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Optimising the Use of Procedural Beds: Time for an Intervention

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Abstract

Aims

The aim of this study was to assess the healthcare needs of patients admitted to a general surgical ward based on age and to determine the number of bed days used per procedure performed for each age category.

Methods

Surgical admissions over a 4-week period were followed from admission until discharge. Patients were divided into two groups based on age (under 65 and over 65). Pre-existing medical conditions, admitting diagnoses, inpatient healthcare requirements and length of stay were compared between the groups.

Results

The over 65s group required fewer procedural interventions, had the longest length of stay and required more medical consults and input from the allied health multidisciplinary team. The ratio of bed days used to procedures performed was lower in the under 65s group (17.2 days per procedure performed) compared to the over 65s group (48.3 days per procedure performed).

Conclusion

Optimising the use of procedural intervention beds will require changes in practice to ensure that these beds are allocated solely to patients requiring an intervention. Our research suggests that developing alternative pathways for patients with non-operative conditions may result in more efficient use of beds designated for procedural interventions.

Keywords: Service planning; emergency general surgery; ambulatory surgery; surgical geriatrics

Introduction

The World Health Organization estimates that the proportion of the world's population that is over 60 years of age will almost double from 12% to 22% between the years 2015 and 2050[1]. The ageing population is just one of the factors that has already begun to create significant challenges for the delivery of high-quality and timely surgical care for the entire population. Surgical care of the older patient has distinct characteristics including different pathology, different pathophysiology, higher risks, more adverse outcomes, longer length of inpatient stay as well as complex ethical and medicolegal issues[2]. Emergency general surgical admissions include a wide variety of conditions that can be managed using conservative, endoscopic, radiological and operative approaches. The acute surgical condition that precipitates admission to hospital may have significant deleterious effects on the older patient and can interact in a negative way with their pre-existing comorbidities, often more so than in younger patients[3]. This phenomenon has been recognised in several specialties including general surgery and the significance of pre-existing frailty and debilitation is better understood now than ever before[4]. Many patients admitted to beds designated for procedural interventions never actually require an intervention, this results in further delays for those in genuine need of a procedure. There is a paucity of data regarding the need for procedural intervention based on age in patients admitted to an emergency general surgical ward. The aim of this study was to assess the in-hospital journey, the needs of patients and the healthcare resources utilised by those admitted to a general surgical unit under the age of 65 and over the age of 65. This study also aimed to determine the number of bed days used per procedure performed for each age category and to determine what groups of patients might be suitable for treatment through alternative pathways.

Methods

All admissions to the department of General Surgery over the 4-week period from August 23rd 2021 to September 19th 2021 were included for analysis. The following details were captured from each patient's admission; age, gender, admission from home or care facility, number of pre-existing conditions, number of pre-existing medications, reason for admission, need for intervention (endoscopic, radiological or surgical), type of intervention, requirement for ICU admission, in-hospital mortality, length of stay (LOS), requirement for medical input, requirement for multidisciplinary team (MDT) input, unplanned readmission within 30 days of discharge, readmitting specialty, reason for readmission and inpatient death on readmission. The MDT included members of physiotherapy, occupational therapy, speech and language therapy, nutrition and dietetics as well as social work. Patients were then divided into an under 65s group and an over 65s group for comparison. Based on our data, the predicted number of emergency general surgery bed days used per year for each group was calculated.

A ratio of annual emergency general surgery bed days used to emergency interventions performed for each group was calculated by multiplying the mean number of bed days used by the number of patients admitted in the four-week period and the product of this was then multiplied x 13, this was then divided by the product of the number of procedures performed in the 4-week figure multiplied x 13. Statistical analysis was carried out using GraphPad Prism version 9.3.1 (350). The groups were compared using Fisher's exact test and the Mann Whitney test. A p value <0.05 was considered significant.

