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Screening for perioperative neurocognitive disorders

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Learning objectives

By reading this article, you should be able to:

- Explain the complexity of perioperative neurocognitive disorders (PNDs).
- Discuss the concepts of frailty and cognitive frailty.
- Describe different screening tools for frailty and perioperative neurocognitive disorders.
- Establish a screening and referral pathway for vulnerable patients.

Key points

- PNDs include a spectrum from delirium to persistent cognitive disorders, with substantial effects on function, quality of life and long-term independence.
- There is no current consensus on screening tools for PNDs, but using multiple strategies and combining tools may improve accuracy.
- Frailty is a strong predictor of PND, especially when accompanied by cognitive impairment, so-called cognitive frailty. Screening for both domains is critical.
- Patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) can be part of screening and referral pathways.
- Positive results on screening must prompt referral to geriatrics, cognitive rehabilitation planning and education of carers.

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Perioperative neurocognitive disorders (PNDs) are common yet underdiagnosed complications after anaesthesia and surgery. Postoperative cognitive decline was first described in 1887 by the prominent British psychiatrist Sir George Savage as a form of perioperative 'insanity'. Consequently, he advised against performing operations 'that are not essential for prolonging or saving lives'.[1] Since then, research has been done redefining these 'cases of insanity'.

More recently (2018), experts have decided to use the overarching term 'perioperative neurocognitive disorders' (PNDs), covering cognitive changes from the period of emergence to 12 months after surgery and beyond (Table 1).[2]

These PNDs include a continuum of diagnoses based on timing and severity. Postoperative delirium (POD) is diagnosed by several criteria including acute, fluctuating disturbance in attention and awareness that typically arises in the first few

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Table 1 Classification, comparison and diagnostic criteria of PNDs.

Characteristic	Postoperative delirium (POD)	Delayed neurocognitive recovery (dNCR)	Neurocognitive disorder (NCD)
Timeline	Within the first hours and days after surgery	Up to 30 days after surgery	>30 days after surgery, up to 12 months
Cognitive change	Acute, fluctuating disturbance in attention or awareness	Cognitive decline from baseline	Persistent cognitive impairment
Cognitive domains affected	Attention, orientation, comprehension, visuospatial, memory and executive function	Memory, attention, executive function	Classified as mild or major depending on severity and impact
Severity level	Transient to severe; fluctuates. Subtypes: hyperactive, hypoactive, mixed	Typically mild to moderate, often transient	Mild (limited impact) to major (significant impairment)
Autonomy level	Temporary loss; may need supervision or assistance	Minor, often reversible functional limitations	Mild to major loss of autonomy, depending on severity

days after surgery. In addition, POD is characterised by changes in cognition that affect memory, language and orientation in time and space. It is further subclassified by psychomotor activity into hyperactive, hypoactive or mixed. Delayed neurocognitive recovery (dNCR) describes transient cognitive impairments observed up to 30 days after surgery, whereas deficits persisting beyond 30 days are defined as neurocognitive disorders (NCDs), classified as mild or major depending on severity and functional impact. Perioperative NCD can affect a patient's life up to 5 yrs after the event and has enormous economic (including withdrawal from the workforce) and psychological implications (isolation, trauma).[3,4]

Pathophysiological contributors

Perioperative NCD may result from non-resolution of a neuroinflammatory cascade. Briefly, high molecular group box 1 protein (HMGB1), a damage-associated molecular pattern, is released from the cytosolic compartment of traumatised tissue and engages the innate immune system by binding to pattern recognition receptors on circulating immunocytes to induce translocation of the transcription factor nuclear factor-kappa B (NF-κB) into the nucleus where it enhances the transcription and translation of proinflammatory cytokines (such as interleukin [IL]-6, tumour necrosis factor α [TNF-α], IL-1β). These cytokines are capable of disrupting the blood–brain barrier facilitating the migration of circulating bone marrow-derived monocytes (BM-DMs) into the brain, attracted by an upregulation of the chemokine monocyte chemoattractant protein-1 (MCP-1) from microglia. Within the CNS, the BM-DMs interact with microglia to release proinflammatory cytokines, such as IL-1β and IL-6, within the parenchyma; both cytokines can disrupt synaptic plasticity, thereby preventing long-term potentiation, the neurobiological correlate of learning and memory. A combination of humoral factors (derived from fatty acids) and neural mechanisms, principally vagal activation, resolve the peripheral and neuroinflammation and restore cognitive function to the premorbid state.[5] Some patients, including older patients, those with preexisting cognitive impairment and those with lower education levels, seem to be incapable of resolving this neuroinflammatory cascade, leading to PND.[6]

