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ERAS - An evidence-based protocol and data-driven care with the patient in the team

Dr Chris Jones
Consultant Anaesthetist
Royal Surrey County Hospital & St Lukes Cancer Centre
SPACeR (Surrey Perioperative And Critical care Research) Group
Honorary Senior Lecturer UCL

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ERAS - An update based on the Guildford experience

Dr Chris Jones
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Honorary Senior Lecturer UCL

Declarations of Interest

- Nil

ERAS

- Fast track programmes
- Enhanced Recovery programmes
- Enhanced Recovery After Surgery
- ERAS

ANNALS OF SURGERY
Vol. 232, No. 1, 51–57

A Clinical Pathway to Accelerate Recovery After Colonic Resection

Linda Basse, MD, Dorthe Hjort Jakobsen, RN, Per Billesbølle, MD, Mads Werner, MD, PhD, and Henrik Kehlet, MD, PhD

From the Department of Surgical Gastroenterology and Anesthesiology, Hvidovre University Hospital, Denmark

ERAS Society

ERAS®

ERAS Society Guidelines

- 2005 – Colonic surgery
  - –Fearon et al Clin Nutr 2005
- 2009 – Rectal Surgery
  - –Lassen et al. Arch Surg 2009
- 2012 – Updated Colonic surgery
  - –Gustafsson et al Clin Nutr 2012
- 2012 – Updated Rectal & Pelvic surgery
  - –Nygren et al Clin Nutr 2012
- 2012 – Pancreatic Resections
  - –Lassen et al Clin Nutr 2012
- 2013 – Radical Cystectomy
  - –Carentola et al Clin Nutr 2013
- 2014 – Gastrectomy
  - –Mortensen et al BJS 2014
- 2016 – Gynae Oncology [1&2]
  - –Nelsen et al Gynecol Onc 2016
- 2016 – Bariatric
  - –Thorrel et al World J Surg 2016

Guidelines – coming soon

- Head & Neck
- Liver resection
- Hip Replacement
- Knee Replacement
- Thoracic
- Oesophageal Resection

Guidelines – coming soon

- Head & Neck
- ~~Liver resection~~
- Hip
- Kne
- Tho
- Oes

World J Surg (2016) 40:2425–2440
DOI 10.1007/s00268-016-3700-1

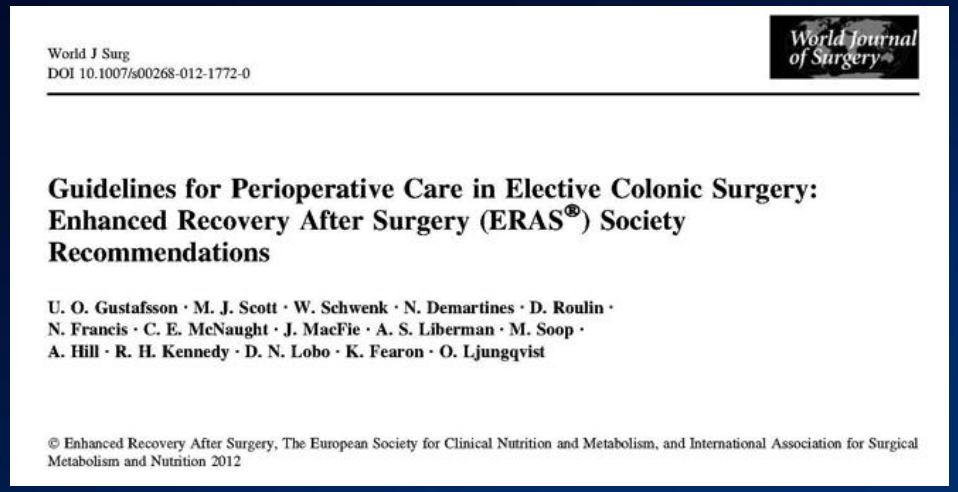
World Journal of Surgery

SCIENTIFIC REVIEW

Guidelines for Perioperative Care for Liver Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations

Emmanuel Melloul[1,2] · Martin Hübner[1] · Michael Scott[3] · Chris Snowden[4,5] · James Prentis[6] · Cornelis H. C. Dejong[7] · O. James Garden[8] · Olivier Farges[9] · Norihiro Kokudo[10] · Jean-Nicolas Vauthey[11] · Pierre-Alain Clavien[12] · Nicolas Demartines[1]

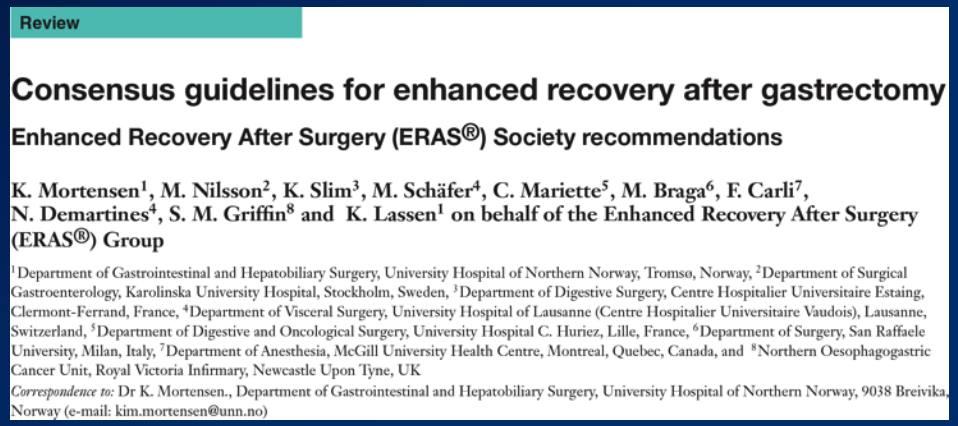
ERAS Society Guidelines



World J Surg
DOI 10.1007/s00268-012-1772-0
World Journal of Surgery

Guidelines for Perioperative Care in Elective Colonic Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations

