

Optimizing care for critically ill older adults

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As populations age worldwide, and medical advances enable a high quality of life into the eighth, ninth and even tenth decades of life, there have been increased admissions to intensive care units (ICUs) among adults aged 65 years and older (older adults). Older adults now account for more than 50% of patients in ICUs in Canada.¹ To date, during the COVID-19 pandemic, 59.3% of patients with COVID-19 admitted to ICUs in Canada were older than 60 years.² People requiring ICU admission are deemed “critically ill.” Critically ill older adults are a unique population with distinct care requirements owing to physiologic and pathologic changes associated with aging. We review best practice in the care of critically ill older adults, drawing on available evidence (see Box 1). We discuss integration of evidence-based geriatric principles into ICU care, the importance of identifying pre-existing frailty in older adults, measures to prevent and treat delirium, and optimization of post-ICU care.

Why and how should evidence-based geriatric principles be integrated into routine ICU care?

Because older adults are more likely to have complex medical and social needs, it is important to use a holistic and comprehensive approach to their care in all health care settings. The increasing numbers of older adults requiring ICU care has led to the development of the nascent field of geriatric critical care. Practitioners of geriatric medicine have expertise in caring for frail older adults, and there is growing interest within the critical care community in adopting evidence-based geriatric principles in the ICU.³⁻¹¹ Geriatricians are already involved in successful collaborative models with clinicians who have expertise in orthopedics, cardiology, vascular surgery, trauma and oncology, with evidence for improved patient outcomes.^{10,12-15} However, an

Box 1: Literature search

We conducted a targeted, nonsystematic MEDLINE (1946–February 2020) search using the terms “geriatrics” and “critical care,” or “intensive care.” The search was limited to articles in English. There were no restrictions on study type, but we primarily sought relevant randomized controlled trials, systematic reviews and meta-analyses. Relevant studies were selected, and their references manually searched for additional papers. Most studies were observational.

Key points

- The integration of geriatric principles into routine care in the intensive care unit (ICU) should be considered as part of the comprehensive care of all older adults.
- Frailty is independently associated with a higher risk of dying in the ICU and should be identified early in admission, using the Clinical Frailty Scale, based on clinical status at least 2 weeks before the acute illness.
- The ABCDEF bundle should be used to help with prevention and treatment of delirium in older adults admitted to the ICU.
- Post-intensive care syndrome includes new or worsening cognitive, physical or mental health deficits, which can persist after ICU discharge.
- Older ICU survivors may benefit from physical rehabilitation, the use of an ICU diary, and integration of geriatric principles into routine post-ICU care.

important barrier to collaborative care models in Canada is the relative scarcity of geriatricians, with fewer than 400 specialists nationally. It is thus most practical for principles used in comprehensive geriatric assessment to be incorporated in other ways into routine ICU care.

Integration of geriatric principles into routine care has been well studied in specialized acute care of the elderly (ACE) units for older adults in hospital who are acutely unwell but do not require ICU admission. In a systematic review and meta-analysis of 13 trials and 6839 patients with a mean age of 81 years, the use of geriatric principles in ACE units was shown to reduce hospital-acquired functional decline, falls, delirium, hospital length of stay, cost and discharge to long-term care.¹⁶ Table 1 summarizes the multicomponent interventions typically used in ACE units. Capacity-building collaborative care models to increase geriatric competencies among ICU staff, as well as innovative strategies such as abbreviated geriatric assessments using electronic health records,²⁵ are promising areas for future research.

Comprehensive care is incomplete without consideration of patients’ social contexts. Geriatricians use a biopsychosocial approach to care planning. Although current evidence is of very low to moderate quality, guidelines support increasing family presence, support and communication in the ICU.²⁶ Resources to increase family-centred care are available online (<https://www.sccm.org/Research/Guidelines/Guidelines/Family-Centered-Care-in-the-ICU>).

What is the relevance of pre-existing frailty for critically ill older adults?

