Improving outcomes for emergency general surgical patients: Enhanced recovery and NELA

Carol J. Peden, MD, FRCA, FFICM, MPH. Royal United Hospital Bath. 3rd ERAS UK Conference, November 2013
Where are we now and where are we going?

- Overview of results of ELN audit
- National Emergency Laparotomy Audit (NELA)
- Enhanced recovery and unplanned surgery
Emergency laparotomy outcomes 2008/9

A Prospective Observational Study of Outcome of Emergency Laparotomy

Cook et al Annals Royal College of Surgeons 1997.
Emergency laparotomy network

• Founded from conversations around mortality data by five enthusiasts at “Age Anaesthesia” in May 2010
• Central resource for spread of ideas and good practice
• Attract “champions”
• Audit data
• Multidisciplinary approach

Variations in mortality after emergency laparotomy: the first report of the UK Emergency Laparotomy Network

D. I. Saunders¹, D. Murray²*, A. C. Pichel³, S. Varley³, C. J. Peden⁴, on behalf of the members of the UK Emergency Laparotomy Network

Editor’s key points

• This is an important first report of the Emergency Laparotomy Network in the UK.
• The report provides evidence for high mortality in these patients.
• Also, crucially, the report points to the variability in care provided to this patient group.
• Areas of concern, and where improvements are required, include pre-optimization, consultant presence, and postoperative high dependency care.
Emergency Laparotomy Network

- BJA Saunders et al 2012
- 1,835 patients from 35 NHS hospitals
- Unadjusted 30-day mortalities:
  - 14.9 % overall
  - 24.4 % if over 80 yrs
- Compared with:
  - Elective colorectal resection 2.7 %
  - Oesophagectomy 3.1 %
  - Gastrectomy 4.2 %
  - Liver met. resection 1 %
When is death inevitable after emergency laparotomy?

- NSQIP database
- 37,500 patients
- 30 day mortality 14%
- Variables most associated with death
  - ASA, age, functional status and sepsis
If you are over 60 and/or ASA 3 or more, your mortality risk is greater than 10%. All these patients should be managed in critical care post-op.

Data from ELN, BJA 2012.
Mortality is the tip of the iceberg!


- Data from the Michigan Surgical Quality Collaborative – 60,411 elective surgeries
- 80-90% of mortality, cardiac, renal and pulmonary complications in the highest risk 25% patients
- 60-70% thromboembolic and infective complications in highest risk patients
This is not a complication, this is Jim

Using patient stories is an effective way of achieving change
People stop arguing and start doing!
Richards, Peden, Dalton et al. ASGBI 2013

146 patients

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Complication rate(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole group</td>
<td>62</td>
</tr>
<tr>
<td>&lt; 80</td>
<td>53</td>
</tr>
<tr>
<td>=&gt;80</td>
<td>77 (p&lt;0.05)</td>
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</table>

Frequency (%) of complications seen

- Wound
- Chest
- Cardiac
- Confusion
- Other Infections
Only 15% of patients had Goal Directed Fluid Therapy

ELN Audit Results
www.networks.nhs.uk/laparotomy
Postoperative Destination

ASA 3 and Post-op Care (%)

- ICU
- HDU
- Ward

ELN Audit Results  www.networks.nhs.uk/laparotomy
What can we do?

“Age, co-morbidity, and the underlying pathology cannot be altered, but the way the process of care is provided may be varied according to the needs of the patient. Ensuring prompt assessment, early resuscitation, and timely access to theatre, with senior staff involvement and appropriate levels of postoperative care are all potentially modifiable factors”.

Saunders et al. Variations in mortality after emergency laparotomy. BJA 2012
Structure, Process and Measure Outcome

Reduce variability
Increase reliability
Measurement alone is not enough
Measurement must be linked to a Quality Improvement Strategy
“To enable the improvement of the quality of care for patients undergoing emergency laparotomy through the provision of high quality comparative data from all providers of emergency laparotomy.”

• £1million over 3 years
• Subcontracted to RCS
The National Emergency Laparotomy Audit

Dave Murray National Clinical Lead
Iain Anderson Clinical Advisor
Carol Peden Quality Improvement Lead
David Cromwell Methodologist
Mike Grocott Chair

www.nela.org.uk

info@nela.org.uk
Timeframes

• **Yr 1: December 2012 - November 2013**
  • Establish infrastructure & recruit hospitals
  • Anaesthetic & surgical leads
  • Define inclusion criteria & dataset
  • Build online data entry system
  • Organisational Audit

• **Yr 2 onwards: Dec 2013 – (Nov 2017)**
  • Individual patient data collection
  • Yearly cycle with annual reports
  • Quality improvement activity
Changing the way we think: understanding the urgency and risk

Adapted from Moore et al Am J Surg 2011
Improving Outcomes for High Risk Surgical Patients