U. O. Gustafsson · M. J. Scott · W. Schwenk · N. Demartines · D. Roulin · N. Francis · C. E. McNaught · J. MacFie · A. S. Liberman · M. Soop · A. Hill · R. H. Kennedy · D. N. Lobo · K. Fearon · O. Ljungqvist



Review

Consensus guidelines for enhanced recovery after gastrectomy

Enhanced Recovery After Surgery (ERAS®) Society recommendations

K. Mortensen[1], M. Nilsson[2], K. Slim[3], M. Schäfer[4], C. Mariette[5], M. Braga[6], F. Carli[7], N. Demartines[4], S. M. Griffin[8] and K. Lassen[1] on behalf of the Enhanced Recovery After Surgery (ERAS®) Group

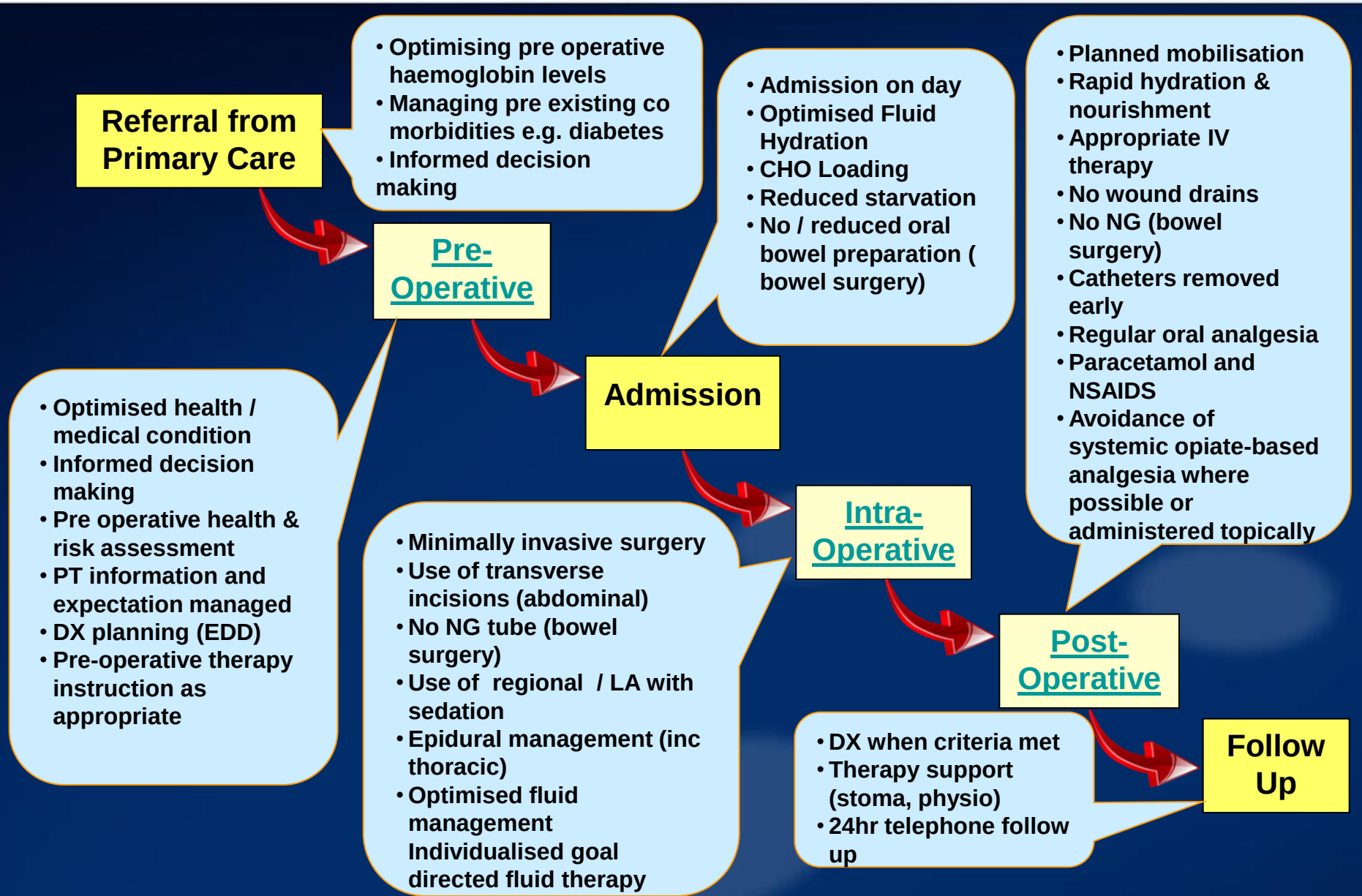
[1]Department of Gastrointestinal and Hepatobiliary Surgery, University Hospital of Northern Norway, Tromsø, Norway, [2]Department of Surgical Gastroenterology, Karolinska University Hospital, Stockholm, Sweden, [3]Department of Digestive Surgery, Centre Hospitalier Universitaire Estaing, Clermont-Ferrand, France, [4]Department of Visceral Surgery, University Hospital of Lausanne (Centre Hospitalier Universitaire Vaudois), Lausanne, Switzerland, [5]Department of Digestive and Oncological Surgery, University Hospital C. Huriez, Lille, France, [6]Department of Surgery, San Raffaele University, Milan, Italy, [7]Department of Anesthesia, McGill University Health Centre, Montreal, Quebec, Canada, and [8]Northern Oesophagogastric Cancer Unit, Royal Victoria Infirmary, Newcastle Upon Tyne, UK

