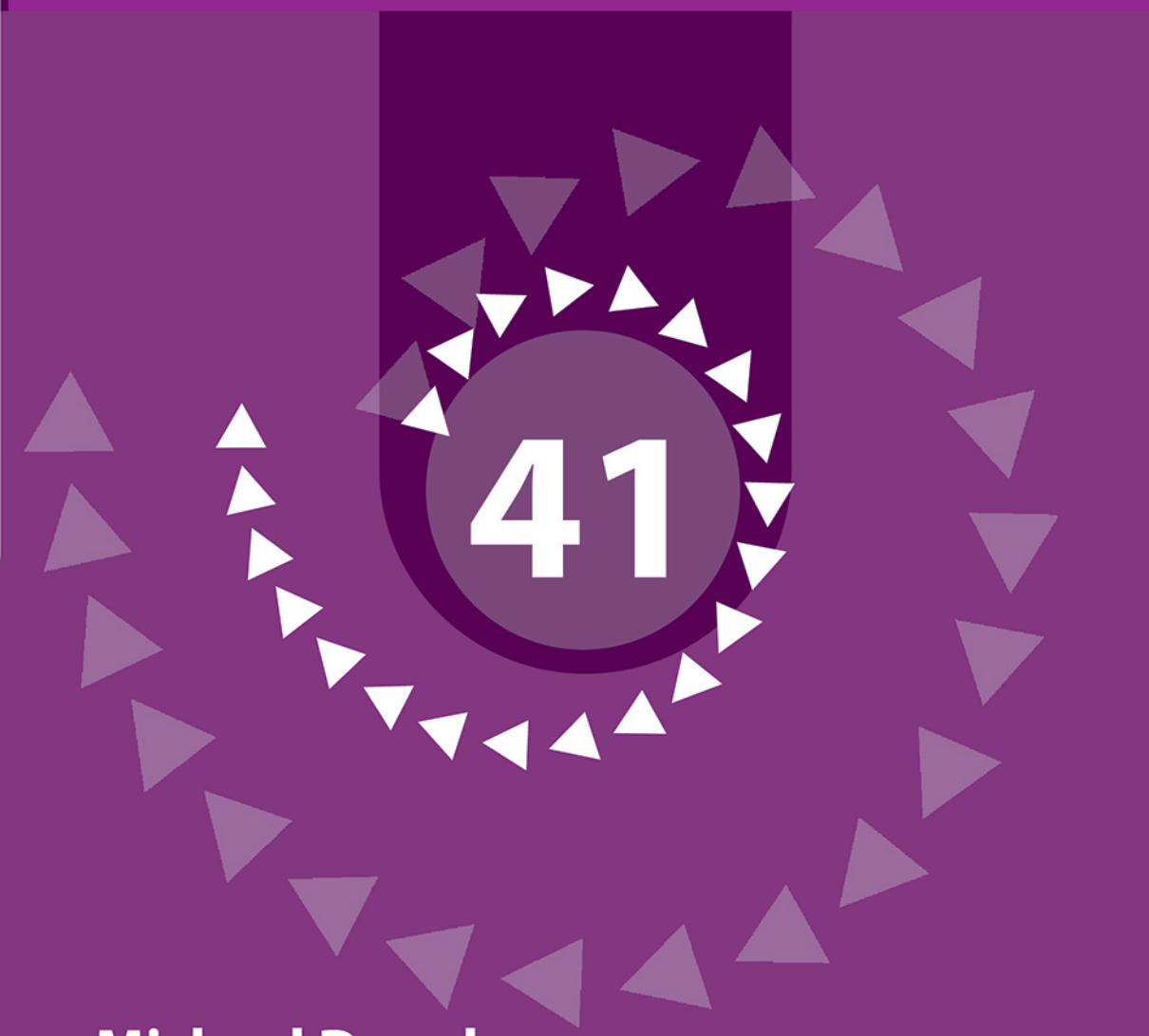
Recent Advances in Surgery



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Section 2

Emergency surgery

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Chapter 4

Improving outcomes in emergency surgery

Sachal Safdar, Peter McCulloch, Giles Bond-Smith

ABSTRACT

The outcomes of emergency abdominal surgery are significantly worse than those of equivalent elective operations. Part of this disparity is due to the poorer systems available for managing these patients. Improving outcomes, therefore, requires a focus on system improvement.

