

# The physician's role in perioperative management of older patients undergoing surgery

**Authors:** Adam L Gordon,<sup>A</sup> Barry J Evans<sup>B</sup> and Jugdeep Dhese<sup>C</sup>

## ABSTRACT

Life-sustaining and life-improving surgical interventions are increasingly available to older, frailer patients, many of whom have multimorbidity. Physicians can help support perioperative multidisciplinary teams with assessment and preoperative optimisation of physiological reserve, comorbidities and associated geriatric syndromes. Similar structured support can be useful in the postoperative period where older patients are at increased risk of delirium, medical complications, increased functional dependency and where discharge planning can prove more difficult than in younger cohorts. Comprehensive geriatric assessment has been shown to improve outcomes and is now embedded in most UK-based services for traumatic hip fracture. Perioperative comprehensive geriatric assessment has been explored in other surgical disciplines and procedures and, where evaluated, has been associated with improved outcomes. The need to support older patients with frailty undergoing surgery exceeds the capacity of specialist geriatricians. Other groups of healthcare professionals need to nurture the core competencies to support this group perioperatively.

As the global population has aged, the number of older people living with multimorbidity, dependency and frailty has increased. A consequence is that the average patient undergoing elective and emergency surgery has become older, frailer and more dependent over time.<sup>1</sup> Conditions requiring surgical intervention, such as degenerative, metabolic or neoplastic disease, increase in prevalence with age, while advances in surgery and anaesthesia have made it increasingly possible to offer surgery to older patients. This is a cause for celebration, as many procedures can be life improving or life sustaining.

Despite the increase in absolute numbers of older people undergoing interventions, they continue to be less likely to access definitive surgery than younger patients – with deferrals, cancellations and modified approaches all more

common in this group. This may be, in part, a legitimate reflection of the increased likelihood of adverse postoperative outcomes in older patients but might also reflect entrenched ideas about risk and benefit of intervention, which are not always evidence based.<sup>2</sup>

There are three distinct stages of the surgical pathway: pre-, intra- and postoperative care. Outwith hip fracture, it is – at present – uncommon for physicians to be systematically involved in any of these. However, it is apparent that there is a role for physicians in supporting anaesthetists, surgeons and their affiliated multidisciplinary teams with pre- and postoperative management, while intraoperative care is likely to remain the preserve of theatre-based disciplines.

## The physician's role: medical management of the older surgical patient

Although chronological age is frequently described as a predictor of perioperative risk, it is more likely that age is a proxy for a number of underlying vulnerabilities to decompensation during or after surgery. Understanding how these vulnerabilities interact to increase perioperative risk is important for three reasons. First, it enables more nuanced and detailed preparation for surgery. Second, it allows informed

### Key points

The surgical population is increasingly older, multimorbid and frail and this group of patients is at increased risk of adverse postoperative outcome

Postoperative complications in older patients can be medical, cognitive or related to increased functional dependency

Structured preoperative assessment and optimisation of physiological status, comorbidities and geriatric syndromes using comprehensive geriatric assessment can improve preoperative health status and reduce postoperative complications

To provide such an approach the physician requires competencies in general, geriatric and perioperative medicine

**KEYWORDS:** Geriatric medicine, perioperative care, surgery ■

**Authors:** <sup>A</sup>clinical associate professor in medicine of older people, University of Nottingham, Nottingham, UK, City University, London, UK and Derby Teaching Hospitals NHS Foundation Trust, Derby, UK; <sup>B</sup>specialty registrar in geriatric medicine, Derby Teaching Hospitals NHS Foundation Trust, Derby, UK; <sup>C</sup>consultant geriatrician, Guy's and St Thomas' NHS Foundation Trust, London, UK and King's College, London, UK

discussion between healthcare professionals, patients and their carers about the risk and benefit of surgery, facilitating shared decision making. Third, it ensures a planned approach to the surgical pathway.

### Assessment and optimisation of physiological reserve

A well-recognised reason for vulnerability to perioperative decompensation is poor physiological reserve, particularly cardiorespiratory reserve. Physicians can assess cardiorespiratory reserve, using cardiopulmonary exercise testing. This is conducted using an exercise bike or treadmill and measurement of gas exchange, where a lower anaerobic threshold is predictive of adverse postoperative outcome across age groups.<sup>3</sup> Other ways of measuring cardiorespiratory reserve, which correlate with cardiopulmonary exercise testing, include the incremental shuttle walk test or gait speed. There is emerging evidence to support preoperative exercise regimens to improve physiological reserve, with benefits seen across age ranges,<sup>4</sup> but there is as yet no compelling evidence that this modifies postoperative outcomes.