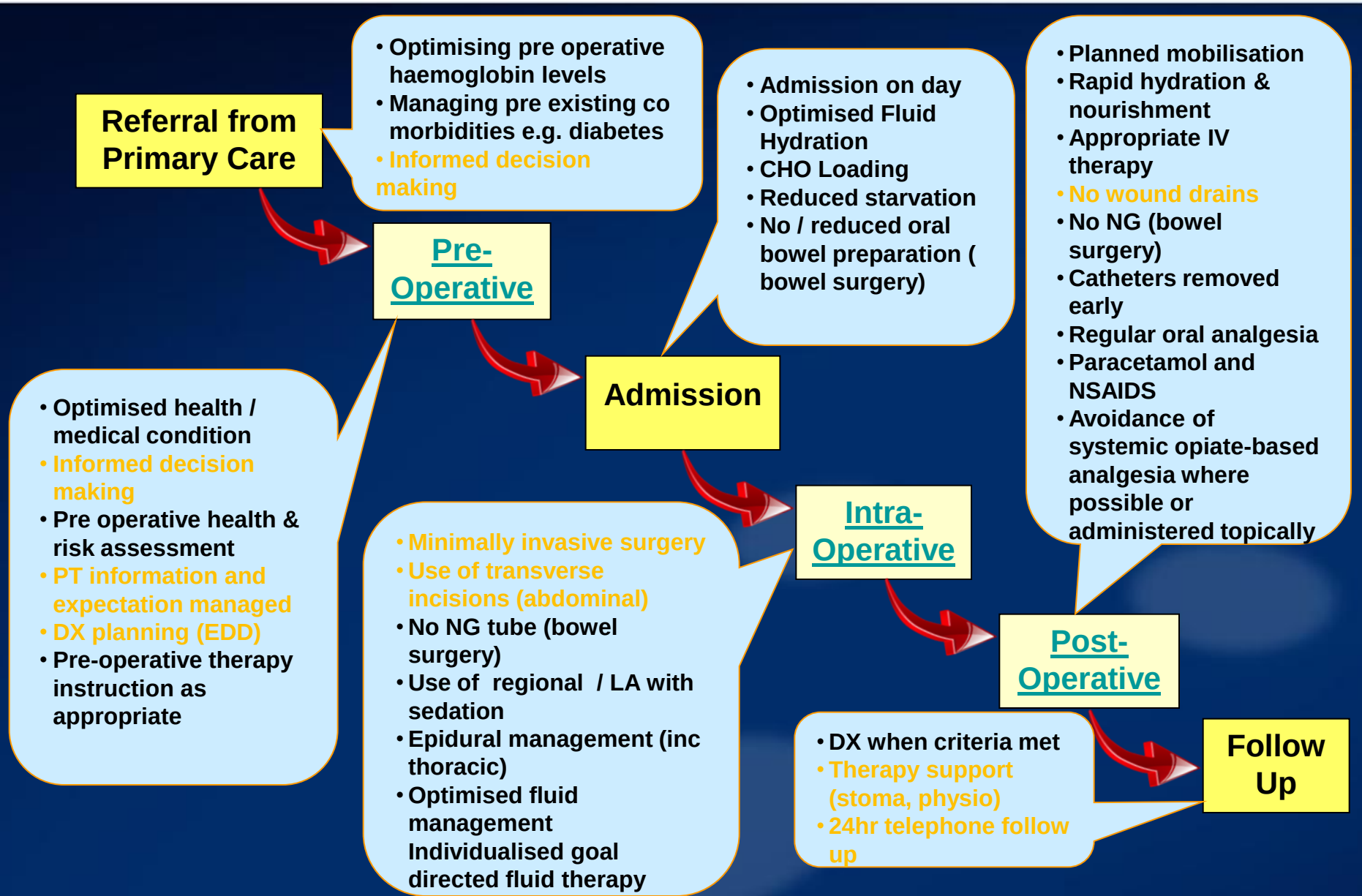
Correspondence to: Dr K. Mortensen., Department of Gastrointestinal and Hepatobiliary Surgery, University Hospital of Northern Norway, 9038 Breivika, Norway (e-mail: kim.mortensen@unn.no)

- Guidelines can be a base for implementation but do not do the implementation for you

Overall rapid uncomplicated recovery leads to:

- Improved Quality
- Improved Patient satisfaction
- Reduced Length of Stay
- Reduced Costs
- Reduction in short term and long term morbidity and mortality


Referral from Primary Care
• Optimising pre operative haemoglobin levels
• Managing pre existing co morbidities e.g. diabetes
• Informed decision making
Pre-Operative
• Optimised health / medical condition
• Informed decision making
• Pre operative health & risk assessment
• PT information and expectation managed
• DX planning (EDD)
• Pre-operative therapy instruction as appropriate
Admission
• Admission on day
• Optimised Fluid Hydration
• CHO Loading
• Reduced starvation
• No / reduced oral bowel preparation (bowel surgery)
Intra-Operative
• Minimally invasive surgery
• Use of transverse incisions (abdominal)
• No NG tube (bowel surgery)
• Use of regional / LA with sedation
• Epidural management (inc thoracic)
• Optimised fluid management Individualised goal directed fluid therapy
Post-Operative
• Planned mobilisation
• Rapid hydration & nourishment
• Appropriate IV therapy
• No wound drains
• No NG (bowel surgery)
• Catheters removed early
• Regular oral analgesia
• Paracetamol and NSAIDS
• Avoidance of systemic opiate-based analgesia where possible or administered topically
Follow Up
• DX when criteria met
• Therapy support (stoma, physio)
• 24hr telephone follow up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Guildford - Enhanced Recovery

