



Beyond Elective ERAS; Challenges and Opportunities Improving Surgical Care and Recovery Collaborative

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Hawaii June 2018

Keck Medicine
of **USC**

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Disclosures:

- ❖ Fellow and Faculty for the Institute for Healthcare Improvement (IHI)
- ❖ Shareholder in Fitzroy Health
- ❖ Consultant for Merck
- ❖ Founder, Board Member and QI Advisor National Emergency Laparotomy Audit (NELA) UK
- ❖ Board Member National ERAS Board UK 2013-2015

‘Surgical safety has emerged as a significant global public health concern.’

<http://www.atulgawande.com/documents/WHOGuidelinesforSafeSurgery.pdf>

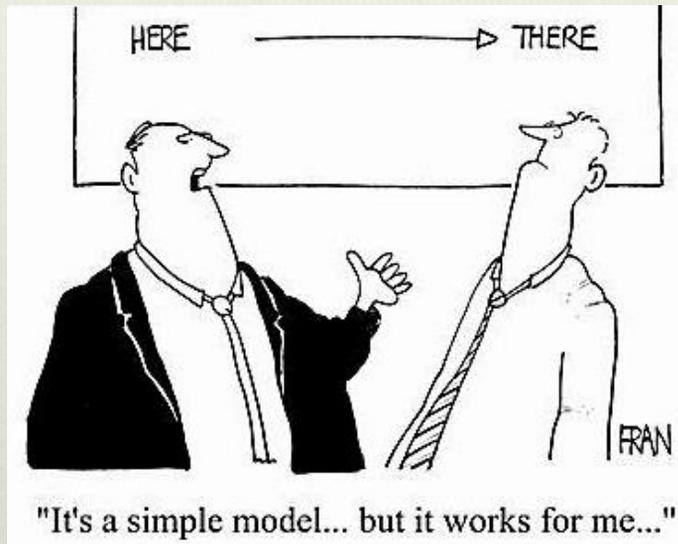
2016 Harvard School of Public
Health Innovator of the Year



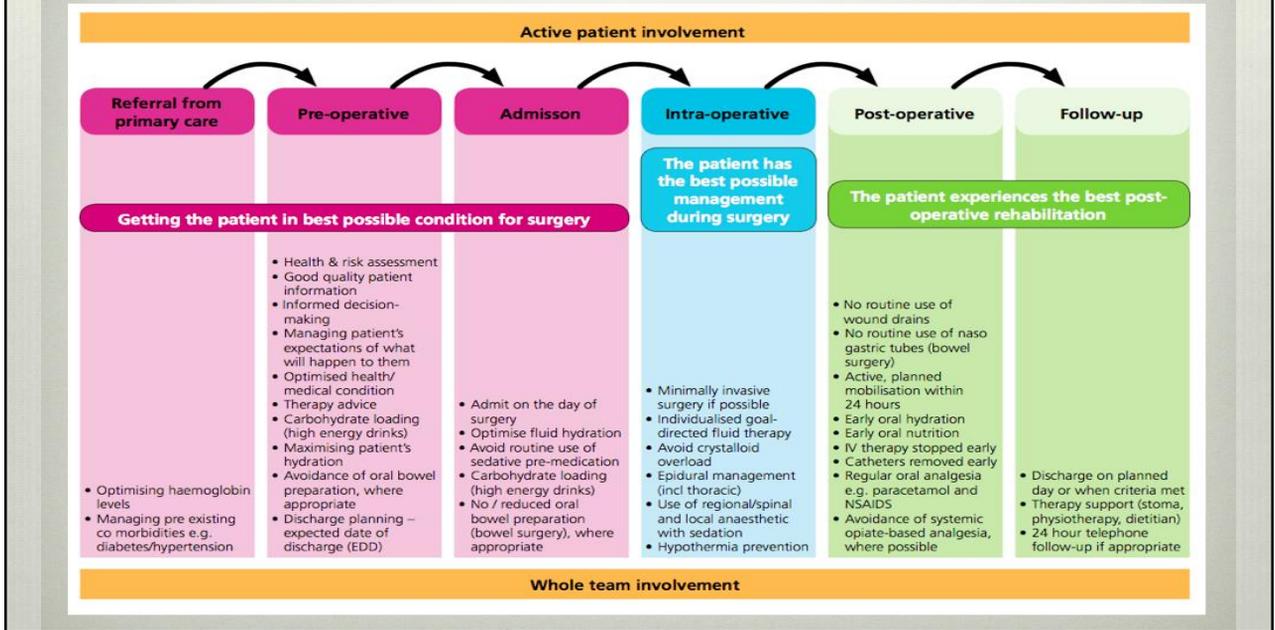
Are our patients too old/frail/sick for ERAS?



The promise of ERP



ENHANCED RECOVERY PATHWAYS



The Who and Why: Defining the High Risk Surgical Patient Group

Mortality rates for selected Healthcare Resource Group procedure codes

Hospital Resource Group procedure code	n	Urgency	Deaths (n)	Mortality rate (%)
Q01: Emergency aortic surgery	6,598	Emergency	2,721	41.25
F33: Large intestine; major procedures with complicating condition(s)	5,765	Emergency	1,290	22.38
F41: General abdominal; very major or major procedures aged over 69 years or with complicating condition(s)	11,648	Emergency	1,843	15.82
H05: Complex hip or knee revisions	1,667	Elective	186	11.16
H33: Neck of femur fracture; aged over 69 years or with complicating condition(s)	170,804	Emergency	15,780	9.24
F11: Stomach and duodenum; complex procedures	3,714	Elective	312	8.40
Q02: Elective abdominal vascular surgery	17,791	Elective	1,321	7.43
F01: Oesophagus; complex procedures	5,594	Elective	375	6.70
F32: Large intestine; very major procedures	44,814	Elective	1,521	3.39
Q03: Lower limb arterial surgery	18,247	Elective	480	2.63

- ❖ Pearse et al Crit Care 2006
- ❖ 80% of surgical deaths in 12.5% of procedures
- High risk population often elderly, comorbidities and emergency surgery
- Despite high mortality rates, fewer than 15% of these patients admitted to the ICU.