### Assessment and optimisation of comorbidities

Individual conditions, common in older populations, are associated with increased surgical risk. These include anaemia, cardiac disease (especially heart failure) and diabetes. For example, those with moderate preoperative anaemia are twice as likely as those with normal haemoglobin to die or experience a complication postoperatively.<sup>5</sup> Multimorbidity is an even more potent predictor of mortality.<sup>6</sup>

Preoperative assessment in older patients should focus on both evaluation of known comorbidity and on diagnosis of previously unrecognised disease. Focus should then be on optimisation of each individual condition. This may include, for example, use of intravenous iron to reduce the requirement for blood transfusion or initiation of a beta blocker to treat atrial fibrillation and prevent uncontrolled postoperative arrhythmia. As many older patients present with multimorbidity, assessment and optimisation requires competencies in general and geriatric medicine to enable multiple conditions to be considered in parallel.

### Assessment and optimisation of geriatric syndromes

Geriatric syndromes are associated with increased operative risk. Preoperative cognitive impairment is a risk factor for postoperative delirium, indicating increased vulnerability to precipitating factors, including the duration and depth of anaesthesia and postoperative infection.<sup>7</sup> Preoperative malnutrition is associated with poorer surgical outcomes, and higher levels of preoperative dependency are associated with increased risk of postoperative institutionalisation.<sup>8</sup>

Attempts to find an overarching narrative encapsulating these vulnerabilities has led to an increased focus on frailty.<sup>9</sup> Used in this way, frailty describes a measurable and quantifiable syndrome of vulnerability to physiological insult. There is evidence that patients with greater frailty experience greater postoperative morbidity and mortality, higher lengths of stay and increased rates of postoperative institutionalisation across surgical subspecialties.<sup>8</sup> Frailty scores have been used

to augment traditional anaesthetic screening tools in older populations although quite when and how they should influence decision making remains unclear.

Once identified, geriatric syndromes can be modified by multidisciplinary interventions. Taking cognitive impairment as an example, this can be recognised, evaluated and the perioperative pathway altered to reduce the risk of decompensation. Patients can be informed of the risk of postoperative delirium and anaesthetists informed to enable modification of intraoperative monitoring and management. Ward staff working with family carers can be encouraged to adopt a systematic approach to delirium prevention, detection and management – for example using the Hospital Elder Life Programme (HELP) model.<sup>10</sup>

### Postoperative care

Postoperative medical complications are more common and are more likely to result in adverse longer-term outcomes in older patients.<sup>11</sup> These complications often occur on general surgical wards after the immediate postoperative period when anaesthetists are no longer involved. Ad hoc reviews by general or specialist medical teams can result in disjointed care.<sup>12</sup> Older patients are more likely to develop delirium, an increase in functional dependency and encounter difficult discharge planning. The role of the physician in supporting surgical teams should extend to a skilled approach to these medical, functional and discharge-related issues.

### The physician's role; the delivery of perioperative care

Perhaps the greatest challenge, given the diverse nature of the interventions described thus far, is the delivery of an integrated approach to older patients undergoing surgery. Comprehensive geriatric assessment (CGA) is defined as a 'multidimensional interdisciplinary diagnostic process focused on determining a frail older person's medical, psychological and functional capability in order to develop a coordinated and integrated plan for treatment and long term follow up'.<sup>13</sup> With a strong evidence base in other healthcare contexts, CGA has an intuitive appeal in older surgical populations. It matches well the need to bring together plans for optimisation of medical problems and geriatric syndromes. It can facilitate shared decision making, encompassing the views of patients, carers, surgeons, anaesthetists, physicians and allied health professions.

The use of CGA in older patients undergoing emergency repair of hip fracture is now well established and widely implemented. Meta-analysis of post-hip fracture orthogeriatric care has demonstrated lower mortality and length of stay for the intervention.<sup>14</sup> National audit data show that specialist geriatrician-led teams are now involved in the assessment of 88% of hip fractures within 72 hours of admission.<sup>15</sup> Harari *et al*<sup>16</sup> explored extending this precept to elective orthopaedics in an observational study, which demonstrated lower rates of postoperative incident pneumonia, delirium and pressure ulcers, and reduced length of stay after the introduction of a pre- and postoperative CGA service. This model has been further explored in elective vascular surgery, with a randomised controlled trial of CGA compared with usual care demonstrating significantly lower length of stay through

reduced medical complications and streamlined discharge planning.<sup>17</sup>

Despite these promising results, there are limited data on CGA in other surgical disciplines.<sup>18</sup> This uncertainty was evident in a survey of 161 UK acute healthcare trusts,<sup>19</sup> which described geriatric medicine services for older surgical patients as present in one third of trusts but that geriatricians played a role in preoperative assessment in only 12% of responding trusts. Confirming these findings, the UK National Emergency Laparotomy audit found that only 10% of patients over the age of 70 years undergoing emergency laparotomy had input from a geriatrician in 2016.<sup>20</sup>

These findings are at odds with national reports<sup>12</sup> that recommend geriatrician input in all complex older patients undergoing surgery. However, they reflect a growing challenge to healthcare more widely, namely that the growing need for specialist support to older patients with frailty exceeds the capacity of specialist geriatricians – either at present or based upon future projected expansion in numbers – to provide such services. If these challenges seem stark in a UK setting, where geriatricians comprise the largest physician specialty, then they are even more difficult to achieve internationally where the specialty of geriatric medicine is less well developed. There is, therefore, a need for surgeons, anaesthetists and all physicians who regularly interact with older patients to become fluent in the concepts underpinning CGA and to participate in proactive and planned care of older people.