International Centre of Excellence for Surgery and Perioperative Medicine

Colorectal ERAS Pathways 2003

ERP MSK / Gynae Onc 2007

ERP # Neck Of Femur 2009

ERP Liver / Pancreas 2009

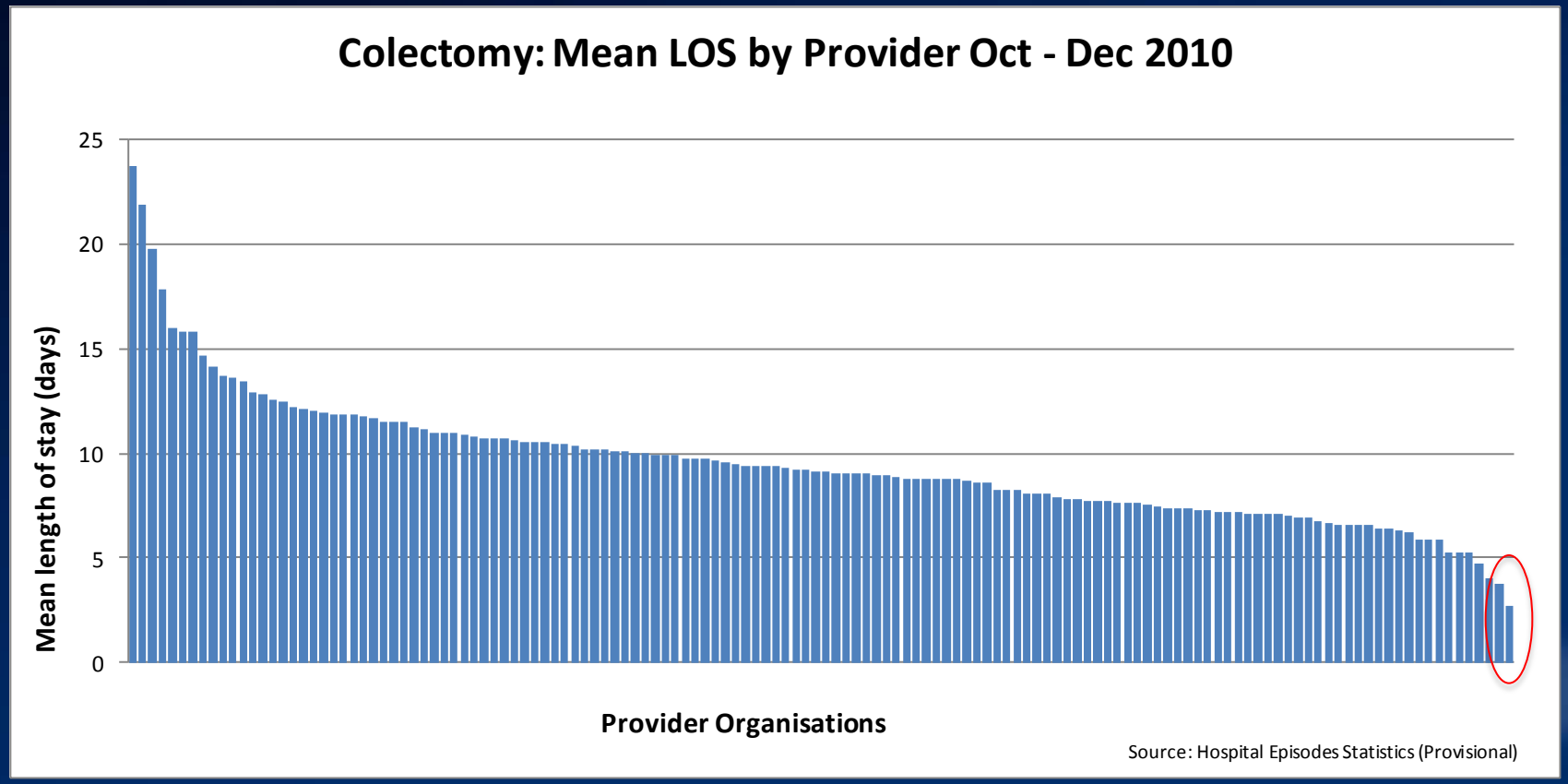
ERP Emergency Laparotomy 2009

ERP Oesophagus 2010

ERP Cystectomy 2013

ERP Head & Neck 2014

UK - Mean LOS by Provider - Colectomy



Guildford: Consistently low length of stay

Colorectal

ORIGINAL CONTRIBUTION

23-Hour-Stay Laparoscopic Colectomy

B. F. Levy, M.R.C.S.[1] • M. J. P. Scott, F.R.C.A.[2] • W. J. Fawcett, F.R.C.A.[2]
T. A. Rockall, F.R.C.S[1]

1 Department of Surgery, Minimal Access Therapy Training Unit, Post Graduate Medical School, University of Surrey, Manor Park, Guildford, Surrey, United Kingdom
2 Department of Anesthesia, Minimal Access Therapy Training Unit, Post Graduate Medical School, University of Surrey, Manor Park, Guildford, Surrey, United Kingdom

DISEASES OF THE COLON & RECTUM VOLUME 52: 7 (2009)