Australia and New Zealand Audit of Surgical Mortality

85% of audited deaths occurred in patients admitted as emergencies with acute conditions

Opportunities for Improvement

- ❖ Reducing delays in diagnosis and treatment
- ❖ Better detection and management of the deteriorating patient
- ❖ Improved communication between coordinating health professionals
- ❖ Improved decision-making around performing surgery for patients who may be more appropriate for palliative care.



ROYAL AUSTRALASIAN COLLEGE OF SURGEONS
AUSTRALIAN AND NEW ZEALAND AUDIT OF
SURGICAL MORTALITY

**NATIONAL REPORT
2016**

Targeting the High Risk Surgical Population



- ❖ Emergency admission
- ❖ The elderly - NOF
- ❖ Major intra-abdominal surgery
- ❖ Comorbidities
- ❖ ASA 3 or more

My experience/Kotter's 8 step Change Model



Leading Change: Why Transformation Efforts Fail.
Kotter. Harvard Business Review 1995

Create urgency!

- ❖ What are the drivers in your system to make change happen?



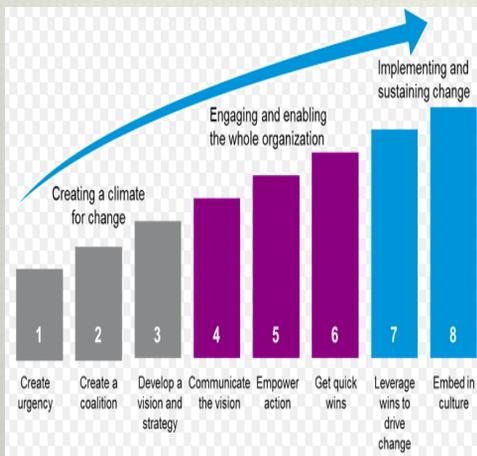
Creating a climate for change. Get the data!!
 WR Deming “in God we trust, all others bring data”



Measurement for Improvement in Anaesthesia and Intensive Care
 Peden CJ, Moonesinghe SR. BJA. 2016 Aug;117(2):145-8.

Create a coalition

Get all the stakeholders engaged
 Start with a process mapping session
 Give everyone the chance to have a voice

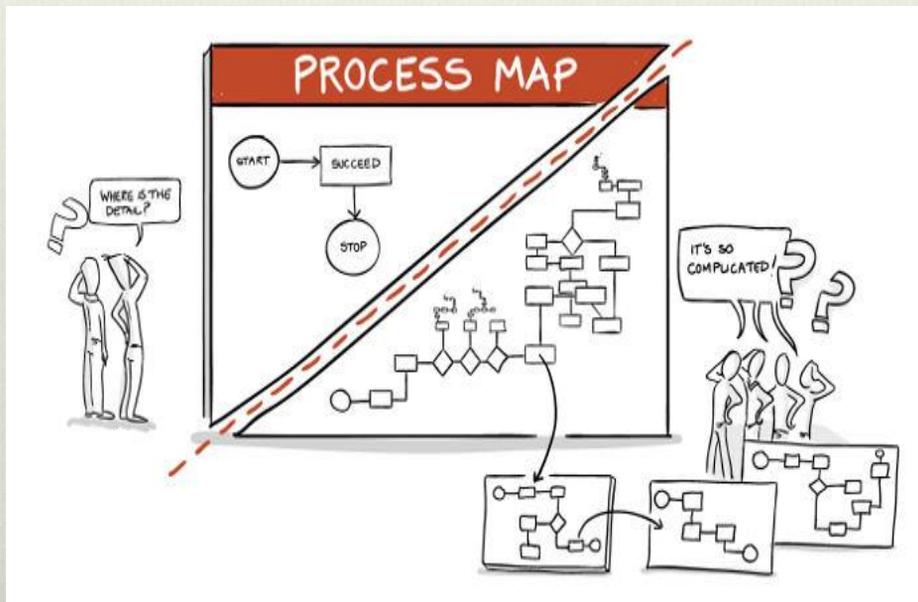


Patient issues, hospital issues, system issues



Get other perspectives!

Map and Segment



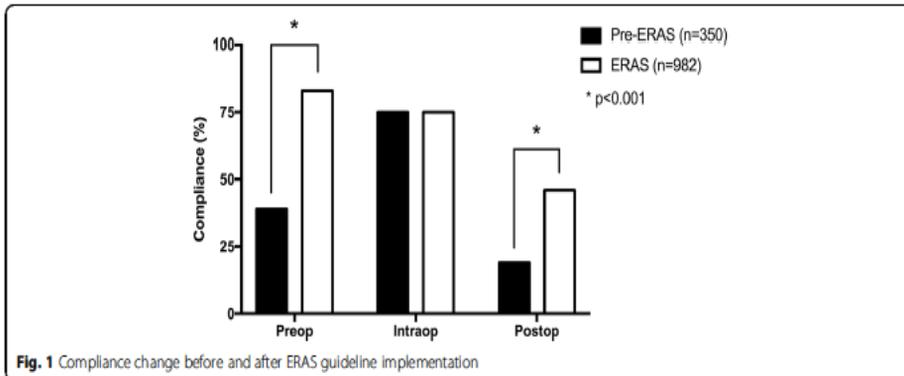
ERAS:
Improving
Outcomes for
High Risk Surgical
Patients

Decrease:
Complications, LOS
Cost

Peden CJ.
Anaesthesia 2011; 66:435-445



Gramlich et al Implementation Science 2017;12:67



If you can't work everywhere, target for big early wins!