Results

252 patients required emergency admission during the 4-week study period, 64.7% of whom were under 65 and 35.3% of whom were 65 or older. The median age was 43 in the under 65s group and 77 in the over 65s group. There was no difference in gender distribution (female = 48.5% vs 48.3%, p=1.00). As expected, the over 65s were more likely to be admitted from a care facility (0.6% vs 9.0%, p=0.001). The over 65s had more pre-existing conditions (median = 1 vs 5, p<0.0001) and were taking more medication (median = 1 vs 7, p<0.0001). The surgical conditions that determined the need for admission in both groups are shown in Table 1. Acute appendicitis was the most frequent reason for admission in the under 65s (18.4% vs 5.6%, p<0.01), whereas gallstone and biliary disease was the most frequent reason for admission in the over 65s (9.8% vs 18.0%, p=0.08). Malignancies of the gastrointestinal tract (1.2% vs 9.0%, p<0.01) and constipation (0.0% vs 4.5%, p=0.01) were diagnosed more frequently in the over 65s group. The over 65s group were more likely to require a consult from a medical team (25.8% vs 41.6%, p=0.01) and were more likely to require input from a member of the allied health MDT (24.5% vs 44.9%, p=0.001). While the over 65s group were less likely to require a procedural intervention (42.9% vs 29.2%, p=0.04) [See Table 2], they still had a longer LOS (median = 3 days vs 7 days, p<0.001). There was no difference between the groups in the ICU admission rate (5.5% vs 3.4%, p=0.55) or the in-hospital mortality rate (1.2% vs 3.4%, p=0.35). Unplanned readmission rates within 30 days of discharge were similar between the two groups (8.0% vs 14.6%, p=0.13). While readmission with a medical issue was more frequently observed in the over 65s group, this was not statistically significant (7.7% vs 23.1%, p=0.59). The in-hospital mortality rate amongst those who were readmitted was higher in the over 65s group, however, it was not statistically significant (0.0% vs 15.4%, p=0.48). The estimated number of annual emergency general surgery bed days used was 15,681 in the under 65s and 16,314 in the over 65s. The estimated ratio of bed days used per procedure performed was 17.2 in the under 65s and 48.3 in the over 65s. There was no difference in the median LOS between patients undergoing and not undergoing an intervention in the under 65s group (median = 3 days vs 3 days, p=0.84). Patients in the over 65s group who underwent an intervention had a longer median LOS than those who did not (median = 7 days vs 5 days, p<0.05). The LOS was longer in the over 65s group not undergoing an intervention compared to the under 65s group not undergoing an intervention (median = 3 days vs 5 days, p=0.01). Similarly, the LOS was longer in the over 65s group undergoing an intervention compared to the under 65s group undergoing an intervention (median = 3 days vs 7 days, p=0.001).

	Under 65 (n=163)	Over 65 (n=89)	
Acute appendicitis	18.4% (n=30)	5.6% (n=5)	**P<0.01**
Gallstone & biliary disease	9.8% (n=16)	18.0% (n=16)	P=0.08
Acute Diverticulitis	8.0% (n=13)	6.7% (n=6)	P=0.81
Cellulitis/skin & soft tissue infection	7.4% (n=12)	9.0% (n=8)	P=0.63
Acute proctology issues	6.7% (n=11)	2.2% (n=2)	P=0.15
Intestinal obstruction	6.1% (n=10)	6.7% (n=6)	P=1.00
Acute/Chronic pancreatitis	4.3% (n=7)	4.5% (n=4)	P=1.00
Thoracoabdominal trauma	4.3% (n=7)	5.6% (n=5)	P=0.76
Terminal ileitis/Colitis/Adenitis	4.3% (n=7)	3.4% (n=3)	P=1.00
Abdominal wall hernia	3.1% (n=5)	4.5% (n=4)	P=0.72
Traumatic intracranial injury/facial injury	4.3% (n=7)	4.5% (n=4)	P=1.00
Benign gynaecology	3.7% (n=6)	0.0% (n=0)	P=0.09
Complications of elective surgery	2.5% (n=4)	2.2% (n=2)	P=1.00
Oesophagogastric/HPB emergencies	4.9% (n=8)	3.4% (n=3)	P=0.75
Intraabdominal abscess	2.5% (n=4)	1.1% (n=1)	P=0.66
Intestinal perforation/ischaemia	2.5% (n=4)	3.4% (n=3)	P=0.70
GI tract malignancy	1.2% (n=2)	9.0% (n=8)	**P<0.01**
Non-specific abdominal pain	1.2% (n=2)	0.0% (n=0)	P=0.54
Urology emergencies	2.5% (n=4)	1.1% (n=1)	P=0.66
Breast pathology	1.2% (n=2)	0.0% (n=0)	P=0.54
Gastrointestinal haemorrhage	1.2% (n=2)	4.5% (n=4)	P=0.19
Faecal loading	0.0% (n=0)	4.5% (n=4)	**P=0.01**

GI = gastrointestinal; HPB = hepatopancreaticobiliary

Table 1: *Final diagnoses in both groups.*

	Under 65 (n=70)	Over 65 (n=26)
Appendicectomy	40.0% (n=28)	19.2% (n=5)
Incision and drainage	17.1% (n=12)	7.7% (n=2)
Emergency laparotomy	14.3% (n=10)	11.5% (n=3)
IR guided procedure	11.4% (n=8)	11.5% (n=3)
Hernia repair	7.1% (n=5)	11.5% (n=3)
Cholecystectomy	2.9% (n=2)	7.7% (n=2)
ERCP	4.3% (n=3)	15.4% (n=4)
Therapeutic endoscopy	2.9% (n=2)	7.7% (n=2)
Craniotomy	0.0% (n=0)	3.8% (n=1)
Chest drain insertion	0.0% (n=0)	3.8% (n=1)

IR = interventional radiology; ERCP = endoscopic retrograde cholangiopancreatography