The prevalence of frailty in older patients admitted to the ICU is about 30%, according to pooled results across 6 prospective observational studies.²⁷ Frailty is a state of decreased physiologic, functional and cognitive reserve that results in increased vulnerability to new health stressors.²⁸ It is believed to result from the interplay of comorbid diseases, genetics and environmental factors,²⁹ and may be partially reversible in the intermediate stages.³⁰ Frailty is not an inherent part of aging, although age is a risk factor for frailty and an independent risk factor for adverse outcomes.³¹

Ascertaining frailty is relevant in the ICU as part of a global assessment to better understand a patient's risk of adverse outcomes and to inform goals-of-care discussions.^{29,32–35} In a prospective multicentre cohort study of 610 patients older than 80 years in Canada, frailty was found to be a more significant

independent predictor of long-term ICU outcomes than age, illness severity or comorbidity.³⁶ A 2017 meta-analysis of 10 prospective cohort studies of moderate quality (mean Newcastle-Ottawa Scale score 6.5) found that pre-hospital frailty was associated with increased hospital mortality (relative risk [RR] 1.71, 95% confidence interval [CI] 1.43–2.05) and long-term mortality (RR 1.53, 95% CI 1.40–1.68), independent of age or illness severity.²⁷ Several studies have reported an incremental increase in mortality for each additional point on the Clinical Frailty Scale (CFS),^{27,33,37,38} particularly in those with severe or very severe frailty (CFS ≥ 7).^{31,38} Understanding the impact of frailty on ICU prognosis shifts the concern from a patient's age toward their overall clinical status and trajectory before ICU admission.

With respect to post-ICU morbidity, patients who are frail and survive their incident critical illness face worsened physical function and higher admission rates to long-term care homes compared with older adults who are not frail.^{27,37,39,40} A 15-year-long prospective longitudinal study of 754 community-dwelling adults

Table 1: Comprehensive multicomponent checklist for routine ICU care*

Principle	Routine practice suggestion
Prevention of delirium	<ul style="list-style-type: none"> • Provide patients with hearing aids and glasses • Implement ABCDEF bundle† • Minimize use of restraints and tethers
Sleep	<ul style="list-style-type: none"> • Earplugs, minimization of noise • Conversion to daytime bolus feeds to decrease night-time interruptions†
Cognition	<ul style="list-style-type: none"> • Cognitive-stimulation activities such as music, family-voice reorientation and family involvement
Mood	<ul style="list-style-type: none"> • Screening for depressive symptoms in patients with prolonged ICU admissions, with referral to psychiatry as needed • Not suggested to screen acutely unwell, newly admitted patients†
Mobility and early rehabilitation	<ul style="list-style-type: none"> • Early physiotherapy or occupational therapy assessment for advancing mobility and function toward maintenance of activities of daily living
Nutrition	<ul style="list-style-type: none"> • Dietitian consult • Prompt correction of dehydration
Continence	<ul style="list-style-type: none"> • Removal of indwelling catheters to avoid catheter-associated bladder infections and promote mobility • Maintenance of regular bowel movements
Skin integrity	<ul style="list-style-type: none"> • Frequent turning to avoid pressure injuries
Minimization of polypharmacy	<ul style="list-style-type: none"> • Daily medication review by pharmacist using STOPP/START criteria¹⁷ or American Geriatrics Society Beers criteria¹⁸ of potentially inappropriate medications • Monitor new high-risk medications (antipsychotics, sedative-hypnotics, opioids) with a plan to taper or discontinue while in ICU†
Environmental modifications to facilitate physical and cognitive function	<ul style="list-style-type: none"> • Large clocks and calendars • Handrails, uncluttered hallways to allow mobilization • Elevated toilet seats and door levers (not knobs) • Paint colours that emphasize earth tones with contrast between floor, wall and ceiling, to aid patients with impaired depth perception
Early discharge planning	<ul style="list-style-type: none"> • Early involvement of social worker and family • Multidisciplinary team rounding with early ongoing emphasis on the goal of returning home (or to pre-hospital living environment)

Note: ACE = acute care of the elderly, ICU = intensive care unit, START = Screening Tool to Alert to Right Treatment, STOPP = Screening Tool of Older Persons' Prescriptions.