Develop a vision and strategy and communicate

- ❖ Have a clear aim
- ❖ “We will reduce mortality for all patients undergoing emergency general surgical procedures by 20% by March 1st 2019”
- ❖ “We will reduce delirium in patients with hip fracture by 20% by December 31st 2018”



Changing the way we think: understanding urgency and risk

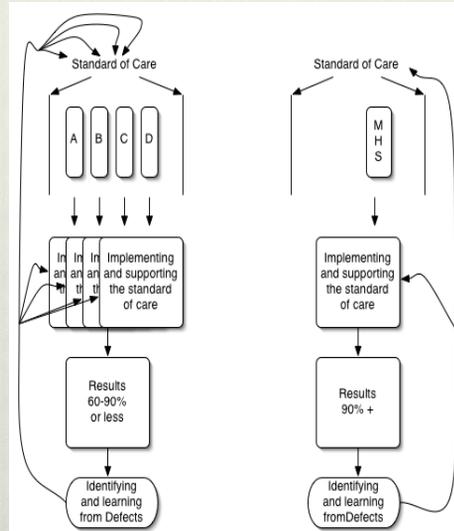
Adapted from Moore et al. Availability of acute care surgeons improves outcomes in patients requiring emergent colon surgery. Am J Surg 2011;202:837-842.



Take an ERAS approach: Standardize 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, reduced 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 reduced

Terry Borman, MD Mayo Health System





Vary care around the patient but standardise where possible



- ❖ Use bundles and checklists to improve reliable delivery
- ❖ Map your clinical pathways with all stakeholders including patients
- ❖ Understand the system you work in

Hip Fracture Pathways

- ❖ Early surgery
- ❖ Early mobilization
- ❖ Delirium screening and prevention
- ❖ Opioid sparing analgesia
- ❖ MDT involvement
- ❖ Reduced LOS
- ❖ Reduced Complications



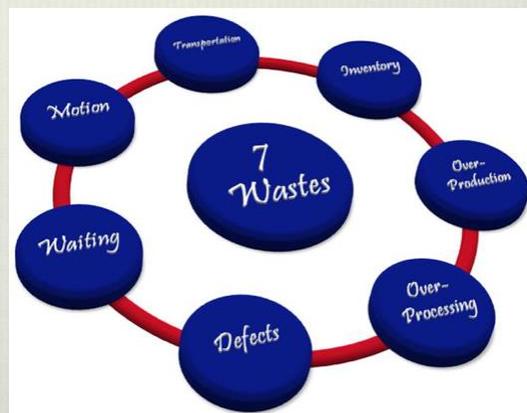
Haugan et al Mortality and readmission following hip fracture surgery *BMJ Open* 2017;7:e015574. doi:10.1136/bmjopen-2016-015574
 Pedersen et al. A comprehensive hip fracture program reduces complication rates and mortality. *J Am Geriatric Society* 2008;56:1831-8

Fractured NOF:

Time is critical for outcome – Lean the process



Kosy et al *J Orthopaed Traumatol* 2013;14:165-70
 Fractured neck of femur care improved by simulated fast-track system



Delirium



American Society of Anesthesiologists®

Perioperative Brain Health Initiative

Promoting brain health for older adults around the time of surgery

7/1/2018



Delirium

Delirium affects 13% to 50% of patients undergoing noncardiac surgery.



The health care costs attributable to delirium are more than \$164 billion per year in the United States.



Older surgical patients (≥65 years of age) have a particularly high risk for developing delirium, with detrimental effects on their recovery.



30% to 40% of cases of delirium are preventable.



Implementing effective interventions to prevent incident delirium and reduce length of stay (LOS) is a clinical priority.



Data from Chen CG, Li HC, Liang JT, et al. Effect of a modified hospital elder life program on delirium and length of hospital stay in patients undergoing abdominal surgery: a cluster randomized clinical trial. *JAMA Surg.* 2017;152(9):827-834.

Additional Resources:

1. Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. *Lancet.* 2014;383(9920):911-922.
2. Dasgupta M, Dumbrell AC. Preoperative risk assessment for delirium after noncardiac surgery: a systematic review. *J Am Geriatr Soc.* 2006;54(10):1578-1589.
3. Leslie DL, Marcantonio ER, Zhang Y, Leo-Summers L, Inouye SK. One-year health care costs associated with delirium in the elderly population. *Arch Intern Med.* 2008;168(1):27-32.
4. Inouye SK, Bogardus ST Jr, Charpentier PA, et al. A multicomponent intervention to prevent delirium in hospitalized older patients. *N Engl J Med.* 1999;340(9):669-76.
5. Marcantonio ER, Flecker JH, Wright RJ, Resnick NM. Reducing delirium after hip fracture: a randomized trial. *J Am Geriatr Soc.* 2001;49(5):516-522.

American Society of Anesthesiologists®

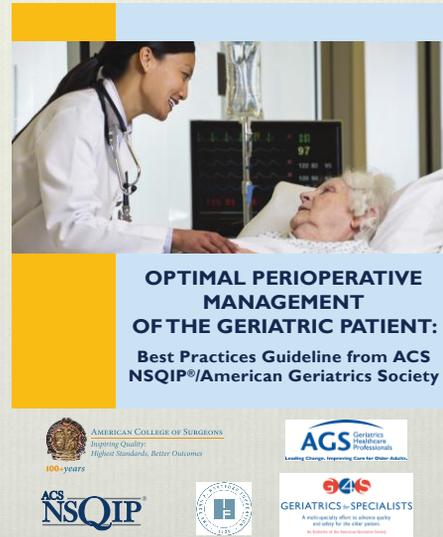
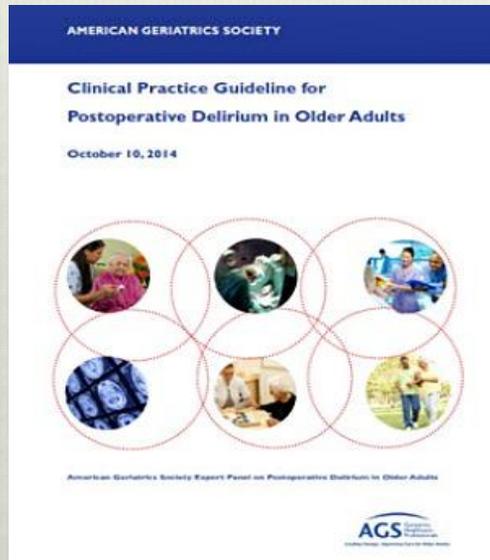
ASA Perioperative Brain Health Initiative



We only wish someone had educated us before the surgery—the emotional toll on the family was overwhelming and much of it could have been avoided with a little bit of information up front.”

