Shine 2012 final report

Improving outcomes from emergency laparotomy. ELPQuiC.

Lead Organisation: Royal Surrey County Hospital, Guildford.
Partner Organisations: Royal United Hospital, Bath; Royal Devon and Exeter NHS Trust; South Devon Healthcare NHS Trust

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The Health Foundation
Tel 020 7257 8000
www.health.org.uk

Part 1. Abstract

Project title: Emergency Laparotomy Project Quality Improvement Care Bundle (ELPQuiC)

Lead organisation: Royal Surrey County Hospital, Guildford

Partner organisation: Royal United Hospital Bath, Royal Devon and Exeter Hospital, South Devon Healthcare Torbay.

Lead Clinician: Nial Quiney

Abstract

Emergency laparotomy is carried out in most acute hospital trusts in the UK. The patients are often frail, elderly and have multiple co morbidities. Approximately 60,000 such operations are carried out in the UK each year and about 15% of patients will die before they are able to leave hospital. This mortality rate is in stark contrast to elective surgical mortality rates that are only 1-2% even for the most complex surgery. Surprisingly this is not a unique problem in the UK. Similar mortality rates for patients undergoing emergency laparotomy have been identified from national databases both in the USA and Denmark.

Over the last ten years much evidence has been collected identifying measures that could improve the outcomes of patients undergoing emergency laparotomy. This includes the use of an early warning score to identify the sickest patients, the rapid administration of antibiotics and fluid resuscitation in those patients who are septic or show signs of sepsis, the need for urgent surgery using the latest methods of fluid resuscitation and the overwhelming benefits of looking after the sickest patients in the intensive care unit after surgery has been completed.

This project has used the 'care bundle' concept to implement the five key, evidence based, steps to ensure that patients requiring emergency laparotomy receive the highest quality care possible.

To do this, there has been the requirement to change the way hospitals deal with emergency surgical patients across many parts of the hospital. In addition we have needed to engage a wide variety of professional groups within the hospital setting in order to ensure patients requiring emergency laparotomy receive both high quality and timely care.

Quality improvement projects need both internal (within one institution) and external (across a number of organisations/hospitals) validity to allow other institutions and hospitals to conclude that a similar approach to this problem could work in their hospital. To provide external validity we have joined with three other acute NHS Trusts in England for this project. To provide internal validity we have used historical controls for each hospital. 'Run charts' and 'statistical process control' methodology has been used to identify and describe the changes that took place in each hospital during the project. These were also used to guide further efforts by each NHS trust to improve the delivery and compliance of the care bundle.

We carried out our quality improvement for eight months from December 2012. We had previously carried out a power calculation to identify the probable number of patients needed to show a 50% reduction in mortality. However we decided to continue the project for eight months as several trusts found the change process difficult to implement. During the eight month study period all consecutive cases presenting for emergency laparotomy (as previously defined by the National Emergency Laparotomy Audit Group) were included in the study.

Over the study period we managed to recruit 427 cases spread across the four trusts. (We had already identified 319 patients who had previously undergone emergency laparotomy to act as historical controls.

Our results show almost a 25% reduction in crude mortality rate across the four trusts. For the most high risk patients (over 75 years of age or American Society Anaesthesiology classification 3 or more) there has been an almost 35% reduction in crude mortality. When adjusted for severity of illness using the Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity score (P POSSUM) more striking improvements are seen, with a risk reduction of 43% across all patients and a numbers needed to treat to save one life of 14. If similar changes could be achieved across all acute hospitals in the UK many lives could be saved.

Chart showing CUSSUM plots for each hospital adjusted for P POSSUM. Blue lines are pre care bundle implementation, red ELPQuiC period.

