Frailty and cognitive impairment: Unique challenges in the older emergency surgical patient

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ABSTRACT

INTRODUCTION Older patients (>65 years of age) admitted as general surgical emergencies increasingly require improved recognition of their specific needs relative to younger patients. Two such needs are frailty and cognitive impairment. These are evolving research areas that the emergency surgeon increasingly requires knowledge of to improve short- and long-term patient outcomes.

METHODS This paper reviews the evidence for frailty and cognitive impairment in the acute surgical setting by defining frailty and cognitive impairment, introducing methods of diagnosis, discussing the influence on prognosis and proposing strategies to improve older patient outcomes.

RESULTS Frailty is present in 25% of the older surgical population. Using frailty-scoring tools, frailty was associated with a significantly longer hospital stay and higher mortality at 30 and 90 days after admission to an acute surgical unit. Cognitive impairment is present in a high number of older acute surgical patients (approximately 70%), whilst acute onset cognitive impairment, termed delirium, is documented in 18%. However, patients with delirium had significantly longer hospital stays and higher in-hospital mortality than those with no cognitive impairment.

CONCLUSIONS Improved knowledge of frailty and delirium by the emergency surgeon allows the specialised needs of older surgical patients to be taken into account. Early recognition, and consideration of minimally invasive surgery or radiological intervention alongside potentially transferable successful elective interventions such as comprehensive geriatric assessment, may help to improve short- and long-term patient outcomes in this vulnerable population.

KEYWORDS

Frailty – Cognitive impairment – Older patient – Emergency surgery

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There are over 10 million people aged over 65 years in the UK. This older (or elderly) population has increased by over 80% during the last six decades, with estimates predicting further increases to nearly 13 million in 2018 and 17 million by 2035.^{1,2} As a consequence, the numbers of older people presenting to emergency general surgical departments for both operative and non-operative treatment has and will continue to increase significantly. This group often have substantially different needs from those of younger emergency surgical patients, making the development of management strategies essential not only to allow service planning, but to optimise decision making,

treatment planning and, consequently, outcomes for this heterogeneous group of patients.³

The older patient group is traditionally associated with poorer outcomes in many aspects of health care, primarily due to their concurrent medical conditions. To surgeons, the issues of co-morbidity, poly-pharmacy, poor nutrition and poor mobility are well known, with strategies to identify and treat these issues firmly established in the elective setting. What will be less well known to the emergency surgeon are two factors that tend to be specific to the older population: frailty and cognitive impairment (or, acutely, delirium). The older adult can present with either or both

of these conditions, or develop them during the course of their hospital admission. They are relatively novel concepts in geriatric medicine, meaning that the majority of work in these areas has been performed in the medical setting, making the older emergency surgical patient a relatively unknown entity.^{4,5}

Frailty

Frailty is a widely used clinical expression of concern about a patient's vulnerability. More definitively, frailty can be defined as a state of vulnerability to the poor resolution of homeostasis after a stressor event, as a consequence of the cumulative decline in many physiological systems during a lifetime.⁵ One needs only to think how acutely unwell an older patient can become with a minor illness (eg urinary tract infection) and how this can be commonly followed by another minor illness to understand this concept. Frailty is estimated to be present in at least 25% of the population aged over 85 years, and predisposes to falls, disability, delirium, increased long-term care and death.⁶ Indeed, preoperative frailty in older elective surgery patients is related to increased postoperative institutionalisation.⁷

With increasing numbers of older patients attending for emergency surgery assessment, what role does frailty play in their outcome? Farhat *et al* assessed frailty in over 30,000 emergency surgical patients aged over 60 years as part of an American College of Surgeons quality improvement programme dataset.⁸ The authors modified the established Canadian Study of Health and Ageing (CSHA) frailty score (Figure 1), finding that the presence of frailty was associated with increased postoperative morbidity and

30-day mortality (odds ratio 11.7; $p < 0.001$).⁸ Indeed, frailty predicted outcomes better than American Society of Anesthesiology physical status classification system. These findings are supported by a prospective UK study that primarily aimed to determine the impact of frailty in 325 older surgical patients admitted to five surgical units in England, Scotland and Wales.⁹ Using the CSHA score, 28% of the patients were found to be frail (varying from mild to severe), a figure that is nearly three times that documented in the elective surgical population.^{10,11} When compared to the non-frail group, the presence of frailty was associated with anaemia, poly-pharmacy (>5 medications) and significantly longer hospital stay (7.6 days vs 11.1; $p = 0.05$). Last and most worryingly, frail patients were 4 times as likely to die at 30 days after admission and 3 times as likely to die at 90 days.⁹ These results suggest that frailty is a major contributing factor to outcomes in the older emergency surgical patient, and highlight the need for interventions to raise awareness, improve diagnosis and, ultimately, lead to improved patient care.