- ❖ Identify patients at high risk for delirium: provide tools for simple preoperative screening for cognitive impairment and risk factors
- ❖ Encourage providers to talk with patients about delirium and promote of orientation through hearing aids, glasses, family/friends' bedside presence.
- ❖ Educate anesthesiologists regarding peri-operative anesthetic sedative and analgesic drug choices, including medications to be avoided.

Guidelines and Implementation



Emergency Laparotomy (Non Trauma)



- ❖ High risk procedure
- ❖ High volume problem
- ❖ Commonest causes adhesions, perforation, ischemia, malignancy, abscess
- ❖ Mortality high:
 - ❖ *BJA 2012 Saunders et al (UK)*
 - ❖ **14.9 % 30 day mortality**
 - ❖ *J Am Coll Surg 2012 Al- Temimi et al (USA)* NSQIP database 37,500 patients
 - ❖ **14% 30 day mortality**
 - ❖ *BJA 2014 Vester-Andersen et al (Denmark)*
 - ❖ **18.9% 30 day mortality**

Aggarwal J, Quiney N, Peden CJ. Improving outcomes in emergency general surgery patients. What evidence is out there? *Anesth Analg.* 2017 Oct;125(4):1403-1405

Emergency Laparotomy Pathway Quality Improvement Care Bundle

Royal Surrey County

RUH, Bath

Royal Devon and Exeter

South Devon



Royal Surrey County Hospital NHS Royal Devon and Exeter NHS Royal United Hospital Bath NHS South Devon Healthcare NHS

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 soiling
- 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

Royal Surrey County Hospital NHS Royal Devon and Exeter NHS Royal United Hospital Bath NHS South Devon Healthcare NHS

Emergency Laparotomy? ELPQuIC

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Pre-operative goals



Royal Surrey County Hospital **NHS** | Royal Devon and Exeter **NHS** | Royal United Hospital Bath **NHS** | South Devon Healthcare **NHS**

Emergency Laparotomy? ELPQuiC

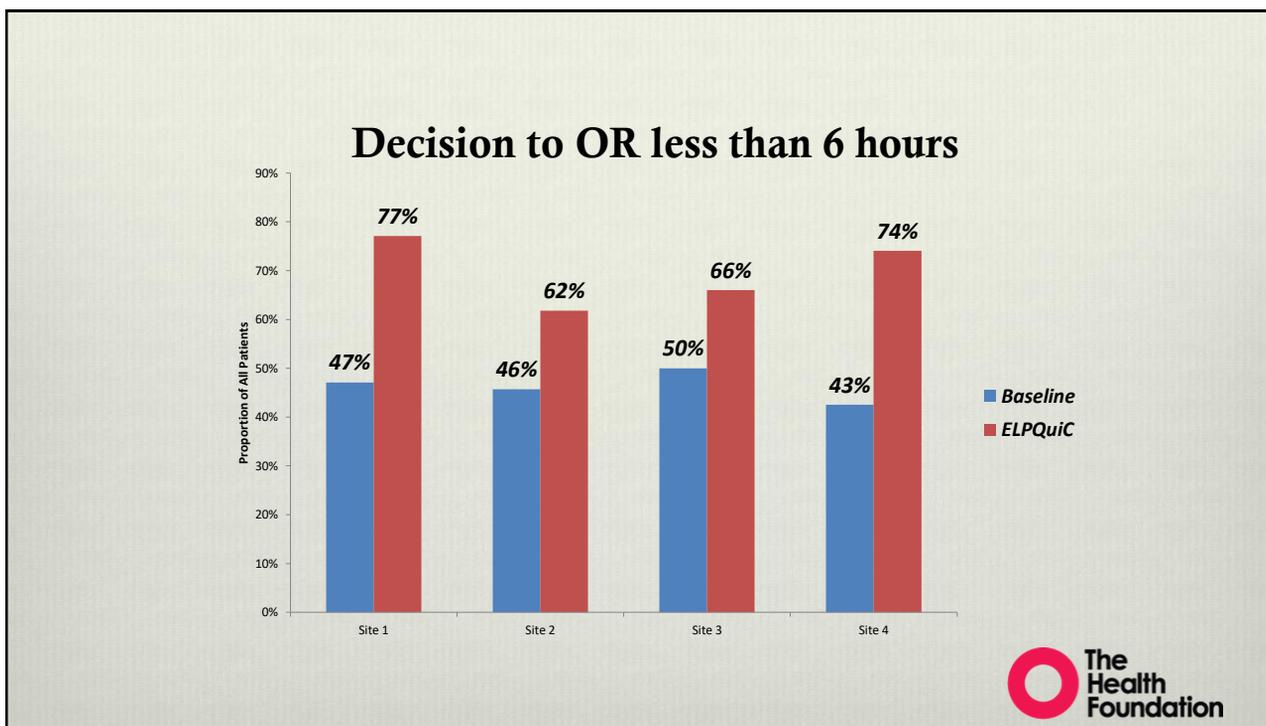
Emergency Laparotomy Pathway Quality Improvement Care-Bundle

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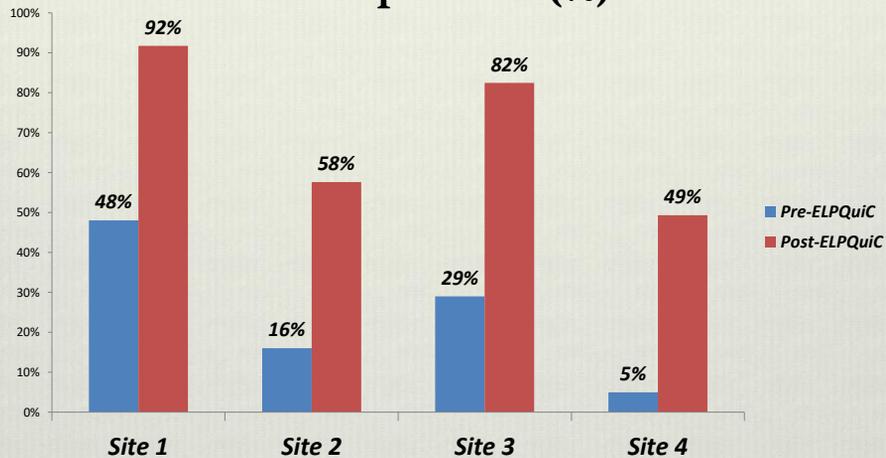
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Post-operative goals