Frailty

Frailty is a multidimensional clinical syndrome characterised by reduced physiological reserves and diminished resistance to stressors, resulting from cumulative declines across multiple organ systems. Although more common in older adults, frailty is not synonymous with ageing and may occur in younger individuals with chronic illness or functional impairments. It reflects a complex interplay of biomedical, psychological and social factors, and in the perioperative context, it has emerged as a strong predictor of adverse outcomes, including PND, functional decline, prolonged hospital stay and mortality.[7]

Systematic assessment for frailty is therefore essential for preoperative risk stratification, shared decision-making and the development of tailored perioperative care plans.[6,8,9] Several validated tools exist (Table 2).

Frailty assessment

Clinical Frailty Scale

The Clinical Frailty Scale (CFS) is a widely adopted, clinically assessed tool that ranks patients on a 9-point scale, from 1 (very fit) to 9 (terminally ill), based on activity levels, comorbidities, mobility and functional dependency.[10] It offers a quick and practical assessment of frailty and is suitable for use in the perioperative period or during hospital admission. Although scores of 5 or higher have traditionally indicated clinical frailty, recent evidence suggests that patients scoring 4, now labelled as 'living with very mild frailty', may also be at increased risk of adverse perioperative outcomes, including PND.[11,12] The CFS demonstrates good interrater reliability and very short screening time of less than 2 min, making it highly feasible for use in both elective and emergency settings, across clinical and research environments.[13]

Frailty Index

The Frailty Index (FI) is a quantitative approach grounded in the deficit accumulation model, which conceptualises frailty

Table 2 Comparison of commonly used frailty screening tools.

Tool	Type	Time	Assesses	Scoring/cut-off	Common application	Strengths	Limitations
Clinical Frailty Scale (CFS)	Clinician-rated global scale	<1 min	Functional status, comorbidities, mobility, activity level	1–9; ≥4 = frail	Preop clinic, ED, wards	Quick, intuitive, validated in perioperative settings and ICU	Subjective; requires clinical judgement
Fried's Frailty Phenotype (FFP)	Physical phenotype	5–10 min	Weight loss, exhaustion, grip strength, walking speed, activity level	0–5; 1–2 = prefrail; ≥3 = frail	Geriatric units, prehabilitation	Evidence based; assesses physical frailty directly	Needs equipment (grip test); time-consuming; not ideal for all perioperative settings
Edmonton Frailty Scale (EFS)	Multidimensional (11 items)	~5 min	Function, cognition, mobility, nutrition, social support, mood, medications	0–17; ≥6 = frail	Preoperative clinics	Structured, validated, includes cognition and functional mobility	Needs patient cooperation; less suited for emergency use or busy systems
Frailty Index (FI)	Deficit accumulation model	Data driven	Multiple deficits (comorbidities, function, cognition, mood, social)	Ratio 0–1; >0.25 often indicates frailty	Research, automated chart review	High predictive accuracy; scalable; adaptable for e-health systems	Data intensive; less feasible for bedside screening
Five-item mFI	Abbreviated FI (claims-based)	<1 min	Comorbidities only	0–5; ≥2 = frailty	Surgical risk models, large datasets	Simple; predictive; easy to automate	Lacks functional/cognitive domains; lower granularity
Electronic Frailty Index (eFI)	Digital population-level tool	Automated	Derived from coded variables in electronic health records	0–1 continuous; categorised into fit to severe	Retrospective screening, QI projects	No extra staff time; ideal for large-scale implementation	Relies on coding quality; not validated for all populations

as the proportion of health deficits present in an individual out of a predefined list, typically 30–70 variables spanning medical comorbidities, functional impairments, cognitive status, mood and social vulnerabilities. Each deficit is scored as present or absent, and the final index reflects the ratio of deficits to total variables assessed (e.g. 0.25 = 25% of possible deficits). Higher FI scores correlate with increased risk of postoperative complications.[12] Although the FI has high predictive accuracy and granularity, its data requirements may limit routine clinical use. Nonetheless, it remains a valuable research tool and can be integrated into electronic health records for automated risk stratification in large populations or in systems with robust preoperative data collection.[14,15] The shortest form of the FI, the 5-item modified FI (5-mFI), offers an alternative suitable for perioperative use. Despite its simplicity, the 5-mFI has demonstrated predictive value for adverse surgical outcomes.[16]

