

# A More Collaborative and Integrated Approach for Elderly Patients Undergoing Major Gastrointestinal Surgery

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Many developed countries in the world today are dealing with the problem of an aging population. In Singapore, the population over the age of 65 years rose from 6.0% in 1990 to 11.2% in 2014 and is expected to be around 25% by 2030.<sup>1</sup> This trend will naturally translate into an escalating number of elderly patients requiring surgery. The management of an elderly patient undergoing surgery is fraught with complexities as elderly patients have a higher incidence of comorbidities and reduced functional reserves. Consequently, they have been shown to have poorer post-operative outcomes. A study of 125 octogenarians who underwent major abdominal surgery found a 30-day mortality of 5.6%, but this risk was reduced with elective surgery with 82.8% of elective patients able to return to their pre-morbid functional status.<sup>2</sup> Furthermore, what differentiates them from the younger population is their own intentions and expectations when they agree to undergo surgery. Long-term survival is often not as important as a return to pre-morbid function and the retention of functional independence.<sup>3</sup> There are numerous studies on postoperative outcomes in elderly patients that miss this point by focusing on mortality and morbidity as the most important outcomes, when it is the functional outcome that matters most to the patient.

The process of aging results in a complex array of anatomical and physiological changes that may result in a progressive decline in functional capacity and reserves. This impairs the compensatory response that the body can mount in the face of disease or the stress of major surgery. Consequently post-surgical complications tend to have a greater impact in an elderly patient, resulting in poorer outcomes. These physiological changes may also result in the manifestation of atypical or diminished clinical features when these complications develop. The impact of aging on the major systems in the body

contributes to the reduced functional reserve.

Normal physiological changes of the cardiovascular system coupled with the increased incidence of cardiac disease the elderly patients contribute to greater perioperative cardiac risk. Changes to the respiratory system increase an elderly surgical patient's susceptibility to pneumonia and the severity of this complication. Reduced renal physiological reserves results in increased sensitivity to nephrotoxic drugs and renal dysfunction from surgical stress. The nutritional status of elderly patients tends to be poorer owing to a loss of appetite and the bacterial overgrowth of the intestines. The association between malnutrition and adverse surgical outcomes is well established in literature. With increasing age, there is a greater prevalence of dementia and a greater risk of post-operative delirium. The development of postoperative delirium is associated with prolonged hospitalization, impaired functional recovery and increased mortality. Postoperative cognitive impairment is also an area of concern in elderly patients. Understanding the changes associated with aging allows the surgeon to anticipate problems that an elderly surgical patient may encounter and overcome them or preferably to prevent them. Furthermore, it establishes the need for a different approach when it comes to the management of an elderly patient undergoing major gastrointestinal surgery

While there are numerous aging-related anatomical and physiological changes that may affect postoperative outcomes, it is important to note that there is significant heterogeneity in the elderly, hence the need to perform a comprehensive preoperative geriatric assessment, allowing the surgeon to perform risk stratification and individualize the preoperative considerations and interventions for an elderly patient. Frailty assessment has emerged in recent years as an important tool for evaluating an elderly patient's functional reserve and resilience to insult from surgery. While the definition and application of frailty is still controversial, it is accepted that the core features include impairments in multiple, interrelated systems resulting in a reduced ability to tolerate stressors. One widely used definition uses the Fried criteria.<sup>4</sup> The presence of frailty is determined by the assessment of weight

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loss, physical exhaustion, grip strength and walking speed. What is interesting about frailty is that patients with multiple comorbidities may not fulfill the criteria of frailty while some patients with no comorbidities may show classic signs of frailty. In our institution, frailty was studied in elderly patients undergoing colorectal cancer resections, and the odds ratio for the development of major postoperative complication was 4.083 (95% confidence interval, 1.433-11.638) for patients who fulfilled the criteria for frailty.<sup>5</sup> Another common tool used especially for elderly is the Charlson Weighted Comorbidity Index, which assigns a weighted value to various medical conditions, with an aggregate score allowing the clinician to quantify a patient's comorbidities.<sup>6</sup> The Barthel Index is also a useful tool for assessing a surgical patient's functional status.<sup>7</sup> It gives a pinpoint assessment of a patient's preoperative functional status but can also be used as yardstick in a patient's postoperative recovery and return to original function. The Physiological and Operative Severity Score for the Enumeration of Mortality and morbidity (POSSUM) and colorectal POSSUM scores are based on a patient's physiological and operative parameters and has been validated as a useful tool for predicting operative morbidity and mortality.<sup>8,9</sup> Other tools for pre-operative assessment include conventional biochemical markers including albumin, renal function and a full blood count.

The traditional approach adopted by most centers for major surgery is multidisciplinary, with the surgeon taking on the role of a gate-keeper and determining which other disciplines should be involved in the care of the patient. Each

member of this team fulfils a specified role and provides input according to his or her own expertise. Communication between the various disciplines is often limited to written entries in patient case notes or to specified team meetings if any at all. This model of care is fragmented and lacks coordination, with individual team members working in silos. With the surgeon as gate-keeper, an elderly patient may be cared for by a different combination of specialists dependant on the surgeon's individual practice and inclinations. Aspects of care which a complex elderly surgical patient would benefit from could be neglected. The timing of referrals determines the degree of impact that specific subspecialty interventions would have. For example, the impact of physiotherapy would be maximized if a referral was initiated preoperatively, allowing room for the optimization of lung function and muscle strength as well education on breathing exercises. Multidisciplinary care is suboptimal due to its inherent pitfalls, which include a failure in shared vision, poor planning and coordination, ineffective communication and a failure in completion and follow-through.<sup>10</sup> A collaborative transdisciplinary model of care aims to break these boundaries by dispensing with hierarchy and promoting free flowing and ongoing communication between members. Transdisciplinary care is coordinated, seamless and aims to improve constantly, with the main aim to provide an integrated and coordinated assessment and care plan for an elderly surgical patient.