The Health Foundation Inspiring Improvement | Shine



Intra-op GDFT (%)



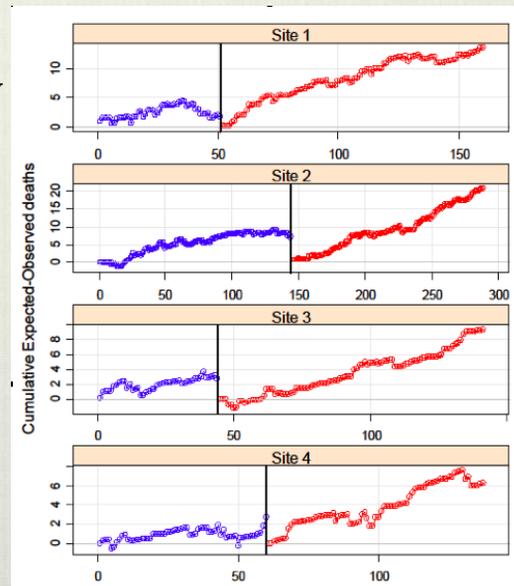
Use of a pathway quality improvement care bundle to reduce mortality after emergency laparotomy

S. Huddart, C. J. Peden, M. Swart et al on behalf of the ELPQuiC Collaborator Group. *BJS Jan 2015*

Risk adjusted mortality using P-POSSUM

In all hospitals a statistically significant increase in lives saved

$P < 0.0001$



Six more survivors per 100 operations

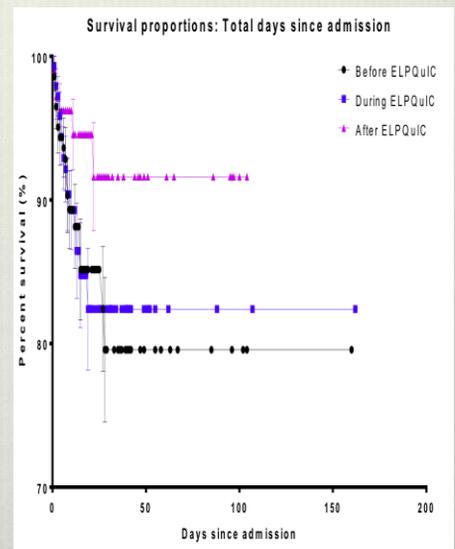


6.47 to 12.44 lives saved over expected after implementation

Estimated costs before, during and after the introduction of the ELPQuIC bundle. *Anaesthesia*. 2016;71(11):1291-1295.

Eveleigh, Howes, Peden and Cook

- ❖ Mortality improved further (to 5%) in an extended follow for the six months after ELPQuIC
- ❖ **Costs remained the same as baseline even though more patients were admitted to critical care or had extended PACU**
- ❖ Improved outcomes with no change in cost – therefore the “**value**” of care increased Porter ME. What is value in healthcare? *NEJM* 2010; 363: 2477-2481.



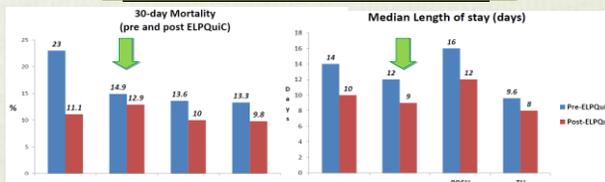
Inform and Enthuse Competition is Good!

- Regular updates by email
- Posters
- Involve the MDT
- Where are we now?
- Where can we improve?
- Who needs to do what?
- Celebrate Success.

Use of a pathway quality improvement care bundle to reduce mortality after emergency laparotomy
Huddart S, Peden CJ, Swart M et al.
BJS Jan 2015;102:57-66

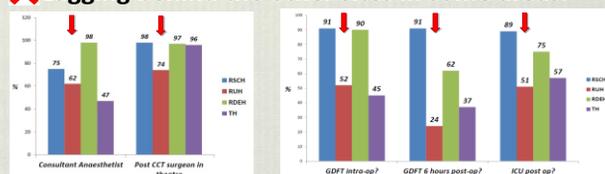
Emergency Laparotomy Peri-operative Care Pathway

Lets be the best!!



✓ Mortality & length of stay improved - well done!

✗ Lagging behind the other sites in some areas:



Please help us continue to improve!

Surgical team

Severahpatie ts recently have had no ELPQuIC paperwork on arrival!
Please complete **boarding card** & **page 1** of ELPQuIC pathway then handover to anaesthetist

Anaesthetist team

Please use LIDCO in theatre & 6 hours post-op

Please send patients to HDU/ICU post-op whenever possible

Make it easy to do the right thing!

General Guidelines for Risk Stratification in ERP

Patient-Specific Risk Factors

- SVV
- BP, HR, ETCO₂, urine, EBL

Procedural Risk

Optimal Analgesia After Surgery

Optimized Patient Comfort + **Fastest Functional Recovery** + **Fewest Side Effects**

- Optimal Pain Rating**
 - At Rest
 - With Movement
 - Impact of Pain on Emotions
 - Impact of Pain on Function
 - Sleep Disruption
 - Improve Patient Experience
- Fastest Functional Recovery**
 - Drinking Liquids
 - Eating Solid Foods
 - Activities of Daily Living
 - Mobilizing
 - Bladder Function
 - Bowel Function
 - Normal Cognitive Function
- Fewest Side Effects**
 - Nausea
 - Vomiting
 - Sedation
 - Itch
 - Itching
 - Dizziness
 - Delirium

Encourages Postoperative DREAMS
[DRinking, EAting, Mobilizing, and Sleeping]

General Guidelines for Goal-Directed Therapy in ERP

Preoperative

- #1: Minimize NPOI. Clear CHO-containing fluids (unless electrolyte repleted) up to 2 hours before surgery.
- #2: If blood preparation is performed, iso-oncotic agents are preferred.
- #3: Risk stratification based on available and validated surgical risk calculators (e.g. POSSUM, S-POD).