Fried's Frailty Phenotype

The Fried's Frailty Phenotype (FFP) defines frailty as a distinct clinical syndrome based on the presence of three or more of the following five criteria: unintentional weight loss, self-reported exhaustion, weakness (measured by grip strength), slow walking speed and low physical activity.[17] Patients meeting one or two criteria are classified as 'prefrail', whereas those meeting three or more are considered frail. This phenotype captures the physical dimension of frailty and has been associated with increased risks of falls, disability, hospitalisation and death. Although the Fried criteria offer a standardised and evidence-based framework for frailty assessment, their implementation requires direct patient testing and is therefore more time- and resource-demanding. Nonetheless, the frailty phenotype remains a foundational model in frailty research and is particularly useful when physical performance metrics are available, such as in prehabilitation programmes or geriatric assessment units.[12]

Edmonton Frailty Scale

The Edmonton Frailty Scale (EFS) is a multidimensional frailty screening tool consisting of 11 items that assess multiple domains, including functional independence, cognition (clock drawing test), mobility (timed up and go test), nutrition, mood,

social support, polypharmacy and continence. The EFS yields a score ranging from 0 to 17, with scores of 6 or higher commonly used to indicate frailty. It can usually be completed within approximately 5 min and has been validated in preoperative and geriatric clinic settings. The EFS offers a structured and comprehensive assessment that incorporates both cognitive and functional components, making it well suited for preoperative risk stratification in elective surgical populations. However, it requires active participation of the patient and direct questioning, which may limit feasibility in emergency situations or high-throughput perioperative workflows.[13,18]

Perioperative cognitive screening

Systematic perioperative cognitive screening remains difficult to implement routinely. The challenge lies not in the absence of effective screening tools, but in integrating these into preoperative workflows.[19] Correct screening requires documenting baseline cognitive status, ideally before surgery, to distinguish between chronic cognitive impairment, acute change (POD) and new postoperative changes. Multiple tools are available, each with unique strengths depending on the clinical context, available time and provider training. Table 3 highlights commonly-used screening tools.

Established screening tools for cognition

Montreal Cognitive Assessment

The Montreal Cognitive Assessment (MoCA) is a 30-point screening tool that assesses several cognitive domains: memory, executive function, visuospatial ability, attention, language and orientation.[20] Its strengths are that it is sensitive for mild cognitive impairment (MCI) and is widely validated. The MoCA has some limitations including that is requires licensing, takes longer to administer (~10–15 min), is less feasible in time-limited settings and requires training and personnel. Scores range from 0 to 30, and a cut-off of <26 indicates cognitive impairment (which depends on the patient's level of education: 1 point is added for <12 yrs of education).[21]

Mini-Cog

The Mini-Cog is a brief screening tool that combines a three-word recall task with a clock drawing test to assess short-term memory and executive function. It is scored from 0 to 5, with a score of 2 or lower indicating that cognitive impairment is likely.[22] The administration time is approximately 3 min. Strengths of the Mini-Cog are that it is extremely brief, has minimal language or cultural bias, does not require licensing and is well suited for preoperative clinics.[8] Limitations are that it is less sensitive than the MoCA, does not assess multiple domains in depth and requires visual or motor ability for clock drawing.

Delirium-specific tools

Confusion Assessment Method

The Confusion Assessment Method (CAM) is a widely used algorithmic tool based on the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*) criteria to diagnose delirium. It evaluates four features: (1) acute onset or fluctuation; (2) inattention; (3) disorganised thinking; and (4) altered consciousness.[23] A positive CAM equates to features 1 (acute onset/fluctuation) + 2 (inattention) plus either 3 (disorganised thinking) or 4 (altered consciousness). Administration time for trained personnel is 3–5 min (3D-CAM). Strengths are its high specificity and that it is widely validated in older adults. Limitations are that it requires training and may miss hypoactive delirium.