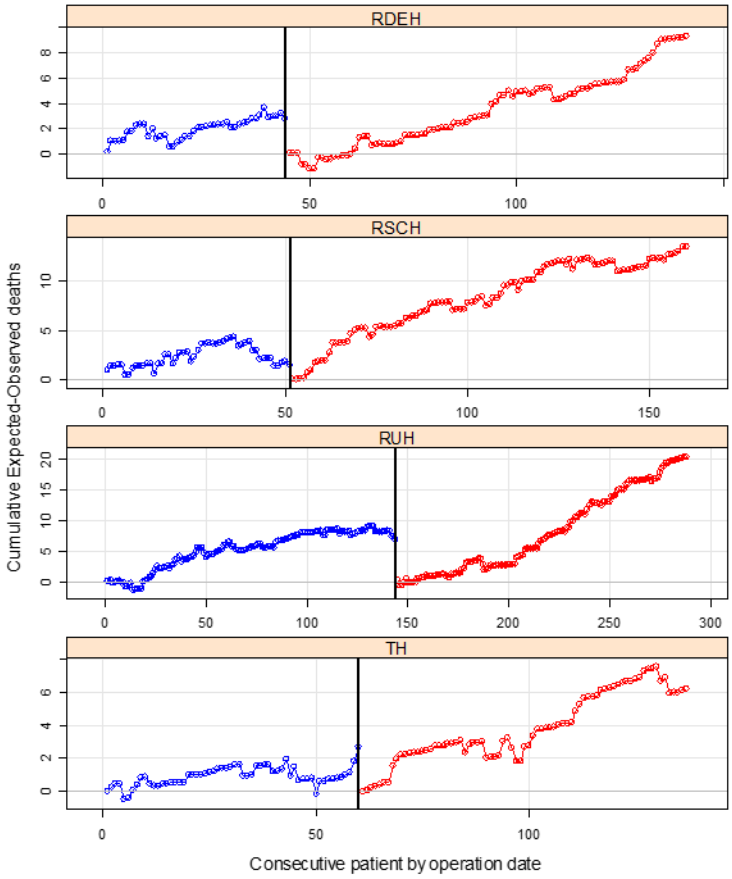
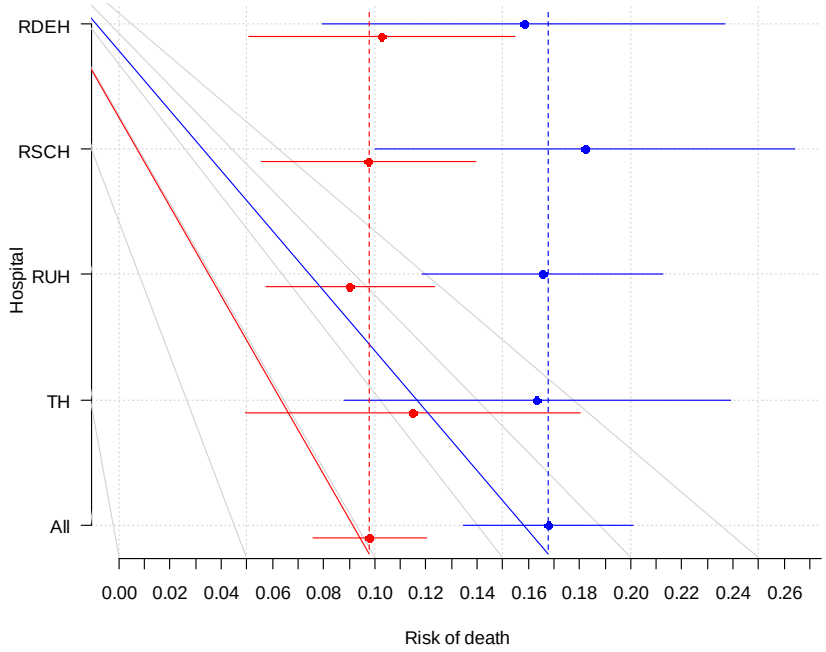


Chart showing Odds Ratio changes for the 4 trusts and combined. Blue indicate pre ELPQuiC and red ELPQuiC period



Performance of each hospital for each of the key metrics are shown in the attached Power point slide set.