Intraoperative

Fluid Monitoring and Goal of fluid intake / fluid responsiveness

Net Pressure + Flow

Reverse the PROBLEM

Immediately Post-Operative (0-12 hrs)

Reverse fluid BB + high urine from "zero balance"

Post-Operative (> 12 hrs)

POQI <http://www.poqi.org>



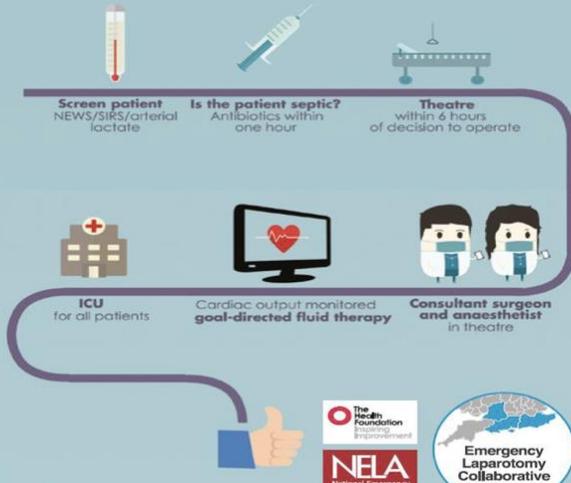
Scaling up ELPQuiC

Standardized pathway

- Clear goals
- Clear timelines
- Defined metrics
- Data uploaded to the National Emergency Laparotomy Audit (NELA)
- Multi-disciplinary involvement

How to save lives in emergency laparotomy

Emergency Laparotomy Collaborative



ELPQUIC Scale Up Results

- ❖ 28 hospitals in a collaborative
- ❖ **5793** patients had an emergency laparotomy at a participating hospital between 1st October 2015 and 31st December 2016
- ❖ Crude mortality rate since the start of the collaborative is **8.7%**, an 11% drop from baseline figure of 9.8% (National data for the same period 10.6%)
- ❖ Length of Stay decreased by 1.3 days across collaborative
- ❖ Process measures improved



Multimodal care regimen in perforated ulcers PULP study

Cohort study in 7 centres in Denmark implementing multimodal care

Surgery < 6 hours (63%)

Early broad spectrum antibiotics

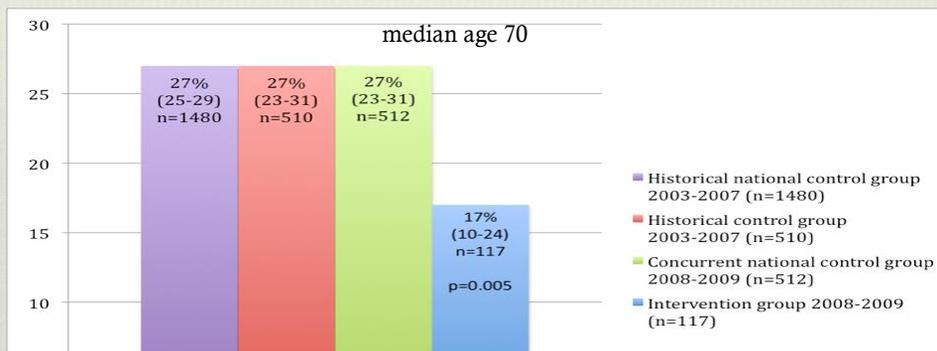
Pre and intraoperative liberal transfusion Møller, Br J Surg 2011

Early + perioperative GDT via SvcO₂ > 70% (90%)

HDU stay at least 12 hours postop (94%)

Standardized monitoring day 1-3 postop (55%)

Multimodal care regimen in perforated ulcers – PULP study



The 30-day mortality rate in patients with PPU was reduced by more than one-third after the implementation of a multimodal and multidisciplinary perioperative care protocol, compared with conventional treatment

Møller, Br J Surg 2011

Ethnography: having a structured approach

“Historically we would finish an emergency and often leave the operating theatreoften you would find out the next morning where the patient had gone. Whereas now this gets us into more of a culture of: ‘ Is this patient high risk? Should they go to ICU? What is our plan of management? Do we extubate?’ Those kind of things are conversations I think we should have’.” (Surgical Fellow Hospital 2)

SOCIOLOGY OF HEALTH & ILLNESS

*Sociology of Health & Illness Vol. xx No. xx 2017 ISSN 0141-9889, pp. 1–16
doi: 10.1111/1467-9566.12585*

Pathways to professionalism? Quality improvement, care pathways, and the interplay of standardisation and clinical autonomy

Graham P. Martin¹, David Kocman¹, Timothy Stephens², Carol J. Peden³ and Rupert M. Pearse⁴;
This study was carried out as part of a wider randomised controlled trial, EPOCH

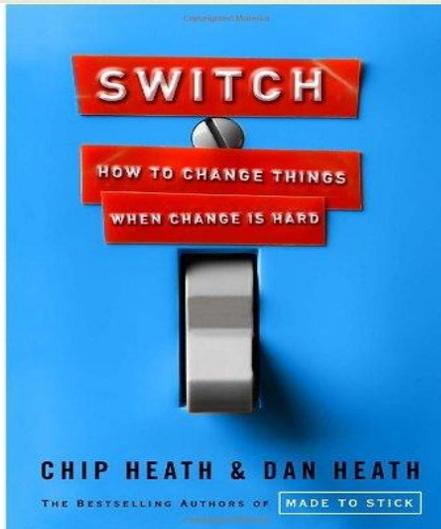
EPOCH Trial Sociology of Health and Illness 2017;39:1314-1329