The 4As Test

The 4As Test (4AT) is a rapid (<2 min) screening tool for delirium and cognitive impairment. It assesses four domains: alertness, orientation (AMT1-4), attention and acute change or fluctuation.[24] Scores range from 0 to 12. Zero points indicates no cognitive impairment or delirium; 1–3 points indicates possible cognitive impairment; and scores ≥4 indicate possible delirium with or without cognitive impairment. Strengths are that it is quick and requires no training to administer, and is validated in emergency medical and perioperative settings.[25] Limitations are that it is less detailed than the CAM and it may require follow-up assessments and confirmatory assessments in borderline cases.

Chart-Based Delirium Identification Instrument

The Chart-Based Delirium Identification Instrument (CHART-DEL) is a retrospective chart review tool designed to identify delirium episodes documented in clinical notes, commonly used in research or quality improvement efforts when direct assessment is not feasible.[26] Limitations are that it relies on the quality of documentation and it cannot be used prospectively or in real-time clinical care.

Integrating cognition and frailty: 'cognitive frailty'

Cognitive frailty refers to the simultaneous occurrence of physical frailty and cognitive impairment.[27] This emerging construct recognises that both conditions often share overlapping pathophysiological pathways such as inflammation, vascular dysfunction and sarcopenia, and that their combined presence identifies a particularly high-risk phenotype. Patients with cognitive frailty are at markedly increased risk of POD, prolonged recovery, functional decline and long-term institutionalisation.[28] Routine integration of both frailty and cognitive screening, using tools such as the CFS alongside brief cognitive tests such as the Mini-Cog or 4AT, enables early identification of cognitive frailty in the preoperative setting.

Recognising this dual vulnerability supports more personalised perioperative planning, facilitates shared decision-making with patients and families and may prompt the implementation of targeted interventions.[29] Although no specific single intervention has been proved to reverse cognitive frailty or consistently improve postoperative outcomes, multidisciplinary strategies, including nutritional support, physical or cognitive prehabilitation, review of medications and management of geriatric syndromes, may improve outcomes and support safer surgical care for older adults.[9,30]

Intraoperative considerations

Emerging evidence suggests that anaesthetic technique plays a contributory role in the development of PND, particularly among patients with preexisting vulnerabilities.[31] Recent guidelines, including the 2024 ESAIC recommendations, emphasise the importance of individualising anaesthetic

Table 3 Comparison of commonly used cognitive screening tools.

Tool	Cognitive focus	Time	Assesses	Scoring	Common application	Strengths	Limitations
Montreal Cognitive Assessment (MoCA)	Multiple cognitive domains	10–15 min	Memory, executive function, attention	0–30 (higher = better); <26 = impairment	Formal cognitive screening	Sensitive for MCI	Requires training; longer to administer
Mini-Mental State Examination (MMSE)	Multiple cognitive domains	7–10 min	Orientation, memory, language	0–30 (higher = better); <24 = impairment	Formal cognitive screening	Widely used; familiar to clinicians	Misses early MCI; copyright restrictions
Mini-Cog	Baseline cognitive screening	2–3 min	Short-term memory and executive function	0–5 (higher = better); <3 = impairment	Preoperative cognitive screening	Quick and practical; suited for preoperative clinics	Does not assess multiple domains in depth
Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE)	Informant based	5–7 min	Long-term decline	1.0–5.0 (higher = worse); >3.3 = impairment	Indirect assessment	Useful when the patient cannot be tested	Needs reliable informant
Confusion Assessment Method (CAM)	Delirium	3–5 min	Acute mental status change	1 + 2 + (3 or 4) = delirium	Formal delirium diagnosis	Validated; high specificity	Requires training
CAM for the Intensive Care Unit (CAM-ICU)	Delirium	3–5 min	Non-verbal delirium	1 + 2 + (3 or 4) = delirium	Intubated or ICU patients	ICU-compatible	May miss hypoactive cases
4A's test (4AT)	Delirium or cognitive screening	2–3 min	Alertness, orientation, attention	0–12 (higher = worse); ≥4 = delirium	Baseline, PACU, ward	No training; rapid	May need follow-up
Intensive Care Delirium Screening Checklist (ICDSC)	Delirium (ICU focused)	2–5 min	Attention, orientation, psychomotor, sleep–wake cycle	0–8 (higher = worse); ≥4 = delirium	ICU and high-dependency units	Suitable for repeated assessments	Requires staff training; dependent on structured observation over nursing shifts
Nursing Delirium Screening Scale (Nu-DESC)	Delirium	2–3 min	Behaviour, orientation, psychomotor	0–10 (higher = worse); ≥2 = delirium	Nursing shift assessments	Easy integration into routine care	Variable sensitivity
Chart-based Delirium Identification Instrument (Chart-DEL)	Delirium	5–15 min per record review	Trigger words or phrases	Binary outcome with probability rates	Research or quality improvement efforts	Augments delirium detection	Relies on quality of documentation
Eight-item Informant Interview to Differentiate Aging and Dementia (AD8)	Informant based	2–3 min	Functional changes	0–8 (higher = worse); ≥2 = impairment	Family-based screening	Very brief; minimal training	Needs informant
General Practitioner Assessment of Cognition (GPCOG)	Mixed (patient + informant)	5–7 min	Memory, language, orientation	0–9 +informant (higher = better)	Primary care, preoperative clinic	Balanced design; practical	Less sensitive than MoCA in MCI