*Based on evidence-based principles of ACE unit care.^{19–23}

†Not included in traditional ACE unit protocols. ABCDEF bundle is a multicomponent strategy for delirium prevention and treatment, and includes pain management, trials of spontaneous awakening, choice of analgesia and sedation, monitoring and management of delirium, early mobilization, and family engagement.²⁴

older than 70 years found that patients who were pre-frail (1 or 2 Fried frailty criteria present, using the Fried phenotypic model of frailty) or frail (3 or more criteria) did not return to their baseline physical function by 6 months.³⁹ They did, however, improve compared with their functional status 1 month after ICU discharge, when disability was at its greatest.³⁹ In comparison, older adults who were not frail at ICU admission returned close to their baseline level of physical function by 6 months.³⁹ Patients who were frail had a 58.8% admission rate to long-term care at 6 months,³⁹ a finding consistent with a 2017 meta-analysis in which these patients were less likely to be discharged home²⁷ (RR 0.59, 95% CI 0.49–0.71). When counselling patients and families on post-ICU expectations, explicit consideration of frailty helps prevent overestimation of functional impairment in those who are not frail, and underestimation in those who are frail (Figure 1). Nevertheless, it is not clear whether the post-ICU outcomes observed are inevitable for patients who are frail, as no studies have examined how changes to management during or after ICU admission could mitigate the incidence or worsening of frailty-associated outcomes. This is an important area for future research.

The 2 main conceptual frameworks of frailty are a physical, or phenotypic, model⁴¹ and a deficit accumulation, or index, model.²⁸ Several tools based on these frameworks may be used to assess frailty.⁴² For older adults admitted to the ICU, we favour

the Clinical Frailty Scale presented in Figure 2. The CFS is highly correlated with the Frailty Index²⁸ and has been validated with good inter-rater reliability (κ 0.74) between assessors in the ICU setting.^{43–46} Its use is more feasible in critically ill patients than other commonly used tools that require grip strength or mobility assessments, for example.^{41,47} To avoid overscoring the CFS based on the state of critical illness of a patient in the ICU, the assessment should be based on clinical status at least 2 weeks before admission.⁴⁸ If there is limited history available from the patient or family members to make this assessment, collateral information can be sought through community care providers, including personal support workers, pharmacists, family physicians and local community care coordinators. Clinicians unfamiliar with the CFS are encouraged to review resources on proper use to ensure reliability.^{48,49}

Why is recognizing delirium important?

Delirium in the ICU is common, although underdiagnosed, with prevalence of 20%–84% depending on the severity of illness and method of diagnosis.^{50–55} It is defined by a change from baseline in attention and awareness that is acute, fluctuating and accompanied by disturbed cognition (memory deficit, disorientation, or abnormal language, visuospatial ability or perception).⁵⁶

