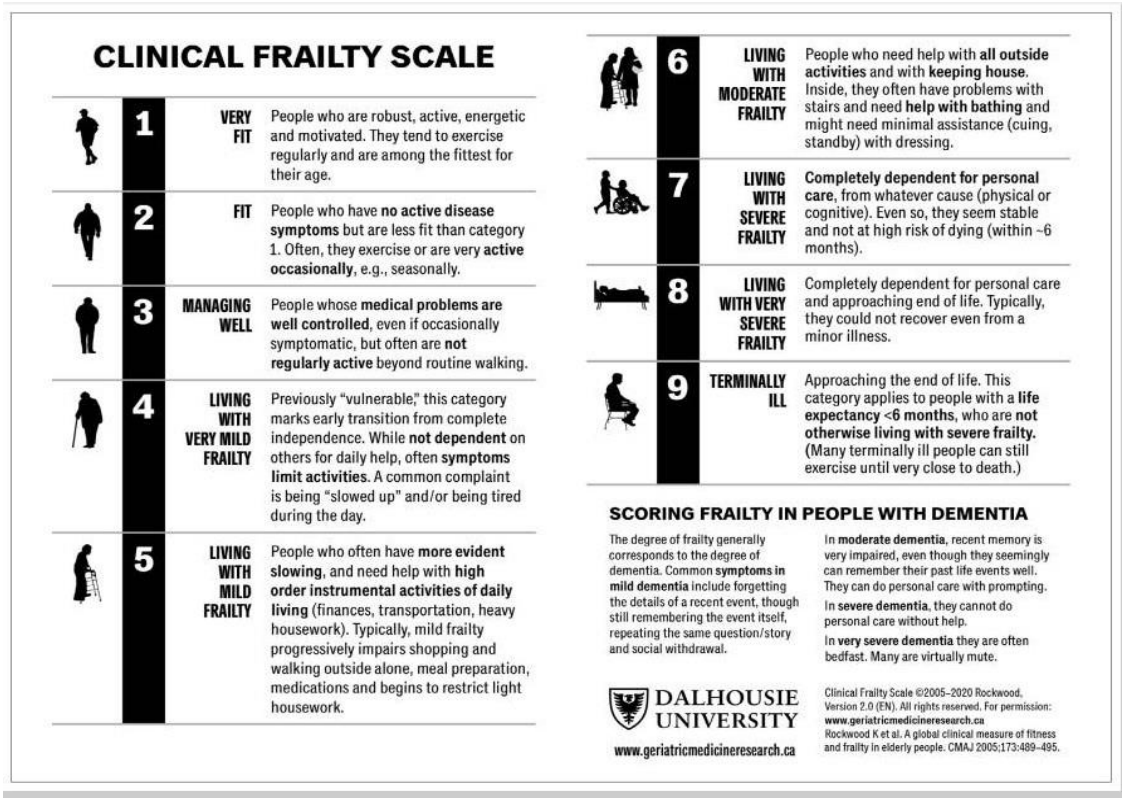

CLINICAL FRAILTY SCALE

1 VERY FIT — People who are robust, active, energetic and motivated. They tend to exercise regularly and are among the fittest for their age.

2 FIT — People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g., seasonally.

3 MANAGING WELL — People whose **medical problems are well controlled**, even if occasionally symptomatic, but often are **not regularly active** beyond routine walking.

4 LIVING WITH VERY MILD FRAILTY — Previously "vulnerable," this category marks early transition from complete independence. While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being "slowed up" and/or being tired during the day.

5 LIVING WITH MILD FRAILTY — People who often have **more evident slowing**, and need help with **high order instrumental activities of daily living** (finances, transportation, heavy housework). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation, medications and begins to restrict light housework.

6 LIVING WITH MODERATE FRAILTY — People who need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 LIVING WITH SEVERE FRAILTY — **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~6 months).

8 LIVING WITH VERY SEVERE FRAILTY — Completely dependent for personal care and approaching end of life. Typically, they could not recover even from a minor illness.

9 TERMINALLY ILL — Approaching the end of life. This category applies to people with a **life expectancy <6 months**, who are **not otherwise living with severe frailty.** (Many terminally ill people can still exercise until very close to death.)

SCORING FRAILTY IN PEOPLE WITH DEMENTIA

The degree of frailty generally corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

In **very severe dementia** they are often bedfast. Many are virtually mute.

DALHOUSIE UNIVERSITY
www.geriatricmedicineresearch.ca

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4AT

Assessment test for delirium & cognitive impairment

(label)

Patient name:

Date of birth:

Patient number:

Date: **Time:**

Tester:

	CIRCLE

[1] ALERTNESS

This includes patients who may be markedly drowsy (eg. difficult to rouse and/or obviously sleepy during assessment) or agitated/hyperactive. Observe the patient. If asleep, attempt to wake with speech or gentle touch on shoulder. Ask the patient to state their name and address to assist rating.

Normal (fully alert, but not agitated, throughout assessment)	**0**
Mild sleepiness for <10 seconds after waking, then normal	**0**
Clearly abnormal	**4**

[2] AMT4

Age, date of birth, place (name of the hospital or building), current year.

No mistakes	**0**
1 mistake	**1**
2 or more mistakes/untestable	**2**

[3] ATTENTION

Ask the patient: "Please tell me the months of the year in backwards order, starting at December." To assist initial understanding one prompt of "what is the month before December?" is permitted.

Months of the year backwards	Achieves 7 months or more correctly	**0**
	Starts but scores <7 months / refuses to start	**1**
	Untestable (cannot start because unwell, drowsy, inattentive)	**2**

[4] ACUTE CHANGE OR FLUCTUATING COURSE

Evidence of significant change or fluctuation in: alertness, cognition, other mental function (eg. paranoia, hallucinations) arising over the last 2 weeks and still evident in last 24hrs

No	**0**
Yes	**4**

4 or above: possible delirium +/- cognitive impairment
1-3: possible cognitive impairment
0: delirium or severe cognitive impairment unlikely (but delirium still possible if [4] information incomplete)

4AT SCORE ☐

GUIDANCE NOTES Version 1.2. Information and download: **www.the4AT.com**

The 4AT is a screening instrument designed for rapid initial assessment of delirium and cognitive impairment. A score of 4 or more *suggests* delirium but is not diagnostic: more detailed assessment of mental status may be required to reach a diagnosis. A score of 1-3 suggests cognitive impairment and more detailed cognitive testing and informant history-taking are required. A score of 0 does not definitively exclude delirium or cognitive impairment: more detailed testing may be required depending on the clinical context. Items 1-3 are rated *solely on observation of the patient at the time of assessment.* Item 4 requires information from one or more source(s), eg. your own knowledge of the patient, other staff who know the patient (eg. ward nurses), GP letter, case notes, carers. The tester should take account of communication difficulties (hearing impairment, dysphasia, lack of common language) when carrying out the test and interpreting the score.

Alertness: Altered level of alertness is very likely to be delirium in general hospital settings. If the patient shows significant altered alertness during the bedside assessment, score 4 for this item. **AMT4 (Abbreviated Mental Test - 4):** This score can be extracted from items in the AMT10 if the latter is done immediately before. **Acute Change or Fluctuating Course:** Fluctuation can occur without delirium in some cases of dementia, but marked fluctuation usually indicates delirium. To help elicit any hallucinations and/or paranoid thoughts ask the patient questions such as, "Are you concerned about anything going on here?"; "Do you feel frightened by anything or anyone?"; "Have you been seeing or hearing anything unusual?"