management in high-risk patients.[6] This includes the considered use of depth-of-anaesthesia monitoring to avoid both excessively deep and excessively light anaesthesia, judicious selection of anaesthetic agents and—where clinically appropriate—the use of regional anaesthetic techniques that may reduce exposure to general anaesthetic agents. Although no single approach has been shown to eliminate PND risk, tailoring the anaesthetic technique to the patient's comorbidities, frailty and cognitive baseline is increasingly regarded as best practice.

Intraoperative management represents a critical, yet historically underrepresented, component of PND prevention, as depth of anaesthesia, haemodynamic stability, analgesic strategy and sedative choice constitute modifiable risk factors that interact with pre-existing brain vulnerability.[32] Maintenance of physiological homeostasis—particularly avoiding prolonged hypotension, hypoxia and significant fluctuations in CO_2 tensions—is central to protecting cerebral function during surgery.[33] Multimodal analgesic strategies that reduce postoperative pain and opioid requirements may further contribute to lowering delirium risk.[6,34] Incorporating these intraoperative considerations into perioperative cognitive care pathways provides a more complete continuum from preoperative risk identification to postoperative surveillance and supports a cohesive, evidence-informed approach to mitigating PND across the surgical journey.

PROMs and PREMs in perioperative cognitive care

The integration of patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) into clinical workflows can potentially enhance perioperative cognitive care.[35] PROMs focused on cognitive function include:

- *Cognitive Failures Questionnaire (CFQ)*: Assesses self-reported cognitive lapses in everyday tasks, providing insight into subjective cognitive complaints that may not be captured by objective testing.[36]
- *Functional Activities Questionnaire (FAQ)*: Evaluates the impact of cognitive changes on daily functioning, which can reveal real-world consequences of subtle cognitive deficits.[37]
- *Quality of Life in Neurological Disorders (Neuro-QoL)*: Includes cognitive function domains that reflect patient-perceived cognitive abilities and limitations.[38]
- *Patient-Reported Outcomes Measurement Information System (PROMIS) Cognitive Function*: Measures self-reported cognitive abilities using standardised metrics that can be tracked over time.[39]

These measures can detect changes in cognitive function that patients find meaningful, even when traditional screening tools show minimal changes. They also provide longitudinal data on cognitive recovery patterns after surgery.[39]

PREMs capture patients' experiences with perioperative cognitive assessment and management[40]:

- *Satisfaction with communication* measures how well cognitive screening results and their implications were explained to patients and families.
- *Perceived value of screening* assesses whether patients found cognitive screening beneficial and worth the time investment.
- *Experience with cognitive support services* evaluates the accessibility and helpfulness of cognitive support services recommended after screening.
- *Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)* includes items related to communication about medications and discharge planning, which are particularly relevant for cognitively vulnerable patients.

Effective implementation strategies include the electronic collection of PROMs and PREMs before and after surgery to reduce the workload for clinical staff, and the integration of these results into electronic health records alongside objective cognitive assessments. Regular analysis of aggregated PROM and PREM data can help identify areas for quality improvement, whereas trends in PROMs may inform personalised postoperative cognitive rehabilitation and support plans.