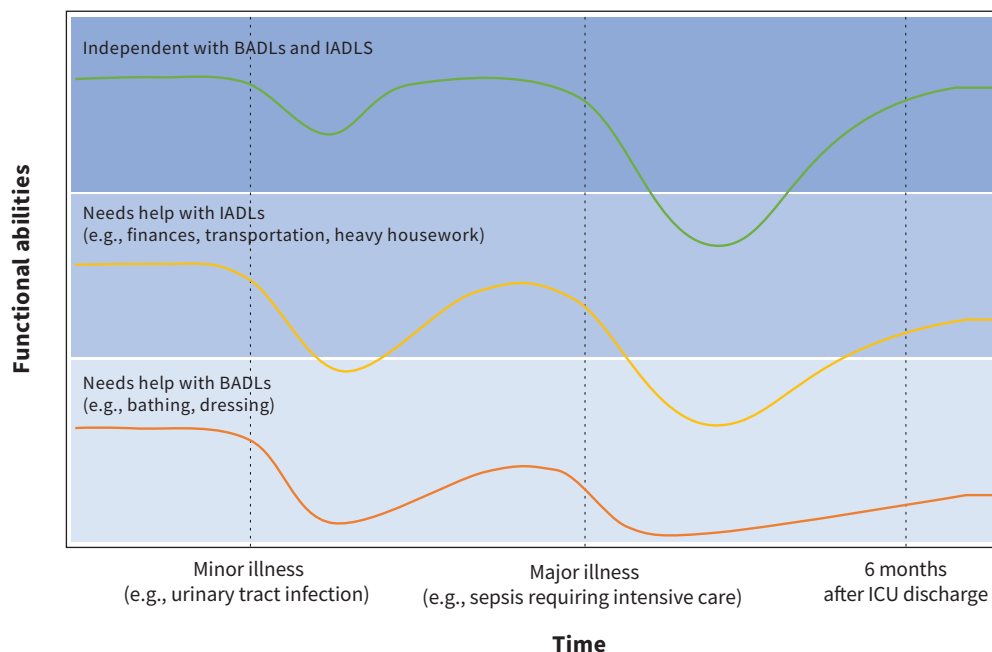











Figure 1: Potential impact of pre-existing frailty on outcomes after minor and major illness. The green line represents the medical course of an individual who is not frail (Clinical Frailty Score [CFS] 1–3, independent with basic and instrumental activities of daily living [BADLs and IADLs]): a minor illness may cause a transient reduction in physical or cognitive function, but the individual recovers to baseline. A major illness requiring admission to intensive care may cause substantial reduction in function and impairment in ADLs, but a patient who is not frail may improve close to baseline by 6 months. The yellow line represents the medical course of an individual with mild frailty (CFS 4–5): a minor illness may cause a disproportionate reduction in function, and the individual may not return to baseline. A major illness requiring admission to intensive care may cause further substantial reduction in function, from which the individual recovers only partially by 6 months. The orange line represents the medical course of an individual with moderate to severe frailty (CFS 6–8): a minor illness is likely to cause further disproportionate reduction in already limited function without return to baseline, and a major illness is likely to result in substantial reduction in function that does not improve by 6 months, assuming the individual is able to survive the index critical illness (in-hospital mortality for CFS 8 is reported at 48%,³¹ and 12-month survival for CFS 6–7 is 35%³⁷). Note: ICU = intensive care unit.

CLINICAL FRAILITY 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 FRAILITY	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 FRAILITY	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 FRAILITY	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 FRAILITY	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 FRAILITY	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 FRAILITY 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.



Clinical Frailty Scale ©2005–2020 Rockwood, Version 2.0 (EN).
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Rockwood K et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489–495.

Figure 2: The Clinical Frailty Score (CFS) can be used to summarize the overall clinical status of a patient based on comorbidities, activity level and functional impairment. Through conversations with the patient, family or other reliable informant, clinical judgment is used to determine which category best fits the patient. It is recommended that the score be based on the patient’s status 2 weeks before admission to an intensive care unit (ICU) (reproduced with permission: Rockwood et al.²⁸).

A 2015 meta-analysis found that delirium in the ICU was associated with increased mortality (RR 2.19, 95% CI 1.78–2.70), a finding that persisted even after the metaregression to account for age, proportion of female participants and Acute Physiology and Chronic Health Evaluation II (APACHE II) scores; longer duration of mechanical ventilation (mean difference [MD] 1.79 days longer), longer ICU admission (MD 33 hours longer), longer hospital stay (MD 23.3 hours longer) and postdischarge cognitive impairment at 3 and 12 months, compared with those who do not develop delirium.⁵¹

Risk factors for delirium in the ICU include benzodiazepine use, blood transfusions, increasing age, a history of dementia, previous coma, higher APACHE II and American Society of Anesthesiology scores, and pre-ICU emergency surgery or trauma.⁵⁷ Of these, benzodiazepine use is potentially modifiable;^{58,59} this class of medication should be avoided unless clearly indicated for a specific medical condition, such as acute alcohol withdrawal.

How can delirium be prevented and managed?

Because delirium often goes undiagnosed, it is important to optimize recognition of the condition. The 2018 Clinical Practice Guidelines for ICU Pain, Agitation/Sedation, Delirium, Immobility and Sleep Disruption (PADIS) recommend screening for delirium with a valid tool,⁵⁷ such as the Confusion Assessment method for the ICU (CAM-ICU)⁶⁰ or Intensive Care Delirium Screening Checklist (ICDSC).⁶¹ The ICDSC has a sensitivity of 99% and specificity of 64%,⁶¹ and the CAM-ICU has a sensitivity of 75.5% and specificity of 95.8%.⁶⁰

Nonpharmacologic interventions are the mainstay of preventing delirium in the ICU. A meta-analysis of 9 studies found that earplugs reduce the incidence of delirium (RR 0.59, 95% CI 0.44–0.78),⁶² suggesting their use is reasonable as a low-harm, low-cost intervention. Several small randomized controlled trials (RCTs) of limited generalizability have investigated other single-component interventions with negative results, including cognitive therapy,⁶³ family-voice reorientation⁶⁴ and light therapy.⁶⁵