Since 2007, the Geriatric Surgery Service has implemented a transdisciplinary model of care in the Alexandra Health System, Singapore. The team comprises of the personnel listed

**Table 1.** The alexandra health transdisciplinary geriatric surgery service

Surgeon	The surgeon is the primary physician of the patients. He directs and heads the Geriatric Surgery Service. He also frequently attends courses and conferences on geriatric patients and has a good understanding of the physiology of geriatric patients and the potential problems faced.
Dedicated nurse clinician	She coordinates the team and functions as the "hospitalist" of the team. She has an important role in directing proper nursing care of these geriatric patients and ensures the input from all members of the transdisciplinary team. She plays a key role in the education of patients and their families on nursing issues.
Anesthetists	They assist in the preoperative assessment and direct necessary investigations. They also formulate an anesthesia plan. They have a special interest in geriatric patients
Geriatric medicine physician	He assists in optimization of physical status and management of comorbidities preoperatively and follows up closely in the postoperative period for early pick up and help in management of medical complications.
Cardiologist	He gives input with regard to cardiac assessment. He will direct preoperative optimization and manage postoperative cardiac issues.
Physiotherapist	She assesses the patients' preoperative function and starts patients on preoperative physiotherapy and devise a rehabilitation plan. She instructs the patients and families on various perioperative exercises.
Dietitian	She assesses patients' nutrition and optimizes it during the perioperative period.
Medical social worker	She identifies family and financial issues and plans early regarding postoperative placement.
Pharmacist	She does medication reconciliation for the elderly patients at first contact and during the perioperative period.
Befriender	She befriends the elderly patient and provides conversation in an attempt to provide "food for the soul."

**Table 2.** Selection criteria for prehabilitation/rehabilitation

Criteria	Selection Criteria				
	Prehabilitation		Postoperative Rehabilitation		
	Day Rehabilitation Centre	Home Prehabilitation	Criteria	Home Rehabilitation	Inpatient Rehabilitation
Charlson Comorbidity Index	>3	>3	Charlson Comorbidity Index	>3	>3
Frailty Syndrome	Positive	Positive	Frailty Syndrome	Positive	Positive
Mobility	Moderate	Poor to moderate	Peri-operative complication(s) requiring more specific care	Negative	Positive

in Table 1, with each member of the team delivering care according to their domain expertise. The key components of the transdisciplinary model of care are active patient involvement, early identification of the key goals for treatment, enhanced coordination and heightened communication between team members, role enhancement and the team's involvement from start to finish.<sup>11</sup> The Service provides collaborative transdisciplinary care for elderly patients requiring surgery, with all members of the team involved from the beginning, removing the need for interdepartmental referrals. The patient is recruited as a member of the team and common goals are established through a stepwise consenting process. There is open communication between members through formal meetings, frequent ad hoc discussions, documentation in case notes and multimedia interaction facilitated by the current technology and information revolution.

Beyond the standard preoperative optimization for comorbidities, there is an emphasis on prehabilitation, which includes preoperative education, nutrition and physiotherapy. Preoperative physiotherapy has the goal of increased mobilization, muscle strengthening and optimization of lung function. The selection criteria that the Service uses to determine the need for prehabilitation or postoperative rehabilitation is shown in Table 2. Prehabilitation begins at least two weeks prior to surgery and may either involve regular visits to a day rehabilitation center or a twice weekly home visit for patients on home prehabilitation. Active and enhanced rehabilitation is initiated postoperatively, with care taken to address geriatric issues which include the prevention of postoperative delirium. There is an emphasis on adequate pain management and early postoperative mobilization. Care does not stop with discharge but continues into the outpatient and community setting. The Service continues to provide home based rehabilitation after discharge to ensure a return to the preoperative functional state and quality of life through home visits.

The transdisciplinary approach is subject to constant review of processes and outcomes with the long-term aim of monitoring adherence to standards of care and for further quality

improvement. Members of the team seek to enhance their roles by acquiring knowledge to improve their capabilities within their fields but enrich themselves by mutual learning about other team member's disciplines.

The Geriatric Surgery Service maintains a robust database for the review of outcomes. In 2009, outcomes from 29 patients managed by the Service was compared to 52 patients who underwent standard treatment. Despite higher POSSUM scores, patients managed under the Service had fewer major complications, reduced 30-day mortality rates and shortened postoperative stays. The Geriatric Surgery Service was also able to produce a trend toward consecutive desired outcomes, demonstrated by a CUSUM curve with a sustained downward slope, a trend which was not demonstrated by patients who underwent standard treatment.<sup>12</sup> From 2007 to 2011, a study of 47 patients managed by the Geriatric Surgery Service revealed that 83% of patients had returned to their preoperative functional status by 6 weeks after surgery. This figure rose to 93.6% at a mean of 91.2 weeks of follow up.<sup>13</sup> Excellent functional outcomes were achieved with a dedicated approach that looks beyond morbidity and mortality as the main goals for a patient undergoing surgery. We also have preliminary data that suggest that the handling of complications through a transdisciplinary approach gives rise to superior outcomes. The medium term survival data of 71 patients who underwent major colorectal resections under the Geriatric Surgery Service until 2013 showed a mean survival time of 205 weeks for all patients, with frailty and a poor Barthel index emerging as negative prognostic factors.

Elderly surgical patients represent a complex challenge that will only grow with an aging population and there is no doubt that they will benefit from a holistic approach. Transdisciplinary care provides an optimal medium for the holistic care of elderly patients undergoing major gastrointestinal surgery.

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