There are many benefits to incorporating PROMs and PREMs into practice.[35,41] It fosters greater engagement by the patient in the management of their cognitive health and helps identify cognitive concerns that may not be captured through conventional screening tools. Furthermore, this approach ensures that clinical interventions are better aligned with patient priorities, leading to more individualised and meaningful care. Ultimately, the continuous feedback provided by PROMs and PREMs contributes to improved quality of care and allows for a more comprehensive evaluation of the effectiveness of cognitive screening programmes.

As currently there is no consensus regarding a single screening tool, combining tools, including PROMs and PREMs, may enhance detection and patient-centredness during perioperative care. For example, the Mini-Cog and the CFS can be used for universal baseline screening.[8,12] The MoCA or MMSE and the EFI or FFP may be reserved for patients flagged as being at high or borderline risk for PNDs.[17,18,21] After surgery, the 4AT or Nu-DESC can provide efficient POD monitoring starting in the PACU, and the CAM may be used as a confirmatory diagnostic tool when delirium is suspected, particularly in settings where trained staff are available.[23,25,42] The CHART-DEL enables the retrospective detection of delirium. Both the CHART_DEL and the FI are particularly useful in research, quality improvement projects or where structured bedside screenings have not been performed.[12,26]

Using multiple tools maximises sensitivity and specificity across perioperative phases, improves workflow integration and helps capture patients at risk for PND (Fig. 1).

Referral pathways

Cognitive impairment exists on a spectrum, ranging from subjective cognitive complaints through mild impairment to major NCDs. Risk stratification enables clinicians to distinguish patients who may benefit from simple preventive measures from those who require intensive, multidisciplinary interventions. In this context, although bedside cognitive screening performed by non-geriatric clinicians often produces a binary result that directs patients into predefined perioperative pathways, cognitive screening should not be regarded as a binary test. Rather, it should be viewed as an entry point into a graded management framework. A positive screening result, such as a MoCA score below the established threshold, should trigger referral to geriatrics, neuropsychology or other relevant specialties for further evaluation

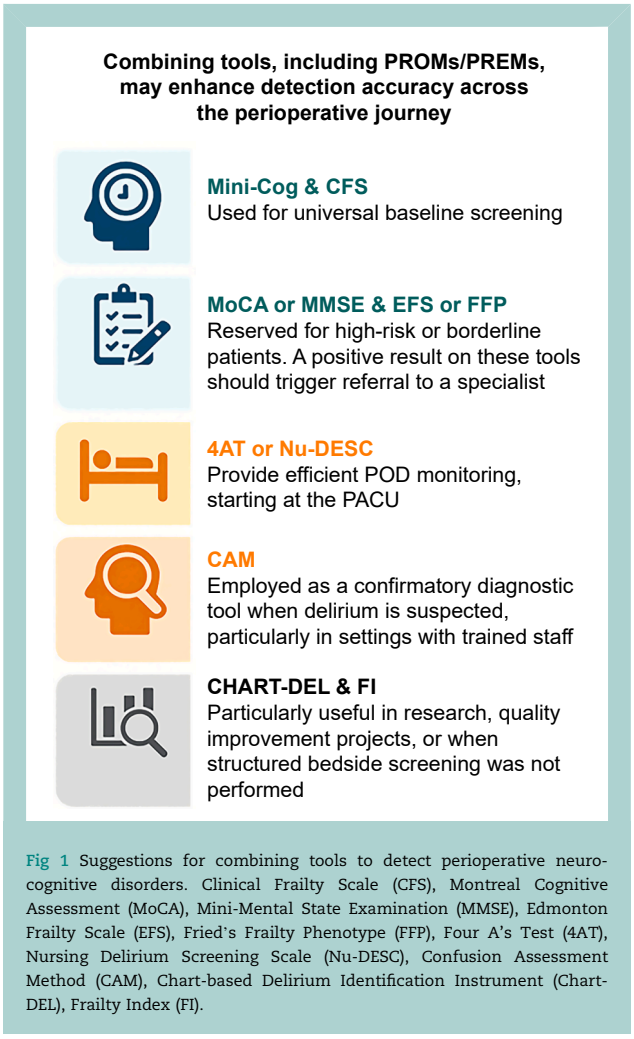

Fig 1 Suggestions for combining tools to detect perioperative neurocognitive disorders. Clinical Frailty Scale (CFS), Montreal Cognitive Assessment (MoCA), Mini-Mental State Examination (MMSE), Edmonton Frailty Scale (EFS), Fried's Frailty Phenotype (FFP), Four A's Test (4AT), Nursing Delirium Screening Scale (Nu-DESC), Confusion Assessment Method (CAM), Chart-based Delirium Identification Instrument (Chart-DEL), Frailty Index (FI).