Evidence is stronger for multicomponent interventions,^{24,66–68} likely reflecting that the development of delirium is multifactorial. The PADIS guideline found an odds ratio (OR) of 0.59 (95% CI 0.39–0.88) for reduced incidence of delirium with use of multicomponent bundles.⁵⁷ The ABCDEF bundle is an operationalized framework of these guidelines; its components include pain management, trials of spontaneous awakening, choice of analgesia and sedation, monitoring and management of delirium, early mobilization, and family engagement.²⁴ Principles of the ABCDEF bundle overlap with the demedicalization and patient-centred principles of the multicomponent interventions typically used in ACE units (outlined in Table 1). In a large, prospective, multicentre cohort study of more than 15 000 patients, use of the bundle resulted in a dose-dependent reduction in delirium incidence (OR 0.60, 95% CI 0.49–0.72), coma, use of physical restraint, ICU readmission, and ICU and hospital mortality.²⁴ Future studies should focus on implemen-

tation and knowledge translation strategies; implementation resources are available online (www.icudelirium.org/medical-professionals/overview).

Antipsychotic use for the prevention of delirium is not recommended,⁵⁷ given a Cochrane meta-analysis⁵⁰ and large subsequent RCT of more than 1700 patients that showed no benefit over placebo.⁶⁹ Dexmedetomidine may be preferentially considered for sedation in patients at high risk for delirium who require sedation for other indications. Although the PADIS guideline recommends against the use of dexmedetomidine for the prevention of delirium,⁵⁷ 2 more recent systematic reviews and meta-analyses suggest it is associated with reduced incidence of delirium.^{70,71}

Most evidence supporting the use of multicomponent bundles is related to prevention of delirium, but they are also recommended for its treatment, as their potential benefits outweigh the risks.^{24,57} Antipsychotics are not effective, with the Modifying the Impact of ICU-Associated Neurological Dysfunction-USA (MIND USA) multicentre RCT of 1789 patients finding no difference in effect between haloperidol, ziprasidone and placebo when measuring duration of delirium.⁵⁴ The PADIS guideline supports use of dexmedetomidine when delirium-associated agitation precludes weaning or extubation,⁵⁷ based on a single, low-quality RCT.⁷² The effectiveness of dexmedetomidine in delirium without agitation remains unclear, and dose reduction is suggested in those older than 65 years, owing to higher rates of bradycardia and hypotension.⁷³

When symptoms of delirium such as hallucinations, anxiety or agitation cause psychological or physical harm to patients or pose risks to health care workers, antipsychotic treatment may be required. If so, it is best to follow the geriatric principle of “start low and go slow,” and prescribe on a short-term and as-needed basis to avoid unintentional use after discharge from the ICU or hospital. A prospective observational cohort study found that 24% of patients treated for delirium with an atypical antipsychotic medication were discharged from hospital on these medications.⁷⁴ Such discharge prescriptions are likely unintentional, but prescribing inertia may lead to their continued use.

What post-ICU complications should physicians anticipate in older adults who survive critical illness?

As medical and technological capabilities have improved, ICU-associated mortality has declined and most older adults survive critical illness; among ICU survivors older than 80 years, long-term mortality rates at 1, 2 and 3 years after hospital discharge are comparable with age- and sex-matched general population mortality rates.⁷⁵ One prospective study of 3920 patients with a mean age of 84 years from 22 countries found an ICU survival rate of 72.5%, with a 30-day survival rate of 61.2%.³⁴ However, surviving critical illness may lead to long-term ICU-associated morbidity and functional decline, which are important outcomes to anticipate and manage proactively in the post-ICU period.

The prevalence of post-intensive care syndrome (PICS) in adults is unclear, but is believed to affect between 25% and 55% or

more of ICU survivors.^{76,77} The syndrome encompasses a heterogeneous group of new or worsening cognitive, physical or mental health impairments⁷⁸ (Figure 3), which can include posttraumatic stress disorder (PTSD) (44% at 6 mo⁷⁹), impairment in instrumental activities of daily living,⁸⁰ depression (34% at 6 mo⁸¹), and cognitive impairment (34% at 12 mo⁸²). Given the scope of impairments, patients with PICS may need higher levels of care or informal caregiver support after hospital discharge. Post-intensive care syndrome—Family (PICS-F) is a similar grouping of outcomes in family members of ICU survivors, and includes new or worsening PTSD, depression, complicated grief or anxiety.⁸³

Management of PICS after ICU discharge is an area of evolving knowledge. Most patients discharged from the hospital experience inadequate specialist follow-up and rehabilitation, polypharmacy, and fragmented care.⁸⁴ Several systematic reviews have examined various post-ICU follow-up interventions;^{85–88} however, the results are difficult to interpret, given low-certainty

evidence and heterogeneity in the populations, interventions, settings (inpatient v. outpatient) and outcome measures. We identified 5 controlled studies in which the intervention group had a mean age of more than 65 years.^{89–93} No studies provided subgroup analysis by degree of frailty, a major limitation given the evidence that pre-existing frailty substantially affects outcomes. Further studies on the management of older ICU survivors in the post-ICU period are needed, with a priori subgroup stratification by degree of frailty. Despite these limitations, some findings can be applied to older ICU survivors.