Each hospital has identified issues and problems specific to that hospital. The use of ‘statistical process control’ techniques and the opportunities for shared learning across the trusts has enabled improvements to take place across all parts of the care bundle in all trusts.

Leadership has been an important part of this project. In order to describe our project from a leadership and team perspective, we have more recently been working with the University of Leicester. We are using an ethnographic study methodology to identify leadership styles and team dynamics that were best suited to managing such widespread change in the four different hospitals.

Part 2. Quality impact: outcomes

This section is intended to explain the measures of quality that you used and to detail the outcomes (up to 500 words). You should address the following points:

- Nature of setting and innovation i.e. description of where
- Course of intervention, tests of change, adjustments
- Please describe the primary and secondary data that you used to demonstrate impact on quality, including:
  a) The source of the data and how easy it was to access
  b) The validity and reliability of the data
  c) Changes made demonstrated by data (please summarise using run charts, bar charts, tables or any other format that best shows changes made)
- Description of confidence; to what extent is the data on quality that you have collected clear and in line with original targets? How satisfactory are your baseline numbers in terms of data quality?
- What adjustments, if any, have you made to outcome measures from your original application?
- What is your assessment of the effect of your project on the quality of the service and the experience of patients?

Nature and setting
This project was a quality improvement project using a care bundle technique to improve outcomes for patients undergoing emergency laparotomy. The care bundle was developed from recommendations and evidence presented in 2011 by the Royal College of Surgeons of England in 'The higher risk general surgical patient. Toward improved care for a forgotten group'.

The care bundle was developed by a small group of clinicians in order to simplify the recommendations made by the Royal College of Surgeons of England. A small pilot study at one trust suggested improvements could be made by using this approach. Three other acute NHS trusts were recruited to see if a similar approach would work across a wider part of the NHS. Each trust was required to have a complete historical data set of patients who had previously undergone emergency laparotomy in their trusts. This data had to be collected on consecutive patients who had undergone emergency laparotomy.

The Care Bundle
The care bundle had 5 key steps:

1. Identify surgical patients who are most unwell (using a MEWS score) and ensure prompt senior nursing and surgical review.
2. For those patients in whom sepsis is evident or suspected perforation of intra-abdominal organs, prompt intravenous antibiotics should be administered (according to local guidelines).
3. Patients that require surgery should be in the operating theatre within six hours of the decision to operate being made.
4. Patients should receive goal directed fluid resuscitation in theatres and for six hours afterwards
5. All patients should be admitted to the ICU

In order for all these elements of the care bundle to be implemented, an assessment of the process of care that was currently on offer had to be made. Significant changes to practice had to be made in order to ensure delivery of each of the key elements of the bundle. For example in order to deliver bundle element 3, several changes needed to occur:

1. The immediate presence of an experienced surgical doctor (MRCS or more) to review the patients and order appropriate investigations.

2. The change in priority in pathology and radiology (CT) to give the investigations of patients potentially requiring emergency laparotomy the greatest urgency (‘code laparotomy’).

3. A change in the way the emergency operating theatres prioritised patients. Patients requiring emergency laparotomy were given the highest priority (other than those patients requiring immediate lifesaving treatment).

4. Consultant surgeons were required to be present during the operation to assist and for advice. In many cases earlier review of patients by consultant surgeons was encouraged.

5. Consultant anaesthetists were also required to be present for patients ASA 3 or greater.

Data collection

Each trust had a lead clinician to implement the project. All leads were Consultants in Anaesthesia. The lead clinician then formed an implementation group to help ensure the care bundle was understood and implemented. Each trust employed a data collection nurse in order to record progress of patients along the care bundle as it happened. Questions on specific points of data collection were made firstly to the local lead clinician. If these were not resolved locally then contact was made with the clinical research fellow based at the Royal Surrey County Hospital.