Oesophageal Resection

Original article

Impact of a multidisciplinary standardized clinical pathway on perioperative outcomes in patients with oesophageal cancer

S. R. Preston[1], S. R. Markar[2], C. R. Baker[1], Y. Soon[1], S. Singh[1] and D. E. Low[2]

[1]Oesophago-Gastric Unit, Royal Surrey County Hospital, Guildford, UK and [2]Department of Thoracic Surgery, Virginia Mason Medical Center, Seattle, Washington, USA

Correspondence to: Dr D. E. Low, Department of Thoracic Surgery, Virginia Mason Medical Center, 1100 Ninth Avenue, Seattle, Washington 98111, USA (e-mail: Donald.low@vmmc.org)

British Journal of Surgery 2013; **100**: 105–112

Emergency Laparotomy

Original article

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

S. Huddart[1], C. J. Peden[2], M. Swart[3], B. McCormick[4], M. Dickinson[1], M. A. Mohammed[5] and N. Quiney[1], on behalf of the ELPQuiC Collaborator Group

[1]Department of Anaesthesia and Intensive Care, Royal Surrey County Hospital NHS Foundation Trust, Guildford, [2]Department of Anaesthesia and Intensive Care, Royal United Hospital Bath NHS Trust, Bath, [3]Department of Anaesthesia and Perioperative Medicine, South Devon Healthcare NHS Foundation Trust, Torbay Hospital, Torquay, [4]Department of Anaesthesia and Intensive Care, Royal Devon and Exeter NHS Foundation Trust, Exeter, and [5]School of Health Studies, University of Bradford, Bradford, UK

Correspondence to: Dr S. Huddart, Department of Anaesthesia, Royal Surrey County Hospital NHS Foundation Trust, Egerton Road, Guildford GU2 7XX, UK (e-mail: samhuddart@nhs.net)

Head and Neck

Patient information leaflet

Royal Surrey County Hospital NHS
NHS Foundation Trust

Enhanced Recovery Programme for Head & Neck Free Flap Surgery

ERAS for Whipples

Royal Surrey County Hospital NHS
NHS Foundation Trust

Chart_____ of _____

Drug Prescribing and Recording Chart for Pancreatico-duodenectomy Enhanced Recovery

Chart rewritten _____ Name/Date

Ward	Date of Admission	Consultant

Information relevant to prescribing

Renal Impairment ☐ Liver Impairment ☐ Pregnancy ☐ Breast Feeding ☐

Previous History of (Check on admission): MRSA colonisation Yes / No Previous history of Cdifficile Yes / No

Nil by mouth- Surgery

Give all regular prescribed medication with 30mL of water on the day of surgery **except for**:-

- Insulin and Oral hypoglycaemic drugs (see Diabetic Protocol)

If in any doubt check with patient's anaesthetic team

VTE Risk Assessment

Please complete MANDATORY risk assessment on pages 2 and 3 for ALL patients.

Other Charts in Use	Start	Sign	Finish	Sign

Open Liver Resection

Randomized clinical trial

Randomized clinical trial on enhanced recovery versus standard care following open liver resection

C. Jones[1], L. Kelliher[1], M. Dickinson[1], A. Riga[2], T. Worthington[2], M. J. Scott[1,3], T. Vandrevala[3], C. H. Fry[3], N. Karanjia[2] and N. Quiney[1]

Departments of [1]Anaesthesia and [2]Hepatobiliary Surgery, Royal Surrey County Hospital NHS Foundation Trust, and [3]Faculty of Health and Medical Sciences, University of Surrey, Guildford, UK

Correspondence to: Dr C. Jones, Department of Anaesthesia, Royal Surrey County Hospital NHS Foundation Trust, Egerton Road, Guildford GU2 7XX, UK (e-mail: drchrisnjones@yahoo.co.uk)

British Journal of Surgery 2013; **100**: 1015–1024

Enhanced Recovery - Liver

Preop info, education and counselling
Preop optimisation
Preop bowel prep (avoid)
Preop fasting + CHO
Avoid Pre-med
Prophylaxis against thromboembolism
Antimicrobial prophylaxis
Standard anaesthetic protocol
PONV
~~Laparoscopy~~
Avoid NG Tube
Prevent intraoperative hypothermia
Perioperative fluid management
Routine surgical drainage
Urinary drainage
Prevention of ileus
Postop analgesia - epidural (avoid opiates)
Perioperative nutritional care
Postop glucose control
Early mobilisation

Gustafsson World J Surg Oct 2012

Enhanced Recovery – Liver

Preop info, education and counselling
Preop optimisation
Preop bowel prep (avoid)
Preop fasting + CHO
Avoid Pre-med
Prophylaxis against thromboembolism
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Prevent intraoperative hypothermia
Perioperative fluid management
Routine surgical drainage
Urinary drainage
Prevention of ileus
Postop analgesia - epidural (avoid opiates)
Perioperative nutritional care
Postop glucose control
Early mobilisation

But 13/20 would be considered standard care

Enhanced Recovery in Liver Resection

- ERP Group
  - Education
  - CHO preOp + ONS
  - Thoracic epidural
  - Early mobilisation
  - Goal Directed Fluid Therapy for 6 hours post operatively with LiDCO*rapid*™

- Standard Group
  - Standard Surgical Technique
  - Standard Anaesthetic
  - Thoracic epidural

Results

- Both groups similar in age, sex, BMI, ASA
- Significantly more malignancies in ERP group [p=0.021]
- Significantly more neoadjuvant chemo in ERP group [p=0.021]
- Significantly higher P-POSSUM operative severity [p=0.012]
- Major resections 21 vs 12 [p=0.06]