Management should optimise rapid diagnosis and decision making by involving experienced clinicians in manning ambulatory assessment units, with point-of-care testing and rapid imaging. Preoperative assessment and preparation should involve anaesthetists and physicians, using standardised protocols. Teamwork training can enhance staff co-operation and reduce intrateam barriers.

Timely access to theatre and postoperative intensive care are essential. Surgery should be conducted by appropriately skilled operators and systems should encourage seeking senior help early. Standardised intraoperative care and pain relief protocols should be designed by anaesthetists within the multidisciplinary team.

Early mobilisation programmes can minimise hospital stay. Detection and effective management of complications is facilitated by 'resilient' escalation processes, and standardised communication tools.

BACKGROUND

The impact of emergencies on hospital workload can be judged by the fact that, at any one given time, half of all beds in the UK are occupied by patients admitted as an emergency [1], with this proportion still increasing [2]. Emergency surgery outcomes are invariably much worse than for equivalent elective surgery [3] and up to 15% of patients who undergo emergency surgery are readmitted within 30 days of discharge [4]. Part of this is because

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of the nature of the patient population – often, these patients have advanced disease and acute decompensation, and tend to be older and in poorer general health than elective surgery patients [5]. Resource allocation also tends to be structured around predictable elective surgery and the extent to which accommodation is made for emergencies is variable and frequently inadequate. Not surprisingly, round-the-clock access availability of emergency surgeons and nurses is linked to better outcomes.

Urgency, along with prioritisation of elective work, combines to ensure processes for emergency surgery is often substandard compared to elective work – unfamiliar teams with less experienced surgeons, often fatigued and with much less support than for elective surgery in terms of imaging, laboratory services, intensive care, physiotherapy, etc. Emergency surgery volume for each surgeon is also linked to better outcomes – demonstrating the need for better clinical pathways for more inexperienced surgeons.

Systems analyses and audits of critical incidents [e.g. The National Confidential Enquiry on Perioperative Deaths (NCEPOD)] illustrate numerous ways in which systems of care for emergencies are deficient, and, therefore, make the argument that emergency surgery outcomes could potentially be improved substantially. This chapter will look at the problem through a human factors lens, analysing the work system to detect areas for potential improvement. It will also highlight valid scientific evidence for interventions which could improve outcomes where this exists, and will augment this with advice, based on practice in a large busy teaching hospital Surgical Emergency Unit, which has adopted and developed a set of practices based on these two sources.

PREOPERATIVE CARE

There should be no barrier to review by the surgical team. The emergency department, general practitioners, paramedics or tertiary services should all be able to refer a patient to an acute surgical unit with no resistance. It is quicker, more efficient and kinder to the patient to accept these patients and exclude a surgical pathology than send them 'round the houses' in an effort to reduce surgical workload at the expense of other departments.

In dealing with acute emergencies, the principal tool for improving outcomes is speed. Evidence from extensive investigation of speed of response has found that in-hospital delays (IHDs) are linked directly to surgical mortality. This should make us suspicious of the idea of 'acceptable delay', which might well be the window during which subsequent complications could have been avoided.

Speed will be improved if we optimise preoperative diagnosis and assessment. Here, it may be useful to think in terms of the enhanced recovery after surgery (ERAS) guidelines for preoperative optimisation. These can be summarised as the following:

- Early identification of physiological derangement and intervention
- Screen and monitor for sepsis – then, early imaging and surgery in cases of sepsis
- Risk assessment for surgery
- Age-related evaluation of frailty and cognitive assessment
- Reversal of antithrombotic medication – then, assessment of thromboembolism risk
- Preanaesthetic medication, including analgesia
- Preoperative glucose and electrolyte management; carbohydrate loading
- Nasogastric intubation
- Patient and family shared decision making

Rapid blood analysis is essential for correction of abnormalities. It is obviously important to be aware of abnormalities, such as anaemia, to then better manage them intraoperatively.

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One way to achieve a rapid test is to have point-of-care testing (POCT) machines. A similar POCT approach has been designed for imaging, particularly ultrasound [point-of-care ultrasound (POCUS)]. Lack of resource, especially for out of hours imaging, is an important barrier to optimal emergency care. Acute surgery units should ideally have the same access to X-ray, CT scans, ultrasound, MRI, etc., as the emergency department.

