Can we rationalise ICU utilisation after emergency laparotomy? A review of current practice

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INTRODUCTION

ICU is a scarce resource, especially during the COVID-19 pandemic. Patients undergoing emergency laparotomy are frequently admitted to the ICU at Glasgow Royal Infirmary, which provides both HDU and ICU care, at the discretion of anaesthetists, surgeons and intensivists. This is somewhat at odds with the more formalised approach taken by national guidelines, which suggest that ICU admission be considered primarily in those patients at higher risk (deemed as estimated mortality >5%).

We analysed patients admitted to ICU from the 1st year of the Emergency Laparoscopic and Laparotomy Scottish Audit (ELLSA), starting November 2017, to outline our utilisation of ICU in these patients and identify potential for more rational use of this resource. The project was registered with and approved by the departmental audit and quality improvement group.

METHODS

Patients admitted to our ICU were prospectively recorded as part of the ELLSA project. We then undertook a retrospective analysis of the anaesthetic charts, operation notes and ICU notes together with radiology and laboratory data to establish their estimated mortality risk, and their treatment outcomes in the ICU.

Where prospectively recorded, estimated mortality using either NELA or p-Possum were used. Where not prospectively recorded, NELA scoring was done using the preoperative data.

We collected data on organ support on arrival, as well as highest level of organ support needed. Patients were categorised as either level 1+, 2 or 3 according to the level of support needed (see figure 1)

10 patients who were already in ICU before laparotomy were excluded, as were two who had been incorrectly coded as having emergency laparotomy, one who had been incorrectly coded as being admitted to ICU, and one in whom sufficient notes were not available, leaving 101 patients for review.

RESULTS

Patients were grouped into low risk (<2% estimated mortality), intermediate risk (2-5% estimated mortality) or high risk (>5% estimated mortality) and data analysed separately for each (see Fig 2).

Approximately 24% of our patients were defined as low risk, and of these only one in five required organ support in any form on admission. There were no escalations of care or ICU deaths in this group. Despite this, these patients occupied ICU beds for almost 3 days each, on average.

The high risk patients made up 64% of ICU admissions, however only just over half were receiving organ support on arrival to the unit. 4 of these patients (15% of the high risk group receiving level 1+ care on admission) went on to require level 2 care having not required organ support on admission. No patients escalated from level 1+/2 to level 3 care. 8 patients (12% of all the high risk group) died in ICU, all of whom had been receiving organ support on admission. The high risk group had on average 82 hours from ICU admission until the last organ support was withdrawn, but spent almost double this time in total in ICU.

DISCUSSION

Patients at apparently low risk of mortality are frequently admitted to our ICU, even in the absence of any requirement for organ support. The prognosis for these patients is excellent, with no deaths or requirements for escalation of care seen in this year's worth of data. This calls into question whether ICU care is truly warranted in this patient group. If low and intermediate risk patients not requiring organ support were not admitted to our ICU, we would have saved 89.5 bed days over the year.

In addition, patients in all risk groups frequently stay in our ICU far longer than the period of time they require organ support. Thus, a large amount of time is spent in our unit providing Level 1+ care. Had the patients in the high risk group all been discharged from ICU once their organ support ended, we could have saved an additional 195 ICU bed days over the year.

The likely reason for most of the extended stays in ICU is a desire for enhanced monitoring and nursing supervision. These data should reassure us that escalation of care in those who are receiving level 1.5 care on arrival to ICU is very rare, especially in the group with low predicted mortality. In our group of 101 patients, all four examples of escalation of care (beyond the level being provided on arrival to ICU) occurred in the high risk group. They included:-

- Two patients who had a very brief (<2hr) period of basic organ support, one respiratory and one cardiovascular. It could be argued that neither of these patients truly needed such support
- One patient had been on noradrenaline in theatre, which was weaned off prior to ICU admission. Several hours later it required to be restarted but was weaned off again within 24hrs of ICU admission
- One patient had an anastomotic leak resulting in septic shock requiring noradrenaline several days into his ICU stay

Death in ICU was also a relatively rare event in our patient cohort, with all deaths occurring in the high risk group, and furthermore all were receiving level 2 or 3 care on admission to ICU.

RECOMMENDATIONS

1) Formal risk scoring using a validated tool such as NELA should be undertaken for all emergency laparotomy patients
2) Low/intermediate risk patients not requiring organ support at the end of the operation should be transferred from theatre to a level 1+ area if felt to require enhanced care, and not to ICU
3) Selected patients from the high mortality risk group who are not requiring organ support at the end of the operation may also be safely cared for in a level 1.5 area, however further data is needed to aid in identifying these patients prospectively
4) Patients in all risk groups who are admitted to ICU and then weaned off organ support could be considered for step down to a level 1+ area until ready for general ward care, rather than remaining in ICU

Fig 1 – Levels of Care	
Level 1+	Enhanced care and monitoring without organ support
Level 2	Basic cardiovascular support (i.e. one vasopressor) or basic respiratory support (i.e. nasal high flow, CPAP/NIV, >50% oxygen by mask)
Level 3	Invasive ventilation, renal replacement therapy or multi-organ support

Fig 2 – Results by risk group

Mortality risk	Number of patients	Level 1+ care on admission	Level 2 care on admission	Level 3 care on admission	Level 1.5 patients requiring subsequent level 2/3 care	ICU mortality	Mean hours to last organ support	Mean hours to ICU discharge
0-2% (Low)	24	79%	8%	12%	0%	0%	16	67
2-5% (Intermediate)	12	33%	17%	50%	0%	0%	62	139
>5% (High)	65	42%	26%	35%	15%	12%	82	155