Results

	ERP Group	Standard Group	p-value
Time until medically fit for discharge - days [IQR]	3.00 [3-4]	6.00 [6-7]	<0.001
Hospital Length of Stay - days [IQR]	4.00 [3-5]	7.00 [6-8]	<0.001

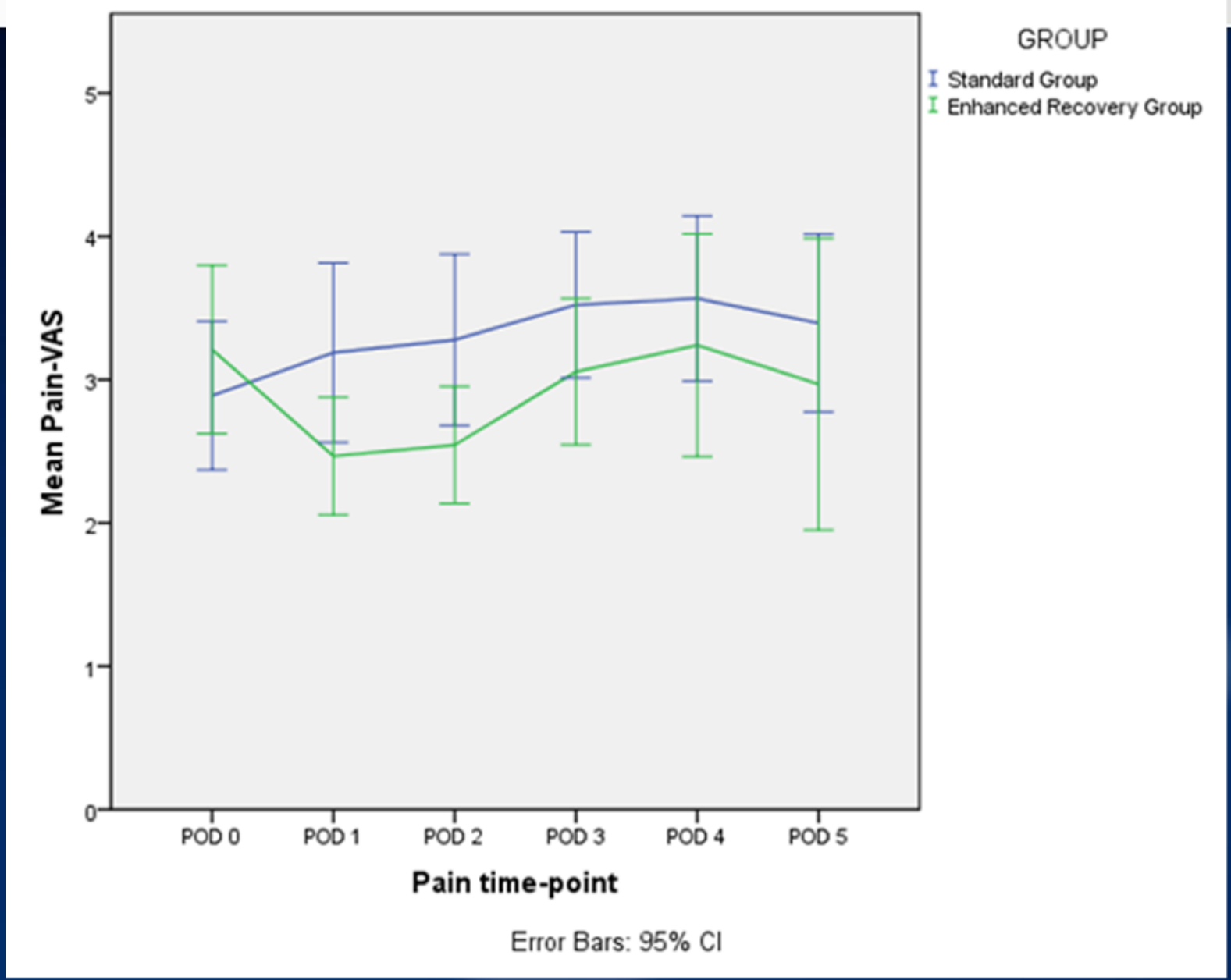
Results – Liver complications

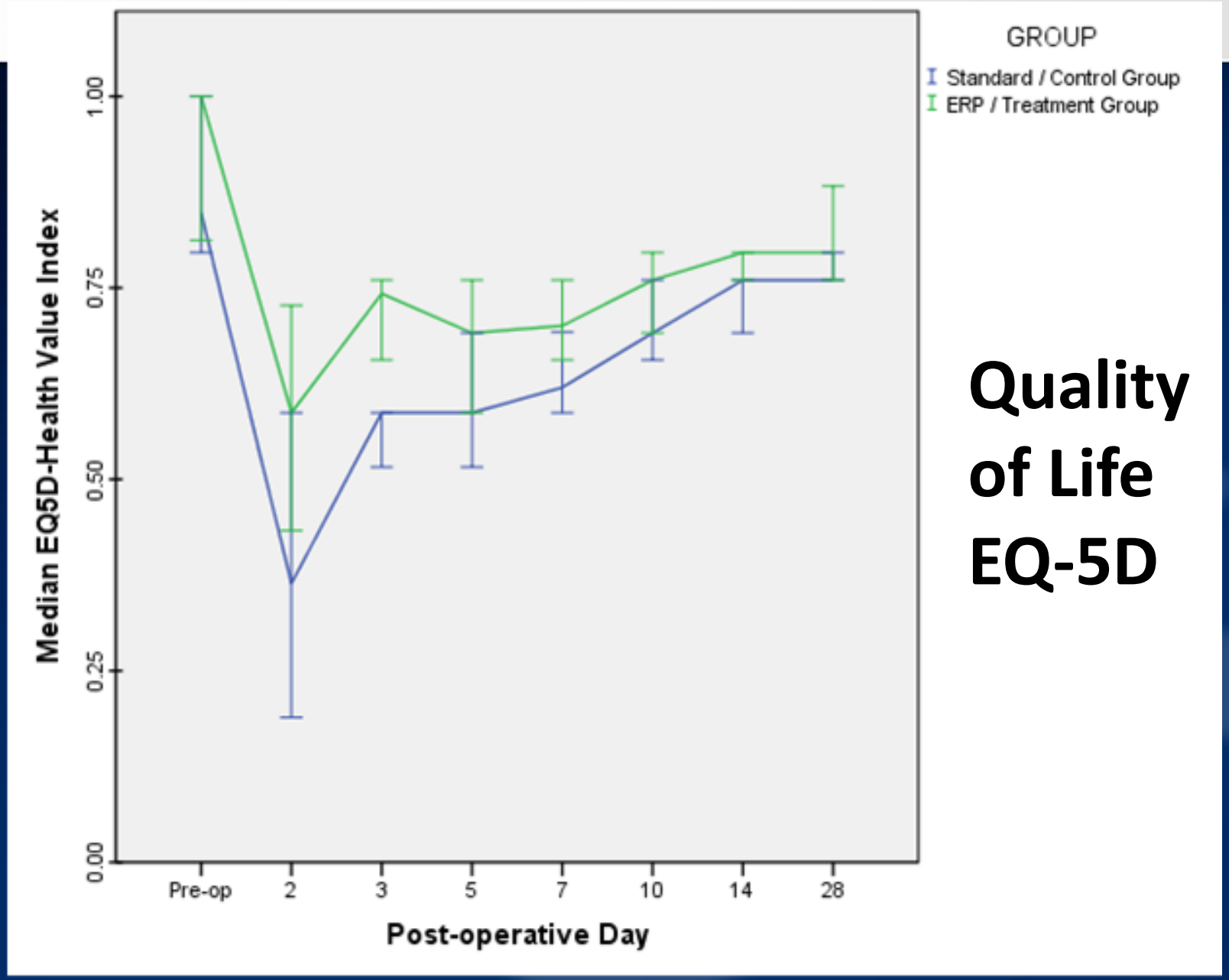
Morbidity	ERP Group	Standard Group	p-value
Abdominal Collection/Infection	2	3	0.319
Bile Leak	3	3	0.322
Biliary Stricture	1	0	0.511
Transient hepatic insufficiency	3	1	0.266
Liver failure	1	1	0.505
Total complications	10	8	0.829
Total no of patients	7 (15.2%)	5 (11.1%)	0.612