A large, population-based cohort study in Taiwan of more than 15 000 sepsis survivors with a mean age of 69.4 years found that physical rehabilitation in the 90 days after ICU discharge resulted in 8% decreased 1-year mortality (hazard ratio [HR] 0.92, 95% CI 0.88–0.96) and 5.6% decreased 10-year mortality (HR 0.94, 95% CI 0.92–0.97).⁹⁰ Mortality reduced in a dose-dependent fashion based on the number of rehabilitation sessions that participants received.⁹⁰

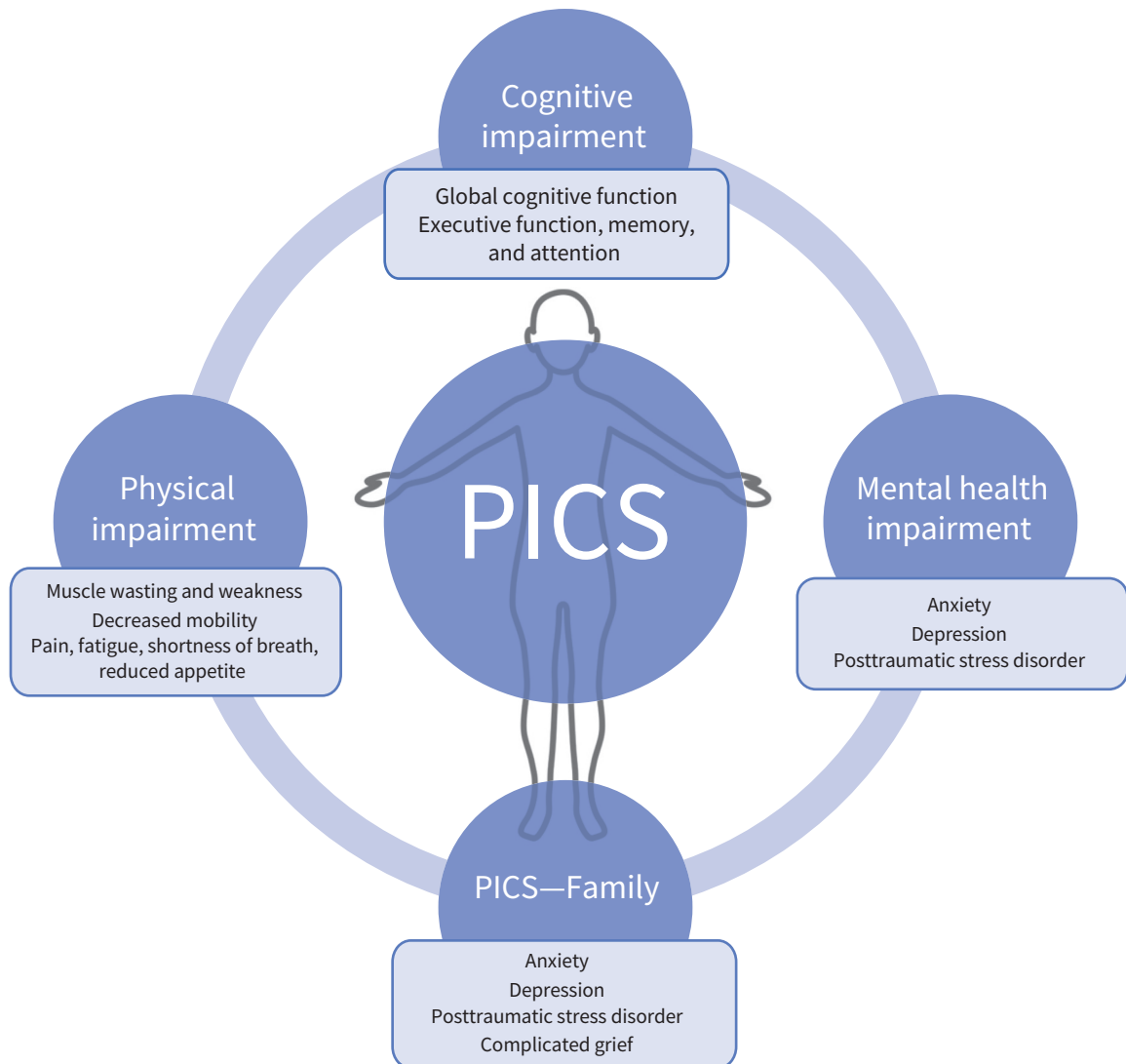


Figure 3: Components of post-intensive care syndrome (PICS). Survivors of the intensive care unit (ICU) may experience cognitive, physical and mental health impairments. Family members may also experience mental health impairments after the care of a loved one in the ICU.

The benefit of physical therapy after critical illness was also shown in a recent systematic review of 16 RCTs and 10 observational studies of adult ICU survivors, which found that interventions for physical function improved depression and mental health–related quality of life.⁸⁵ Importantly, it appears benefits may be lost if the correct population is not targeted, which could partially explain why some rehabilitation studies have not shown the same benefit in other populations.^{94–96} For example, the study in Taiwan found that there was no survival benefit in patients with a duration of ICU stay or mechanical ventilation less than 7 days, or in those with few comorbidities (measured by a Charlson Comorbidity Index ≤ 2),⁹⁰ suggesting that patients most likely to benefit from physical rehabilitation are those who are less well at baseline or experience a prolonged critical illness and are thus at greater risk of muscle wasting and deconditioning. Determining what interventions work, for whom, and in what circumstances will help health teams avoid both under- and overuse of resources in patient-centred post-ICU care. A realist review (which uses a systematic approach to understand the mechanisms behind intervention outcomes) on post-ICU interventions is currently under way and will hopefully provide guidance for future post-ICU care pathways.⁹⁷

Other potentially effective interventions in older adults include the use of an ICU diary⁹² and incorporation of ACE unit principles into post-ICU care.⁸⁹ An ICU diary is a record kept by family and health care providers during a patient's ICU stay to fill in memory gaps,⁹² and in the general ICU population has been associated with reduced risk of depression and better quality of life in 2 systematic reviews.^{98,99} The ACE unit principles showed promise in 1 small RCT in France that, although underpowered, found a trend toward improved functional autonomy when older adults were admitted after ICU discharge to a geriatric ward using ACE unit principles, compared with routine care on a medical ward.