Decrease: Mortality Complications Cost

Preoperative Care
- Preoperative assessment
- Patient information/consent
- Risk assessment
- Optimization
- SCIP measures
- WHO Surgical checklist
- Optimal monitoring
- “Damage limitation” surgery
- Location based on P-POSSUM

Intraoperative Care
- Pain management
- Fluid management
- Physiotherapy

Service Organisation
- Delirium management

Postoperative Care
- Strategies other than surgery
- Palliative Care
- Patient and family involvement

End of Life Care
- Patient and family involvement

Standardise the pathway

Current - Variable, lots of autonomy not owned, poor if any feedback for improvement, constantly altered by individual changes, performance stable at low levels

Desired - variation based on clinical criteria, no individual autonomy to change the process, process owned from start to finish, can learn from defects before harm occurs, constantly improved by collective wisdom - variation

Terry Borman, MD Mayo Health System
I think I'd rather manage a large software development project.

The daydreams of cat herders
Poor NHS care puts lives of emergency surgery patients 'at risk'

Report finds that delays in finding operating theatre spaces lead to deaths while only one in three receives critical aftercare

Sam Jones and agencies
guardian.co.uk, Thursday 29 September 2011 09.02 BST
Article history

The Royal College of Surgeons report found a patient's chance of survival after a critical operation varied widely between NHS hospitals. Photograph: Christopher Furlong/Getty Images
What the “Higher Risk General Surgery Patient” report says....

<table>
<thead>
<tr>
<th>Clinical assessment</th>
<th>Diagnostics</th>
<th>Intraoperative phase</th>
<th>Postoperative care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial blood gases.</td>
<td>Definitive surgery within 2hrs to operate.</td>
<td>Intra-operative period:</td>
<td>Time to admission to critical care within 4hrs of decision to admit to critical care.</td>
</tr>
<tr>
<td>Expedited diagnostic investigations (CT within 6hrs).</td>
<td>Critical care needs discussed with anaesthesia and critical care.</td>
<td>&gt; Targeted optimisation of cardiovascular and respiratory function using invasive techniques.</td>
<td></td>
</tr>
<tr>
<td>Goal directed resuscitation.</td>
<td>Avoid further organ dysfunction by adoption of supporting clinical initiatives, eg Acute Kidney Injury protocol.</td>
<td>&gt; Anaesthesia to expand.</td>
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<tr>
<td>Communication of results of investigations to consultant surgeon and general anaesthetic team (FRCAnaes) including emergency theatre within 1 hour.</td>
<td></td>
<td>End of Surgery:</td>
<td></td>
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</tbody>
</table>

Standardise care based on objective measures  >10% mortality risk admit to critical care
## Enhanced recovery pathways

### Active patient involvement

- **Referral from primary care**
  - Optimising haemoglobin levels
  - Managing pre-existing co-morbidities e.g. diabetes/hypertension

- **Pre-operative**
  - Health & risk assessment
  - Good quality patient information
  - Informed decision-making
  - Managing patient’s expectations of what will happen to them
  - Optimised health/medical condition
  - Therapy advice
  - Carbohydrate loading (high energy drinks)
  - Maximising patient’s hydration
  - Avoidance of oral bowel preparation, where appropriate
  - Discharge planning – expected date of discharge (EDD)

- **Admission**
  - Admit on the day of surgery
  - Optimise fluid hydration
  - Avoid routine use of sedative pre-medication
  - Carbohydrate loading (high energy drinks)
  - No / reduced oral bowel preparation (bowel surgery), where appropriate

- **Intra-operative**
  - Minimally invasive surgery if possible
  - Individualised goal-directed fluid therapy
  - Avoid crystalloid overload
  - Epidural management (incl thoracic)
  - Use of regional/spinal and local anaesthetic with sedation
  - Hypothermia prevention

- **Post-operative**
  - No routine use of wound drains
  - No routine use of naso gastric tubes (bowel surgery)
  - Active, planned mobilisation within 24 hours
  - Early oral hydration
  - Early oral nutrition
  - IV therapy stopped early
  - Catheters removed early
  - Regular oral analgesia e.g. paracetamol and NSAIDS
  - Avoidance of systemic opiate-based analgesia, where possible

- **Follow-up**
  - Discharge on planned day or when criteria met
  - Therapy support (stoma, physiotherapy, dietitian)
  - 24 hour telephone follow-up if appropriate

### Whole team involvement

- The patient has the best possible management during surgery
- The patient experiences the best post-operative rehabilitation
Effect of a comprehensive surgical safety system on patient outcomes
deVries et al NEJM;2010:363;1928-37

**Figure 1.** Mean Number of Complications in Intervention Hospitals and Control Hospitals before and after Implementation of the Surgical Safety Checklist.
SurPaSS deVries et al

- **Surgical Patient Safety System**
- 3800 patients before and after, absolute risk reduction of 10.6
- Reduction in number of complications in SurPass hospitals
- Mortality reduced from 1.5 to 0.8%
- No change in control hospitals
Use of a structured checklist and standard team training produced a statistically significant reduction in morbidity.