Results – Medical Complications

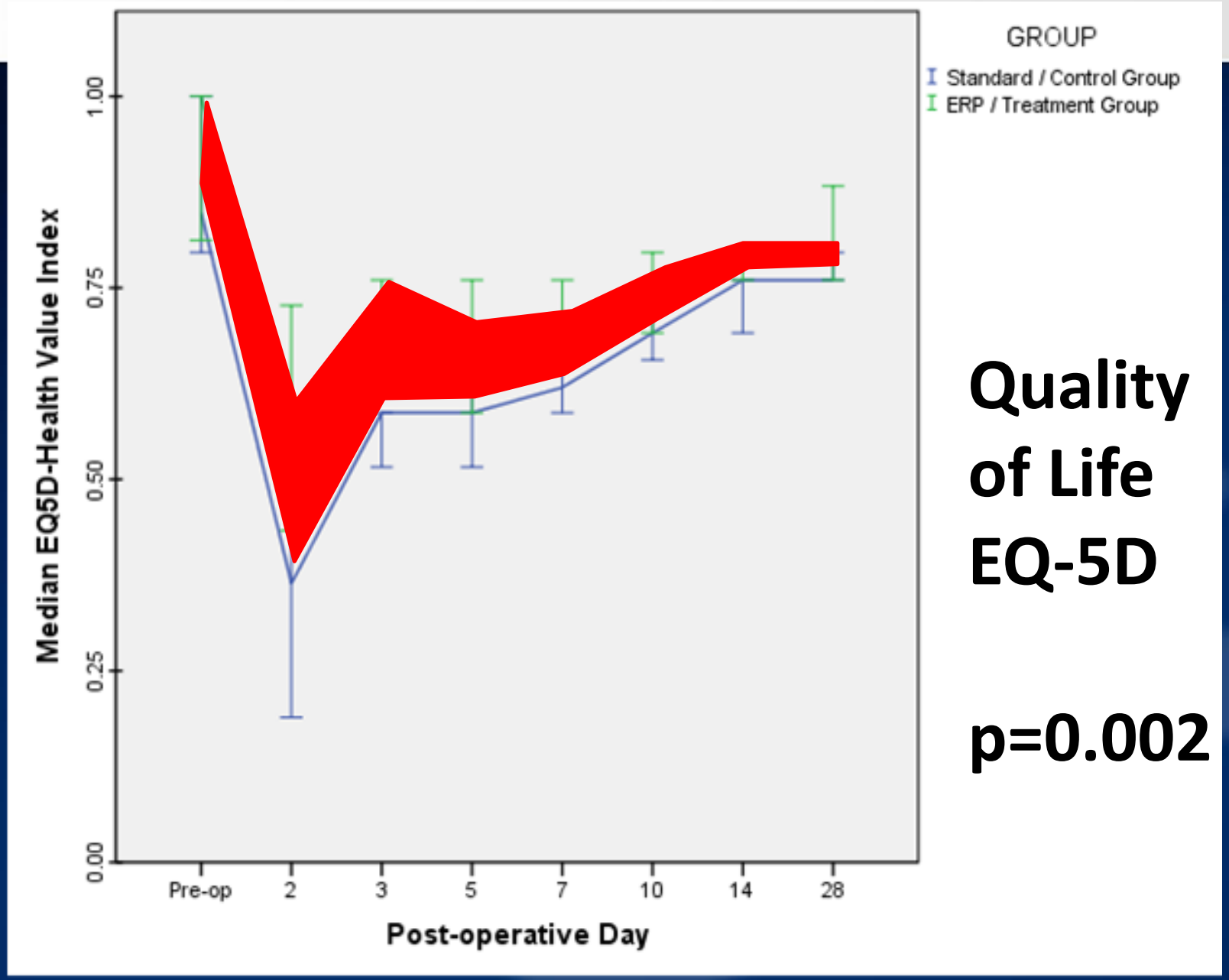
Morbidity	ERP Group	Standard Group	p-value
Arrhythmia	1	3	0.255
Chest Infection / Pneumonia	1	5	0.101
Delirium	1	0	0.511
GI Bleed	0	1	0.5
Hypotension	0	2	0.253
Incarcerated port-site hernia	1	0	0.511
Perforated diverticulum	0	1	0.5
Pleural Effusion	0	1	0.5
Postoperative Ileus	0	3	0.129
Thromboembolic disease	0	1	0.5
Urinary tract infection	0	1	0.5
Wound Dehiscence/infection	0	2	0.253
Total Complications	4	20	**0.009**
No. of patients with complications	3 (6.5%)	12 (26.7%)	**0.020**