Rapid access to observations, blood tests (POCT machines) and ultrasound scans in an acute surgical unit triage can allow the clinician to have all the results inside 15 minutes of arrival. This massively improves time to a definitive decision, which should be under 60 minutes from time of arriving in a surgical emergency unit triage. Access to endoscopy is another major factor in improving speed and service quality as it ensures rapid diagnosis and management for the substantial percentage of patients requiring flexible-sigmoidoscopy, oesophagogastroduodenoscopy (OGD) and endoscopic retrograde cholangiopancreatography (ERCP).

Delegation of initial assessment to inexperienced staff, with inadequate close support, is a common factor in poor outcomes. Inefficient work systems often impose excessive workload on these staff, and inadequate systems for communication and cooperation between departments mean that juniors may be unable to reach the right person, or different departmental priorities may prevent other specialities providing the right timely help.

Preoperative optimisation should be based on both:

1. The patient's condition – meaning the physiological derangements such as fluids and electrolytes, blood loss, treatment of sepsis, etc.
2. The care pathway – ensuring a timely response in terms of key components such as antibiotic administration, CT scanning, scheduling of surgery, etc.

There is evidence for multidisciplinary teams (MDTs) resulting in better outcomes, and qualitative evidence that useful nursing input is not adequately integrated. Lack of systems for communicating critical information can be somewhat remedied by standardisation of a 'shared language'; e.g. there is moderate improvement in patient outcomes when 'situation, background, assessment, recommendation' (SBAR) is used.

Emergency surgery work is disorganised or delayed when decision-making is structured around the convenience of the senior team members – deferring planning and execution until a morning ward round, for example. Restructuring of work systems to match expertise and manpower to need, and to eliminate avoidable delays is obviously likely to be helpful. Similarly, it is important to understand when the peaks and troughs are throughout the day, week and year – to ensure rota management that optimises staffing for workload. The use of a prospective registry to collect relevant system and process data alongside outcomes has been proposed and may help to point out areas for system improvement.

Preoperative pain relief and counselling are important in optimising recovery. Similarly, early interaction with the operative team can help prevent unnecessary delays. Early consultation with anaesthetic teams and intensive care teams is essential in planning preoperative/postoperative care: Medical team consultation may be required for complex and frail patients. There should also be clarity about level of care and priority for surgery needs; an early discussion between senior clinical staff can smooth this process.

Standardisation of protocols for perioperative care, and escalation of concerns, can be helpful in ensuring all aspects of preparation are considered in a timely fashion. Teamwork between doctors and nurses can be enhanced by specific teamwork training and this increases engagement with process improvement exercises – this is the so-called concept of 'shared decision making'.

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Transfer logistics are another common problem delaying emergency surgery in many hospitals. Porters are usually disempowered and unable to restart stalled efforts at transfer. A standard handover, ID and transfer protocol with the responsibilities of all parties made clear help to standardise all sorts of handover, to streamline and improve results.

Finally, access to an ambulatory unit so that patients are not admitted to hospital just for investigation, or to reassure the surgeon rather than the patient, greatly improves efficiency and patient experience. However, this can only be achieved if experienced surgeons are the 'gatekeepers' who rapidly decide on which patients to manage on an outpatient basis.

ACCESS TO THEATRE AND INTRAOPERATIVE CARE

Unlike medicine, acute surgical treatment is in theatre. Without access to theatre, the patient cannot get their definitive treatment and so stay in hospital longer, not only before but after treatment, e.g. laparoscopic cholecystectomy patients operated on within 24 hours of admission can usually go home the same day or within 24 hours.

Major savings in time, and improved outcomes, are likely to be brought about by having standard operating procedures (SOPs) for common conditions such as abscesses, acute pancreatitis, cholecystitis, gallstone-related jaundice, intractable biliary colic, diverticulitis, rectal bleeding, pancreatitis, etc. Education is required for anaesthetic and nursing teams as part of these SOPs, to neutralise common but inaccurate beliefs. All over the UK, e.g., hot laparoscopic cholecystectomy is still seen as a nonemergent pathology, despite the evidence that the quicker a symptomatic gallbladder is treated, the less it costs the NHS and the quicker the patient returns to work.

The WHO checklist compliance should ensure that ID checks, antibiotics, deep vein thrombosis (DVT) prophylaxis, allergy and other safety checks are undertaken before surgery commences. Safety checklists have the additional benefit of actually improving team communication. Briefing the team on the plan and possible problems with their solutions is probably the most valuable part of the checklist process but is one of the aspects most commonly omitted or inadequately done.