The data collected fell into several categories:

1. Patient demographic data e.g. age, sex, ASA.

2. Timing and delivery of key elements of the care bundle. Time to administration of antibiotics, timing to CT scan, time to arrival in operating theatre from booking time. Use of goal directed fluid therapy in theatre.

3. Who delivered care? Consultant surgeon and anaesthetic involvement in theatre. Was the consultant surgeon directly involved in initial review or was experienced surgical trainee only involved before theatre?

4. Place of care. Was ICU used for postoperative care? How long was the patient on ICU? Length of stay in hospital.

5. Post-operative morbidity and complications using a POSSUM score.

6. Length of stay and final destination of patient (home, nursing home or other). Mortality rate at 30 day and hospital discharge.

Effect of data collection.

Every 6 weeks during the project all four trusts met to discuss progress. Run charts, SPC charts and outcomes were presented. Each hospital gave a review of progress and identified successes and failures. More details are given of charts in the enclosed presentation.

Impact of the project.

Each hospital has continued to deliver the ELPQuiC bundle after completion of the formal aspects of data collection. The 'emergency laparotomy pathway' is here to stay.

In one hospital the consultant surgeons have agreed to completely change the way in which they deliver care to emergency surgical patients. They have agreed to have no other commitments when they are providing emergency care and will do so for several days at a time (continuity of care).

We would plan to re-audit the pathway about one year after completion to see what longstanding changes have occurred and which elements of the care bundle have been most difficult to maintain.

The concept used in this test project has helped to gain funding for a much larger project to improve care for patients undergoing emergency laparotomy across the UK. The EPOCH project has been funded by NIHR for £1.5 million pounds to deliver improved care through a quality improvement package led by Professor Carol Peden http://www.epochtrial.org/epoch.php?page=news. The trial is supported by a major research team led by Professor Rupert Pearse. The concepts used will very much be based on what we have learned in ELPQUIC.

Part 3. Cost impact

No financial assessment has been made.

Part 4: Learning from the project

We have shown about a 25% reduction in crude 30 day mortality across all four trusts. With P POSSUM risk adjustment this has shown a 43% relative risk reduction across all hospitals. This is a substantial achievement and can be approximated to 27 patients lives saved who might otherwise have died by 30 days, if mortality rates had remained unchanged (427 patients, 14.7% mortality rate before v 8.3% mortality rate after).

All hospitals have made dramatic changes to the way in which they delivered care to patients undergoing emergency laparotomy. Some hospital were more successful than others in reducing headline mortality. However the hospitals that were less successful still made changes to their processes and have served to identify more and less successful strategies to the whole project. Our ethnographic collaboration will hopefully identify some of the key differences.

One aspect that has surprised us is the acceptance of doctors of some elements of the care bundle but desire to dispute the evidence base for others. In addition it proved very difficult to teach whole departments about using new technologies that they were not familiar with.

Undoubtedly constant reinforcement of the message of our project and regular interactions with each of the professional groups involved in delivery of the pathway has been required in order to achieve best results.

If this type of project were to be repeated we would probably make sure that adequate training was available before we started the project.

Part 5. Plans for sustainability and spread

This section is intended to communicate your plans for sustainability and spread (up to 500 words). You should include:

- How realistic will it be to sustain the benefits of the project beyond March 2014?
- How do you plan to spread this innovation beyond the Shine award sites? What additional resources (and from who) will you need to support this activity beyond the Shine funding period?
- Please detail any external interest/potential contacts that you have identified that you need to pursue and those that you have already engaged with?

The project has been widely publicised. We have made presentation to NHS England and a number of scientific meetings (see below). In addition we have so far published an editorial in Colorectal Disease describing aspects of the bundle.