Cognitive impairment

Cognitive impairment is the decline of intellectual function and can be acute onset (delirium), chronic (dementia) or acute on chronic. Delirium is a concept surgeons will be familiar with, especially in elective orthopaedic or cardiothoracic surgery, where, in the latter, it is estimated to develop in up to 75% of patients postoperatively.¹² Delirium is characterized by fluctuating disturbances of consciousness, disorientation and perception abnormalities, alongside impaired thinking and speech, that typically

1	Very Fit	Robust, active, energetic, well motivated and fit; these people exercise regularly and are in the most fit group for their age
2	Well	without active disease, but less fit than people in group 1
3	Well, with treated comorbid disease	disease symptoms are well controlled compared to people in group 4
4	Apparently vulnerable	although not frankly dependent, these people commonly complain of being "slowed up" or have disease symptoms
5	Mildly Frail	with limited dependence on others for instrumental activities of daily living
6	Moderately Frail	help is needed with both instrumental and non instrumental activities of daily living
7	Severely Frail	completely dependent on others for activities of daily living or terminally ill

Figure 1 Canadian study of health and ageing clinical frailty score

MONTREAL COGNITIVE ASSESSMENT (MOCA)
Version 7.1 Original Version

NAME: _____ Education: _____ Date of birth: _____
Sex: _____ DATE: _____

VISUOSPATIAL / EXECUTIVE

Copy cube Draw CLOCK (Ten past eleven) (3 points)

Points: / 5

NAMING

/ 3

MEMORY Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED	No points
1st trial	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
2nd trial	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

ATTENTION Read list of digits (1 digit/ sec.). Subject has to repeat them in the forward order 2 1 8 5 4
Subject has to repeat them in the backward order 7 4 2 / 2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors
 F B A C M N A A J K L B A F A K D E A A A J A M O F A A B / 1

Serial 7 subtraction starting at 100 93 86 79 72 65 / 3
4 or 5 correct subtractions: 3 pts. 2 or 3 correct: 2 pts. 1 correct: 1 pt. 0 correct: 0 pt

LANGUAGE Repeat: I only know that John is the one to help today. / 2
The cat always hid under the couch when dogs were in the room.

Fluency / Name maximum number of words in one minute that begin with the letter F (N ≥ 11 words) / 1

ABSTRACTION Similarity between e.g. banana - orange = fruit train - bicycle watch - ruler / 2

DELAYED RECALL Has to recall words WITH NO CUE FACE VELVET CHURCH DAISY RED Points for UNCUE recall only / 5

Optional Category cue Multiple choice cue

ORIENTATION Date Month Year Day Place City / 6

© Z.Nasreddine MD www.mocatest.org Normal ≥ 26 / 30 TOTAL / 30
Administered by: _____ Add 1 point if ≤ 12 yr edu

Figure 2 Montreal Cognitive Assessment (MOCA)

settles after several days. Several predictors of postoperative delirium have been identified: increasing age, which encompasses visual impairment, severe illness, cognitive impairment, hypoglycaemia and poly-pharmacy; preoperative cognitive decline; intensive care admission and alcohol.^{13,14} Like frailty, delirium appears to be multifactorial in nature. Unsurprisingly, the development of delirium is associated with adverse postoperative outcomes, such as prolonged hospital stay, functional decline, increased social support (increasing costs), death and prolonged cognitive impairment even 1 year after surgery, which suggests that delirium may itself be a cause of dementia.^{12,15}

In contrast to the work on delirium in elective surgery, there has been little research into the prevalence of delirium or, more generally, cognitive impairment in older emergency surgical patients. One recent UK study prospectively assessed cognitive impairment in 245 older patients admitted under emergency surgeons.¹⁵ Using the Montreal

Cognitive Assessment tool (MoCA) within 24 hours of admission,¹⁶ the majority of patients (70%) had cognitive impairment, with 18% unable to complete the tool due to disability, too unwell or known advanced dementia.¹⁵ Not unexpectedly, increasing age was associated with an abnormal MoCA score.