- Historical control 23.6% complication rate
- Team training only 15.9% complication rate
- Checklist and team training 8.2% complication rate

*Journal Am Coll Surg* 2012;215;766-776
Emergency Laparotomy Pathway Quality Improvement Care Bundle
Royal Surrey County RUH, Bath
Royal Devon and Exeter
South Devon

Patients who require Emergency Laparotomy surgery have a 15–20% risk of dying within 30 days

What is ELPQuiC?
- Multi-centre quality improvement project.
- 5 step care-bundle aimed at Improving quality and consistency of care from admission to post operative care.
- Evidence based (RCS England, DoH, NICE, Surviving Sepsis Campaign).
- Continuous prospective audit tracking compliance to the bundle elements and individual patient outcomes.

After 1st December 2012 ALL PATIENTS presenting with acute abdominal conditions THAT MAY REQUIRE EMERGENCY MAJOR SURGERY should be started on the pathway.

For more details please refer to the ELPQuiC bundle posters displayed in key clinical areas.
Emergency Laparotomy?

**ELPQuiC**

Emergency Laparotomy Pathway Quality Improvement Care-Bundle

ALL PATIENTS presenting with emergency abdominal conditions THAT MAY REQUIRE EMERGENCY LAPAROTOMY are to be started on the Emergency Laparotomy ER Pathway and comply to the care-bundles goals below.

1. **Early Assessment and Resuscitation**
   - MEWS within 30mins of arrival in hospital
   - Outreach review if MEWS >3
   - MRCS surgical review within 30 minutes of referral
   - Measure arterial lactate
   - Prompt fluid resuscitation

2. **Early Antibiotics**
   - Within 1 hour if there is evidence of SIRS/sepsis
   - Within 3 hours if there is suspicion of intra-peritoneal salling

3. **Prompt diagnosis and Early surgery**
   - CT scan – ‘Code Emergency Laparotomy’ prompts:
     - ‘Next Slot’ prioritisation, scan within 2 hours of booking, verbal report within 1 hour of scan
     - ‘Next Slot’ prioritisation on Emergency Theatre List
     - Knife-to-skin within 6 hours of decision to operate
     - Consultant surgeon and anaesthetist present in theatre

4. **Goal Directed Fluid Therapy**
   - Goal Directed Fluid Therapy using cardiac output monitoring intra-operatively and for 6 hours post-operatively

5. **Post-operative Intensive Care for all**
   - All patients to be cared for on intensive care
   - If no intensive care bed is available – alternative level 2 area (e.g. Post Anaesthetic Care Unit)
   - Goal Directed Fluid Therapy for 6 hours post-operatively
Emergency Laparotomy? ELPQuiC

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Innovate!
How do other industries do this?

“Preparing for a safe flight and ensuring it leaves on time is analogous to adequate resuscitation and a timely trip to theatre. It is, however, only a small preparatory step to a long journey.”

RUH Bath
Emergency Surgery Research Group
ELPQuiC
Emergency Laparotomy Pathway Quality Improvement Care-Bundle
Intra-op GDFT (%)
ELPQuiC

Emergency Laparotomy Pathway Quality Improvement Care-Bundle

Post-op ITU (%)
RUH Mortality Current State

Mortality at 30 days

ELPQUIC
Results

• Differences in LOS or mortality are not statistically significant

• BUT unmatched populations
  • ?case matching
  • ?sub-analysing high risk groups (e.g. Elderly, ASA3+)

• CUSUM charts for risk-adjusted mortality
What will improvement look like?

- 50,000 emergency laparotomies per year
  - 15% mortality = 7500 deaths

- Best 25% of Trusts - 7.5% mortality
  - 3750 lives saved

- Best 10% of Trusts - 5% mortality
  - 5000 lives saved
What will improvement look like?

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  • 5000 lives saved
EPOCH Trial
Enhanced Peri-Operative Care for High-risk patients
Quality improvement for Emergency Laparotomy patients

Rupert Pearse, Carol Peden, Julian Bion, Mike Grocott, Alan Girling, Richard Lilford, Sally Kerry, Graham Martin, Carolyn Tarrant, Peter Holt, Omar Faiz and Tim Stephens
Safer surgery requires reliability and standardisation

• This can be done and early results show improvement may be significant
• Improve reliability of evidence based care
• Standardise pathways of care
• Don’t forget teamwork and communication
• Create a sense of urgency!
Everyday you make progress. Every step may be fruitful. Yet they will stretch out before you, an ever lengthening, ever ascending ever improving path. You know that you will never get to the end of the journey. But this so far from discouraging, only adds to the joy and glory of the climb.” Winston Churchill
Thanks

Thanks to all my ELPQUIC colleagues
Particularly:
Sam Huddart, Nial Quiney, Bruce McCormick, Mike Swart and Louise Corrigan