and tailored perioperative planning.[9,43] Patients identified as higher risk may benefit from tailored anaesthetic strategies, enhanced delirium prevention bundles, closer postoperative surveillance and proactive discharge planning, whereas lower-risk patients may require reassurance and standard preventive care.

Importantly, screening tools should be selected according to the perioperative phase and the clinical question. In the preoperative period, instruments such as the MoCA, Mini-Cog or AD8 are designed to identify baseline cognitive vulnerability and longer-term neurocognitive risk. In contrast, postoperative screening focuses on the detection of acute neurocognitive changes, particularly delirium, and therefore relies on tools such as the CAM, 4AT or the Intensive Care Delirium Screening Checklist (ICDSC). Using the same instrument across all perioperative phases may not be appropriate, as the goals differ between baseline risk assessment and detection of acute syndromes. Beyond hospital discharge, ongoing cognitive surveillance may be warranted in selected high-risk patients. In this context, remote assessment tools such as the telephone-administered MoCA (MoCA-T) offer a feasible option for longer-term cognitive follow-up when in-person evaluation is impractical. A phase-specific approach to screening supports continuity of care while optimising sensitivity and feasibility at each time point.

Cultural beliefs about cognition, ageing, mental health and surgery vary widely and can significantly influence how patients perceive and respond to cognitive screening and positive results. In some cultures, cognitive decline may be seen as a private matter or a source of shame, leading to reluctance or outright refusal to participate in screening and follow-up. Although validated translations of screening tools are available, language barriers can still compound this issue. Moreover, the loss to follow-up after discharge may further exacerbate inequalities in care, particularly among socially vulnerable populations.

Optimal management of PND relies on a multidisciplinary patient-centred team approach, where collaboration between various healthcare professionals and others is essential. Each team member brings a distinct perspective and set of skills to the assessment and management of cognitive risk:

- Surgeons and anaesthetists should communicate the risks of PND to frail patients and their families.[44]
- Anaesthetists play a key role by tailoring perioperative medications and anaesthetic techniques to reduce the likelihood of neurocognitive complications, and to create a postoperative plan.[6]
- Geriatricians contribute through comprehensive geriatric assessments, management of comorbidities and coordination of care transitions.[43]
- Nurses are essential in monitoring for signs of delirium and cognitive changes and in providing education to patients and their families.[8,42]
- Neuropsychologists offer specialised expertise in conducting in-depth cognitive evaluations and developing individualised rehabilitation plans.
- Allied health professionals, including physiotherapists, occupational therapists and dietitians, support functional recovery by addressing mobility, nutrition and discharge planning.[30]
- Chosen family members play a vital role in recognising cognitive changes, supporting perioperative care and participating in discharge planning. Engaging families early ensures that they are prepared to assist with postoperative monitoring and rehabilitation.[45]

This collaborative, team-based model ensures that cognitive vulnerabilities are not only identified early, but also consistently communicated and effectively managed throughout the perioperative period, ultimately improving patient outcomes and quality of care.

Conclusions

Perioperative NCDs remain prevalent, underrecognised complications with far-reaching consequences for older and frail surgical patients. Despite validated tools, routine screening for cognitive impairment, frailty and POD/dNCR is inconsistently applied across perioperative workflows. Early diagnosis of cognitive frailty, via combined frailty and cognition assessment, is crucial to stratify risk, guide shared decision-making and personalise perioperative care. Implementing a multimodal screening strategy that integrates brief, validated tools with patient-reported outcomes, automated chart review and multidisciplinary care pathways enhances patient safety, and promotes cognitive resilience. As patients presenting for surgery are increasingly older, embedding these

practices into routine perioperative planning is no longer optional, it is essential.

MCQs

The associated MCQs (to support CME/CPD activity) are accessible at www.bjaed.org/cme/home for subscribers to *BJA Education*.

Declaration of interests

The authors declare no direct conflicts of interest related to this manuscript.

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