Empower action and get quick wins



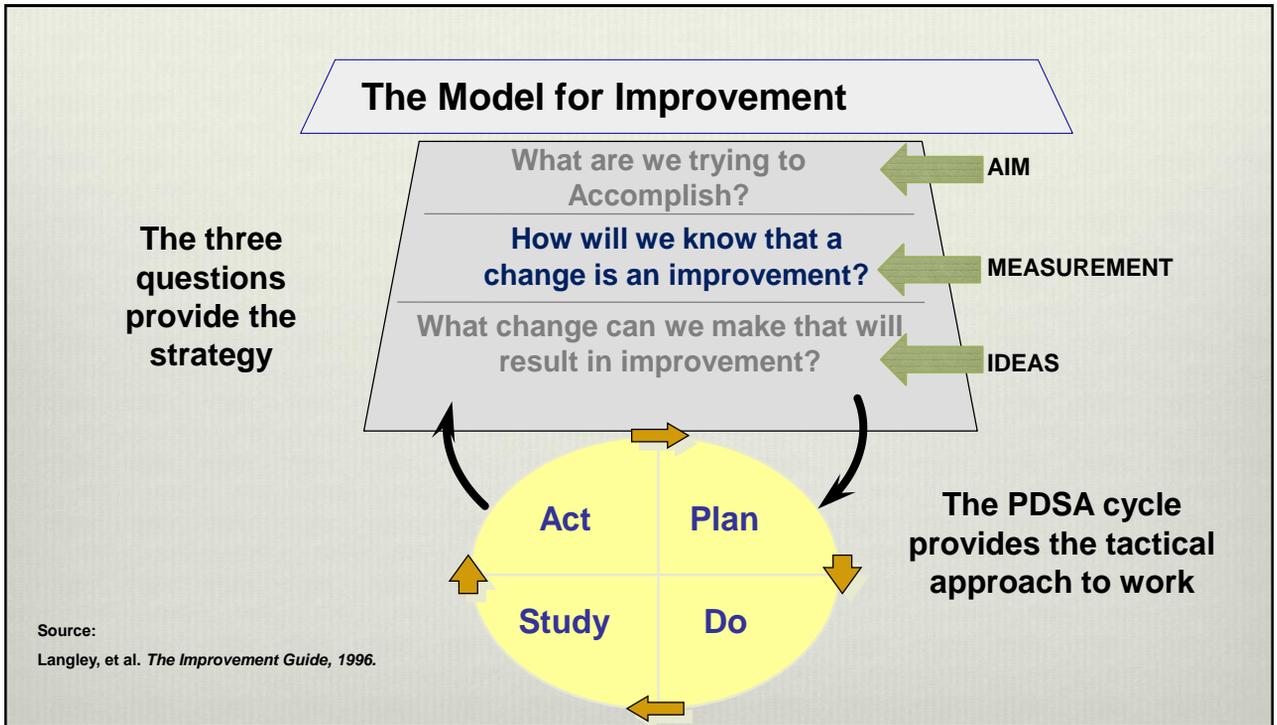
Understand that change is hard!!

The Psychology of Change

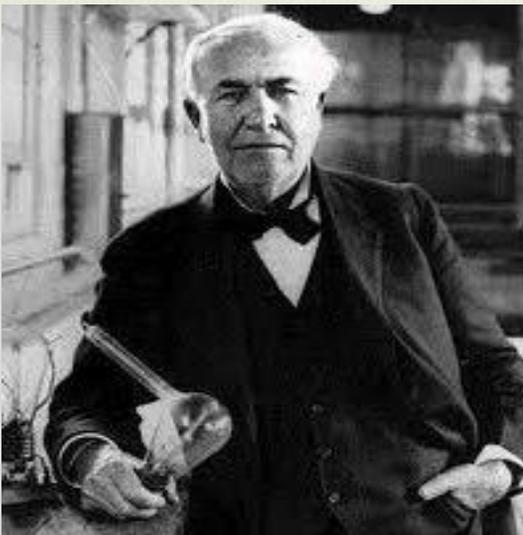


Don't start with a battle!





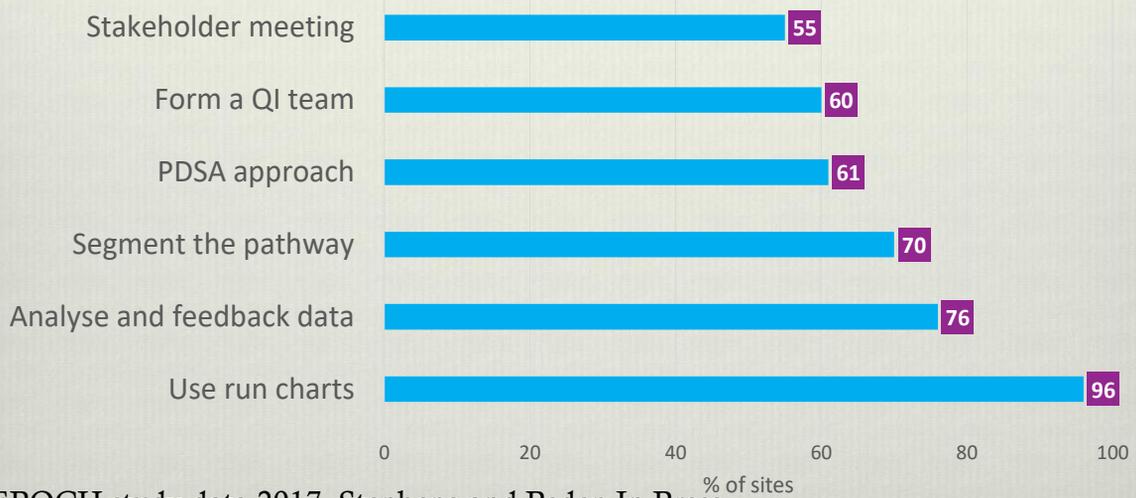
The Value of “Failed” Tests



“I did not fail one thousand times; I found one thousand ways how not to make a light-bulb”