Publication of the complete project will undoubtedly lead to further interest. Plus this project forms a significant basis for the major NIHR funded EPOCH project as discussed above. This uses very similar goals (care bundle elements) but is due to be introduced across 90 hospitals. The ethnographic study we have commissioned from the University of Leicester will feed into this EPOCH trial to allow them to understand what aspects of our project have been successful or otherwise.
Publications

Emergency major abdominal surgery - 'The times they are a-changing'. Huddart S, Peden C, Quiney N. Colorectal Dis. 2013 Jun;15(6):645-9.

Presentations:

Association of Anaesthetists of GB and Ireland March 2013
Emergency laparotomy quality improvement. S Huddart

Association of Coloproctologists Annual Scientific Meeting. Liverpool.
There may be trouble ahead. Improving outcomes from emergency laparotomy. Quiney N. July 13.

1st Middle Eastern Forum on Quality Improvement in Healthcare. Qatar, United Arab Emirates
Surgical safety: how to reduce surgical morbidity and mortality. March 2013. Peden C.

Whole day Seminar Association of Anaesthetists of Great Britain and Ireland
Quality Improvement for Emergency Laparotomy London 26th March 2013. PedenC.

British Society of Geriatric Medicine.
Emergency Laparotomy in the elderly: where are we now? Belfast 19th April 2013 Peden C.

Visiting Professor Nuffield Department of Surgery University of Oxford: Grand Rounds.
Emergency Laparotomy. Oxford 5th May 2013 Peden C

Age Anaesthesia: Presentation to Emergency Laparotomy Network Group:
Update on improvement in emergency laparotomy. Stratford 5th May 2013 Peden C

Scottish Emergency Laparotomy Improvement Group. June 13**.**
ELPQuiC. S Huddart.

MSc group Oxford University Surgical MSc Leadership module.
How to use quality improvement to effect change in surgery. Oxford 23rd May 2013 Peden C.

Royal College of Surgeons Safer Surgery Conference.
Emergency surgery and quality improvement. Plymouth 24th June 2013 Peden C.

Evidence Based Perioperative Medicine (EBPOM).

Quality Improvement in Perioperative Care. London 4th June 2013 Peden C.

Controversies in ICU Sept 2103. London.

Improving outcomes from emergency laparotomy. Quiney N.

Drs Updates.

Quality Improvement for High Risk Surgery Da Balaia Portugal 2nd October 2013. Peden C.

KSS Anaesthetic Trainee Study Day. **Oct 2013**.

Improving outcomes from emergency laparotomy. Quiney N.

Enhanced Recovery (ERAS) UK Conference.

Improving outcomes for emergency surgical patients: enhanced recovery and NELA. Birmingham 8th November 2013. Peden C.

Visiting Professor, University of Southern California (USC). Grand Rounds in Anesthesiology.

Improving outcomes for patients undergoing emergency surgery. Los Angeles, USA 13th December 2013. Peden C.

Association Anaesthetists Great Britain and Ireland. Winter Scientific Meeting ..

What can Anaesthetists do to drive quality improvement? London 16th January 2014. Peden C.

West of England Anaesthetic Update. Jan 14

Improving outcomes from emergency laparotomy. Quiney N

Evidenced Based Perioperative Medicine (EBPOM) Regional Meeting.

Optimal care for emergency laparotomy patients: putting the theory into practice. Exeter. 11th March 2014 Peden C.

European Intensive Care Meeting Brussels. March 2014

Improving outcomes from emergency laparotomy. Quiney N.

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Association of Surgeons in Training. Belfast. March 2014
Improving outcomes in emergency laparotomy S Huddart

Royal College of Anaesthetists: Core Topics CPD. April 14.

Improving outcomes from emergency laparotomy. Quiney N.

London Deanery Anaesthetic Trainee Study Day. April 14.

Improving outcomes from emergency laparotomy. Quiney N.

World Congress in Enhanced Recovery meeting. ERAS and Emergency Surgery. Valencia Spain 25th April 2014. Peden C.

Poster

Patient Safety Congress Birmingham. May 2013
Improving outcomes from emergency laparotomy S Huddart

Final publication will be submitted March/April 14.