⁸⁹ Many hospital policies already support incorporation of geriatric principles into routine care for all older patients in the form of age-friendly care initiatives.^{100–103} The integration of ACE principles outlined in Table 1 may be considered for older ICU survivors admitted to medical or surgical wards, to prevent further hospital-acquired disability. Several studies using system and technological innovations to implement ACE principles are available.^{104–107}

During a hospital stay or soon after hospital discharge, referral to geriatric medicine for cognitive impairment, geriatric psychiatry for mental health concerns, and physiatry for optimization of physical function may be helpful to address specific components of PICS, although referral strategies have not been directly studied. Other postdischarge management strategies, such as nurse-led ICU follow-up services, are not effective, according to current evidence.^{86,87}

Conclusion

Guidance on how best to care for critically ill older adults is limited by a lack of RCTs that specifically focus on older adults and lack of studies that stratify results by the degree of frailty. Despite these limitations, we have identified steps to improve care, including understanding pre-existing frailty as a prognostic tool in the ICU, the importance of nonpharmacologic multicomponent

Box 2: Unanswered questions

- What other interventions during or after admission to the intensive care unit (ICU) can prevent the incidence or worsening of frailty?
- How does frailty affect the success of interventions used to manage post-intensive care syndrome?
- Are collaborative care models using geriatric principles effective for the management of critically ill older adults during or after ICU admission, and what components are necessary for success?

interventions in delirium prevention and treatment, applying principles of geriatric medicine in routine ICU care, and an appreciation for the high prevalence of cognitive, physical and mental impairments after ICU admission. The involvement of geriatricians, who are experts in frailty, cognitive impairment and the care of older adults, may help intensivists and hospitalists focus on the acute nature of ICU and post-ICU care while the unique needs of older adults are addressed. Future research directions include geriatric collaborative care models in the ICU, implementation of geriatric principles in the post-ICU period, and the use of peri-ICU frailty assessments to create and monitor individualized treatment plans that address patients' overall health trajectories (see Box 2).

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