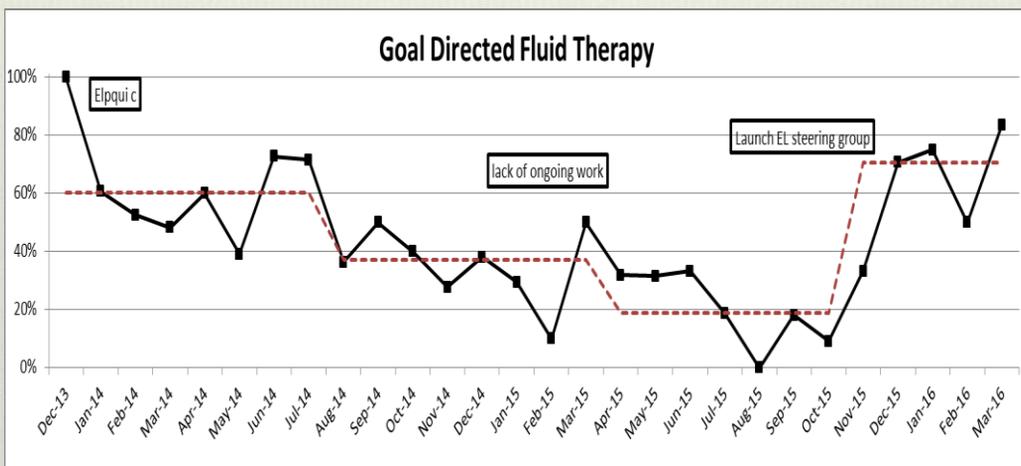
Thomas Edison.

Usage of individual QI strategies by teams in 90 UK hospitals-EPOCH study



EPOCH study data 2017, Stephens and Peden In Press

Use Run Charts Constant measurement and feedback



Perla RJ, Provost LP, Murray SK. The run chart: a simple analytical tool for learning from variation in healthcare processes *BMJ Quality & Safety* 2011;20:46-51.

ELC Learning Together – Collaborative power

- Innovations shared
- E.g. Virtual Peer Review

“Reenergizing

Excellent sharing of information

Useful update and networking

Stimulating, Supportive, Relevant

*Sharing and learning from each other,
being able to ask questions of others*

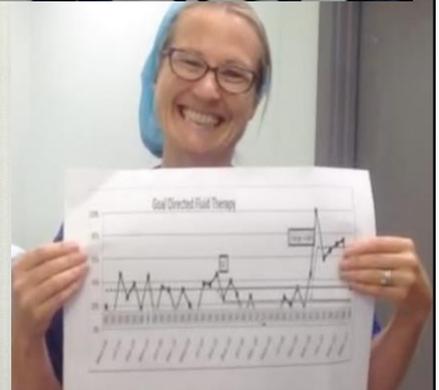
Learning from failures and successes

*Showing the way to improve and
approach any obstacles”*

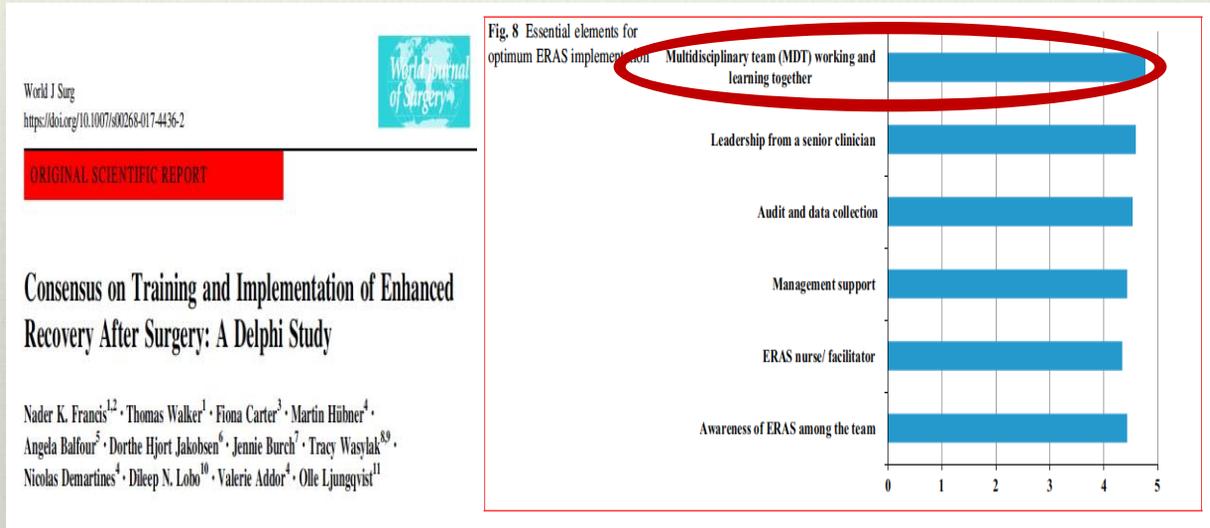


Implement and sustain change

Leverage quick wins, celebrate success, embed in culture, create joy in work!



Essential elements for optimum ERAS implementation.



Consensus on Training and Implementation of Enhanced Recovery After Surgery.
 World J Surg; Jan 2018

The high risk surgical patient and ERAS

- ❖ These patients will benefit from an ERAS approach
- ❖ You will save lives, reduce complications and increase value!
- ❖ Understand the pathways
- ❖ Segment
- ❖ Select a few key processes to work on
- ❖ Measure, monitor and feedback
- ❖ Get passionate about it and make change happen!

Finally



“Success consists of going from failure to failure without loss of enthusiasm!”

Resources

- ❖ The Institute for Healthcare Improvement (IHI) website <http://www.ihl.org>
- ❖ Change management resources <http://www.ihl.org/resources/Pages/Changes>
- ❖ IHI Open School <http://www.ihl.org/education/ihlopenschool/>
- ❖ IHI Quality Improvement Essentials toolkit very useful
<http://www.ihl.org/resources/Pages/Tools/Quality-Improvement-Essentials-Toolkit> Templates for project planning forms, driver diagrams, QI aides.
- ❖ Harvard edX a practical improvement science online course
<https://www.edx.org/course/ph556x-practical-improvement-science-harvardx> free if you are not seeking certification.
- ❖ Royal College of Anaesthetists UK - number of resources on QI free. Perioperative Improvement Science and Management (PRISM) section has an introductory QI course <http://www.prism-ed.com> QI book downloadable <https://www.rcoa.ac.uk/system/files/CSQ-ARB2012-QIA.pdf> includes a background to QI, also details on tools such as driver diagrams