Responsibility for intraoperative supportive care rests with the anaesthetist but should be discussed with the senior surgeon. One way to pre-empt untoward events is to have better intraoperative communication tools to increase shared situational awareness. Control of fluid balance and cardiac output by transoesophageal echo, the use of epidurals and nerve blocks all require team awareness and response.

Surgery should be conducted rapidly, and more experienced help requested promptly if it seems likely to be required. There are strong cultural barriers to asking for help early, which are deep seated and international. These cannot be overcome by exhortation but require the introduction of systems which make such escalation mandatory in specific circumstances. Novel analgesia methods, such as rectus sheath catheters, can improve recovery and encourage early mobilisation of patients. Intraoperative analgesia is evidenced as being better than postoperative analgesia alone.

POSTOPERATIVE CARE

Adequate monitoring and skilled nursing are essential in the first 12–24 hours after major emergency surgery. Lack of resource for tertiary level care needs to be balanced against

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the risks of delay. Inappropriate delay should be avoided by early liaison between senior clinicians and managers. In terms of the team looking after patients postoperatively, surgical residents, who can provide round-the-clock care, have been shown to improve outcomes overall for patients (alone or in conjunction with other teams).

Analgesia, early mobilisation and re-establishment of enteral nutrition and physiotherapy should be part of the standard postoperative protocol. Physiotherapy is a low-cost, postoperative intervention to reduce complications after emergency surgery. There is also reduced mortality when early enteral nutrition is established. Delayed mobilisation increases the risk of readmission and of death, especially in the old and frail. ERAS programmes in the acute setting ensure patients eat and drink and mobilise quicker. Perioperative input, before and after the operation, can speed this process up, as well as good patient education before the operation.

Managing complications is also a crucial part of the postoperative care of the patient. There is some suggestion that SBAR is better implemented if used in conjunction with other interventions [5]. The human factors interventions of a shared language for communication about critically ill patients, and of 'resilient' escalation procedures, (which strengthen rescue processes by making them more agile in adapting to rapidly evolving situations) are currently under evaluation and are showing promise in improving the speed and quality of escalation and treatment. The concept of 'failure to rescue' may be a better measure of service quality than simple operative mortality, whose use needs to be contextualised.

If MDTs are involved, as they should be, they should also be part of discharge planning. This would bring about a more co-ordinated discharge effort and would reduce unnecessary stalling while awaiting input from multiple specialities, who may have visited the patient during the current admission.

Key points for clinical practice

- Systems analyses and audits of critical incidents (e.g., NCEPOD) illustrate numerous ways in which systems of care for emergencies are deficient and, therefore, make the argument that emergency surgery outcomes could potentially be improved
- In dealing with acute emergencies, the principal tool for improving outcomes is speed
- Lack of resource, especially for out of hours imaging, is an important barrier to optimal emergency care
- Delegation of initial assessment to inexperienced staff, with inadequate close support, is a common factor in poor outcomes and escalation to senior staff should be mandatory in specific circumstances
- Early consultation with anaesthetic teams and intensive care teams is essential in planning preoperative/postoperative care: medical team consultation may be required for complex and frail patients
- Major savings in time, and improved outcomes, are likely to be brought about by having SOPs for common conditions
- The human factors interventions of a shared language for communication about critically ill patients, and of 'resilient' escalation procedures, are currently under evaluation and are showing promise in improving the speed and quality of escalation and treatment

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Recent Advances in Surgery 41

"Recent Advances in Surgery 41" continues the series' tradition of highlighting key developments across a wide range of topics in surgical practice worldwide—from innovations in technique to evolving concepts in the management of Breast Cancer and complex disorders. With multidisciplinary care now central to modern surgery, we acknowledge the invaluable contributions of our colleagues across specialties whose work informs much of the evidence presented here.

For the first time, this edition includes chapters on Sustainability in Surgery and Human Factors in Surgery, reflecting their growing relevance in clinical practice. Emergency surgery remains a major focus, with updated discussions on rectal injuries, aortic dissection, acute cholecystitis, burst abdomen, and broader topics such as the use of tranexamic acid and approaches to improving emergency surgery outcomes.

Compact yet comprehensive, this volume serves as a practical resource for surgeons worldwide and an essential companion for those preparing for professional examinations.

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