Another group, led by Ansaloni, assessed delirium in over 300 postoperative elective and emergency surgical patients.¹⁷ They used the Confusion Assessment Method and the Delirium Rating Scale, both of which are validated for the assessment and severity of delirium respectively,^{18,19} whereas the MoCA is best at detecting early stages of impairment.²⁰ Delirium was present in 17.9% of older emergency patients, which is substantially lower than the prevalence of cognitive impairment; however, delirious surgical patients had a significantly longer hospital stay and higher in-hospital mortality than controls.¹⁸ These findings from both studies described support the results from other surgical specialties that cognitive impairment and delirium are present in the acute older

surgical patient, and that poorer postoperative outcomes are likely to result. Unfortunately, as yet no study has tracked emergency admission delirium to postoperative delirium to allow the development of specific strategies to predict postoperative delirium and its associated poorer outcomes.²¹

Strategies for frail and delirious older emergency surgical patients

In the elective setting, the success of the comprehensive geriatric assessment (CGA) and home- and group-based exercise programmes have led to improved mobility and functional status across a range of medical and surgical geriatric settings.^{3,22,23} The CGA places the older patient 'at the centre of the process' and is a multi-dimensional approach involving several specialties, including elderly medicine consultants; physiotherapists; psycho-geriatricians; occupational therapists; dieticians; pharmacists; and social workers. In addition, family and friends will be approached for information and support, and the need for community services established. Significantly improved outcomes have been extensively reported in the literature from units applying the CGA, including earlier discharge time, reduced re-admission rates and an increased likelihood of the patient being discharged to their original residence, rather than to a nursing or residential home.

This led to the introduction of the successful Proactive care of Older People undergoing Surgery (POPS), which applies the CGA during elective preoperative assessment and introduces new collaborators to the CGA: surgeons; surgical specialists and anaesthetists.³ The concept, which is supported by the British Society of Geriatricians, is simple: early identification of the individual patient's needs allows planning and optimal patient recovery, and safe discharge. Indeed, there are joint ward rounds with surgeons and geriatricians in some units. It is unlikely that one single factor is solely responsible for the documented improved outcomes with CGA and POPS; rather it is more likely that the cumulative effect of multiple small improvements in medical care, in combination with well-planned social care provision, have led to improvements, which probably reflects the multifactorial nature of frailty and delirium.

Although the majority of research has been conducted in the elective setting, the CGA could be applied to the emergency surgical setting. On emergency admission, all patients aged over 65 years could be referred to the elderly medicine department for a CGA. An established collaboration with the surgical and geriatric teams could ensure optimal surgical recovery, alongside optimal 'geriatric' recovery, with both teams learning from each other. There are overlapping concepts from surgery and the CGA that suggest that this could be a strong collaboration: eg, the CGA focus on improving mobility and functional status through exercise programmes is similar to one of the key targets of the enhanced recovery after elective surgery programme (ERAS).²⁴ This raises the possibility that one option to improve frailty and delirium, and their associated

poor outcomes, is to develop a multi-disciplinary and individualised emergency enhanced recovery programme specifically for older patients. This emergency ERAS would have to be individualised to the patient and take into account the possibility of surgical drains, catheters, oxygen, fluids and total parenteral nutrition, for example. It would also need to be feasible and safe for older patients that are still in various stages of recovery; eg in bed, up to sit.

There are also non-operative and operative surgical strategies for the older frail and delirious emergency patient to be considered. Non-operative strategies primarily include interventional radiology.²⁵ The clinical role of angiography and transcatheter techniques has developed significantly over the last decade: unstable trauma patients with major organ or pelvic injuries can avoid the morbidity and mortality of acute emergency surgery; ruptured abdominal aortic aneurysms can undergo emergency endovascular repair; and bleeding gastric or duodenal ulcers that cannot be controlled endoscopically can be spared surgery. Clearly, interventional radiology is an approach that favours the older patient, even if frail or delirious, and will be an avenue that continues to develop as advances in technology and experience broaden.

The evidence that laparoscopic surgery minimises surgical stress and improves early recovery is well accepted and there is growing evidence that laparoscopic surgery is safe in the older surgical patient.²⁶ A recent systematic review assessed seven trials comparing laparoscopic and open colorectal surgery that included older patients (average age 70 years). Two reported data specifically on older patients, with both demonstrating a reduction in the length of stay with laparoscopy of 2 days compared to open surgery, with no significant increase in morbidity.²⁶ Laparoscopic surgery is increasingly being considered in the emergency setting, including for cholecystectomy, appendectomy, perforated duodenal ulcers, wash-out for diverticulitis and subtotal colectomy in acute colitis.²⁷ These minimally invasive advances again favour the older adult, leading to reduced postoperative pain, with an accompanying reduction in postoperative complications such as pneumonia, venous thromboembolism and immobility. Clearly this approach will depend on the experience of the emergency surgeon. However, it is likely that, as minimally invasive surgery continues to develop and further technological advances are made, older adults will be one of the main beneficiaries.

Conclusions

Improved knowledge of frailty and delirium by the emergency surgeon will the specialised needs of older surgical patients to be taken into account. With frailty present in over 25% of older patients and cognitive impairment present in over 70%, early recognition of these conditions, and consideration of minimally invasive surgery or radiological intervention alongside the introduction of CGA, may help to improve short- and long-term patient outcomes in this vulnerable population.

Conflicts of interest

There were no sources of funding or conflict of interest for this article.

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