Table 2: *Procedures carried out in both groups.*

Discussion

The data from this study highlights the reality that patients over 65 years of age have a more complex inpatient journey when admitted to an acute general surgical ward. Many of the over 65s group are admitted to hospitals from care facilities with complex medical backgrounds. There are also issues regarding polypharmacy and in some cases, this may precipitate or exacerbate their problem, this is particularly true regarding the use of anti-platelet and anti-coagulant agents. The data above reflects the obvious reality that younger patients tend to be admitted with diseases where the aetiology is an acute inflammatory process, such as appendicitis, that can be resolved rapidly with an intervention or with antibiotics. The older cohort tend to present with a similar spectrum of acute inflammatory illnesses, although there is some evidence from our data that this cohort may be more likely to present emergently with a first presentation of a subacute pathology such as a gastrointestinal tract malignancy. As demonstrated by the data from this study, the younger group are more likely to require an intervention, whereas many patients in the older group require a conservative approach to their problem with greater reliance on the allied health MDT. The excess length of stay seen in the older group begins to make sense when one considers the likely differences in the preadmission baseline of each group of patients, the potential need for rehabilitation in the older group during their hospital stay and the variation in the spectrum of diseases between the groups with implications for investigations and duration of treatment.

The findings of this study raises questions regarding the optimal use of beds designated for procedural interventions in our hospital. The current system has a fixed number of beds assigned for patients who require an intervention, however, a significant number of these beds are occupied by patients who will never require any form of procedural intervention[5]. Furthermore, our data has shown that the patients over 65 who do not require a procedural intervention stay longer than patients under 65 who also do not require a procedural intervention. This creates a significant backlog and delays access to timely endoscopy, interventional radiology and surgical procedures for those who need it, potentially resulting in excess morbidity, longer hospital stays and increased cost of healthcare[6-8]. Of course, the problem is extremely complex and underpinned by the fact that patients are often admitted with undifferentiated problems that require diagnostic radiology as a first step. Furthermore, many conditions that require a conservative approach still fall under the remit of the general surgeon. There are however many patients admitted to surgical wards that don't require care by a general surgeon or the delivery of specialist surgical nursing care. This might be changed with early access to diagnostic imaging to aid with informed decision making at the point of entry to the hospital. A clear diagnosis at the time of presentation may facilitate safe discharge back to a care facility or a step-down facility, the construction of an appropriate outpatient plan, referral to a community team or in cases where admission is required but no procedure is needed, the patient can be admitted to a non-procedural intervention bed.

Another option is to consider admitting all patients regardless of age with non-operative conditions such as rib fractures, head injuries, cellulitis and malignancies that are advanced at the time of diagnosis under the care of an internist or an acute care physician. A member of the surgical team could consult on these patients where necessary. A system of this nature would ensure that procedural beds are kept free for those who need them while also ensuring that patients with non-operative conditions receive the medical care, surgical care and allied health care that they need. Ideally, the number of beds available in step-down facilities would be increased to facilitate the movement of these patients once their acute issue is resolved, otherwise the fixed number of non-procedural beds would quickly become blocked. Improving access to ambulatory care could also help reduce the number of patients admitted to procedural intervention beds. If patients had guaranteed access to outpatient diagnostic imaging and outpatient conservative treatment options such as intravenous antibiotics, surgeons would feel more confident managing these patients in the community. In addition to freeing up procedural intervention beds, ambulatory care would likely be more cost-effective than inpatient care for many of these conditions. Other options include the use of Clinical Decision Units (CDUs) run by physicians from the emergency department and the introduction of Emergency Department in the Home (EDITH), the latter has been commenced in our department and has resulted in some reduction in the number of patients having to physically attend the hospital for diagnosis and treatment. These measures could ensure adequate availability of dedicated procedural intervention beds with appropriate pre and post-procedural nursing for those who actually need such resources. This is relevant now more than ever as cancellations of elective surgery during the last 2-years has resulted in longer waiting lists and more patients are attending hospitals with emergency presentations of undiagnosed or underlying conditions that they are awaiting procedural intervention for[9, 10].

Many procedural intervention beds are occupied by patients of all ages who do not require an intervention. Procedural intervention beds are an important resource and we must ensure optimal allocation of these beds to help reduce the delay in time to theatre or other intervention for those who need it. Improving access to diagnostic imaging at the time of entry to the hospital may help to stratify patients into procedural requiring and non-procedural requiring groups, thus allowing optimal use of scarce procedural intervention beds. Greater access to ambulatory care, the use of CDUs, increased capacity of convalescence and rehabilitation beds and a change to current practice regarding who manages non-operative conditions are other mechanisms that may help to ensure more efficient use of procedural intervention beds. Our novel measure using the ratio of bed days used to procedures performed has demonstrated that we are not using procedural intervention beds efficiently. We must work harder to ensure that these beds are preserved for patients requiring an intervention who also need access to perioperative nursing, intensive pre and post-operative monitoring and members of the extended surgical team.

Declaration of Conflicts of Interest: The authors have no conflicts of interest or competing interests to declare.

Ethical Approval: Approval for this study was granted by our institutional audit committee.

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