## Conclusion

Older people are likely to continue undergoing surgical procedures at ever increasing rates. This group experience excess morbidity and mortality, which is likely to be underpinned by complex models encompassing frailty, homeostatic failure and multiple morbidity, for which chronological age acts as a proxy. Effective approaches will involve comprehensive and detailed assessment with coordinated and structured management following on from this. Geriatricians and their multidisciplinary teams cannot do this alone and there is a legitimate role for physicians from all specialties to support such initiatives. ■

## Conflicts of interest

The authors have no conflicts of interest to declare.

## References

- 1 Etzioni DA, Liu JH, Maggard MA, Ko CY. The aging population and its impact on the surgery workforce. *Ann Surg* 2003;238:170–7.
- 2 Ahamat N. Access all ages: assessing the impact of age on access to surgical treatment. *Bulletin* 2012;94:300.
- 3 West M, Jack S, Grocott MPW. Perioperative cardiopulmonary exercise testing in the elderly. *Best Pract Res Clin Anaesthesiol* 2011;25:427–37.
- 4 Myers J, McElrath M, Jaffe A *et al.* A randomized trial of exercise training in abdominal aortic aneurysm disease. *Med Sci Sport Exerc* 2014;46:2–9.
- 5 Partridge J, Harari D, Gossage J *et al.* Anaemia in the older surgical patient: a review of prevalence, causes, implications and management. *J R Soc Med* 2013;106:269–77.
- 6 Roche JJ, Wenn RT, Sahota O, Moran CG. Effect of comorbidities and postoperative complications on mortality after hip fracture in elderly people: prospective observational cohort study. *BMJ* 2005;331:1374.
- 7 Rudolph JL, Jones RN, Rasmussen LS *et al.* Independent vascular and cognitive risk factors for postoperative delirium. *Am J Med* 2007;120:807–13.
- 8 Partridge JSL, Harari D, Dhesei JK. Frailty in the older surgical patient: a review. *Age Ageing* 2012;41:142–7.
- 9 Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. *Lancet* 2013;381:752–62.
- 10 Reuben DB, Inouye SK, Bogardus ST *et al.* MODELS OF GERIATRICS PRACTICE; The Hospital Elder Life Program: A Model of Care to Prevent Cognitive and Functional Decline in Older Hospitalized Patients. *J Am Geriatr Soc* 2000;48:1697–706.
- 11 Polanczyk CA, Marcantonio E, Goldman L *et al.* Impact of age on perioperative complications and length of stay in patients undergoing noncardiac surgery. *Ann Intern Med* 2001;134:637–43.
- 12 National Confidential Enquiry into Perioperative Deaths. *An age old problem - a review of care received by elderly patients undergoing surgery*. London: NCEPOD, 2010.
- 13 Rubenstein LZ, Stuck AE, Siu AL, Wieland D. Impacts of geriatric evaluation and management programs on defined outcomes: overview of the evidence. *J Am Geriatr Soc* 1991;39:8S–16S.
- 14 Grigoryan KV, Javedan H, Rudolph JL. Orthogeriatric care models and outcomes in hip fracture patients: a systematic review and meta-analysis. *J Orthop Trauma* 2014;28:e49–55.
- 15 Royal College of Physicians of London. *National Hip Fracture Database annual report 2016*. London: RCP, 2016.
- 16 Harari D, Hopper A, Dhesei J *et al.* Proactive care of older people undergoing surgery ('POPS'): designing, embedding, evaluating and funding a comprehensive geriatric assessment service for older elective surgical patients. *Age Ageing* 2007;36:190–6.
- 17 Partridge JSL, Harari D, Martin FC *et al.* Randomized clinical trial of comprehensive geriatric assessment and optimization in vascular surgery. *Br J Surg* 2017;104:679–87.
- 18 Partridge JSL, Harari D, Martin FC, Dhesei JK. The impact of pre-operative comprehensive geriatric assessment on postoperative outcomes in older patients undergoing scheduled surgery: a systematic review. *Anaesthesia* 2014;69:8–16.
- 19 Partridge JSL, Collingridge G, Gordon AL *et al.* Where are we in perioperative medicine for older surgical patients? A UK survey of geriatric medicine delivered services in surgery. *Age Ageing* 2014;43:721–4.
- 20 NELA Project Team. *The second patient report of the National Emergency Laparotomy Audit*. London: Royal College of Anaesthetists, 2016.

**Address for correspondence: Dr Adam Gordon, Division of Medical Sciences and Graduate Entry Medicine, University of Nottingham, Derby Medical School, Royal Derby Hospital, Derby DE22 3NE, UK.**  
**Email: Adam.Gordon@nottingham.ac.uk**