VAS Pain Scores





Quality of Life EQ-5D



Quality of Life EQ-5D

p=0.002

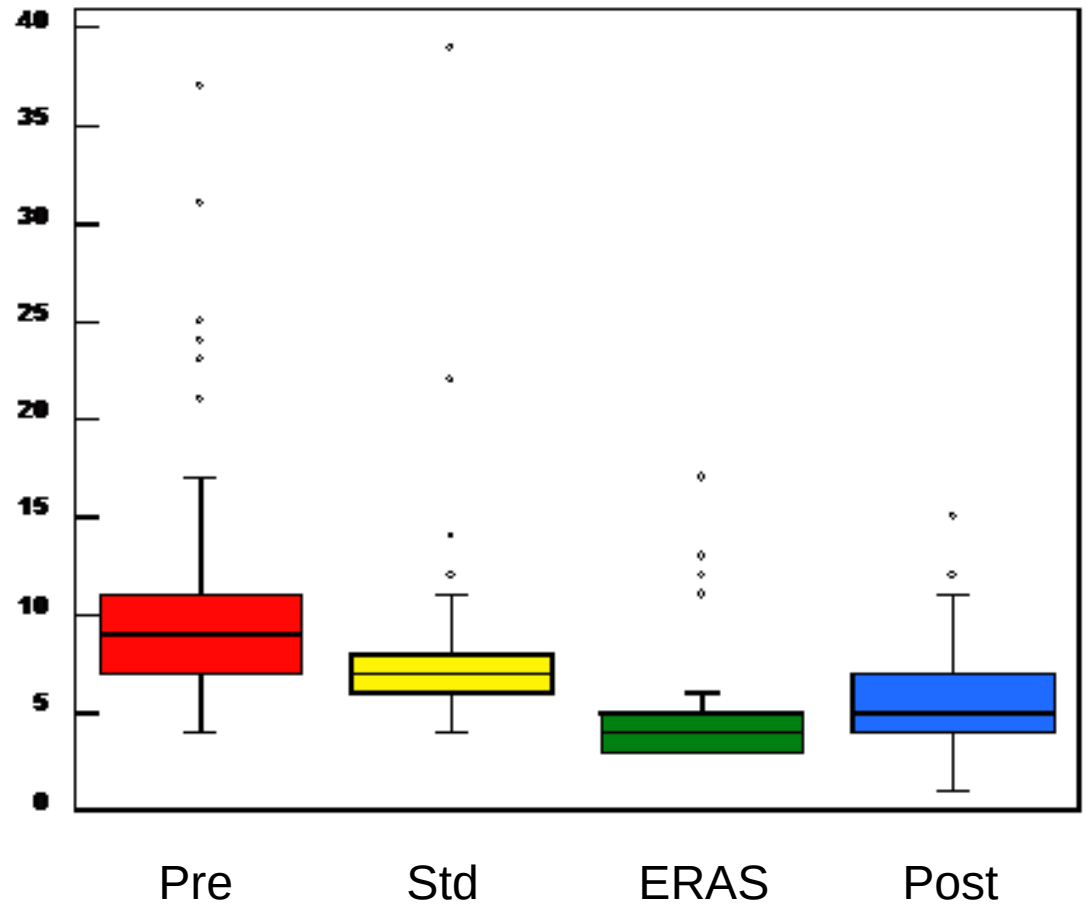

ERAS®

Cost Analysis

- Based on anaesthetic, surgical, length of stay (per level of care), and community costs (POD-28)
- Δ Costs = £995.17 in favour of ERP

- LiDCO*rapid*™, ONS, preOp
- Physio
- Acute Pain Team

Sustainability



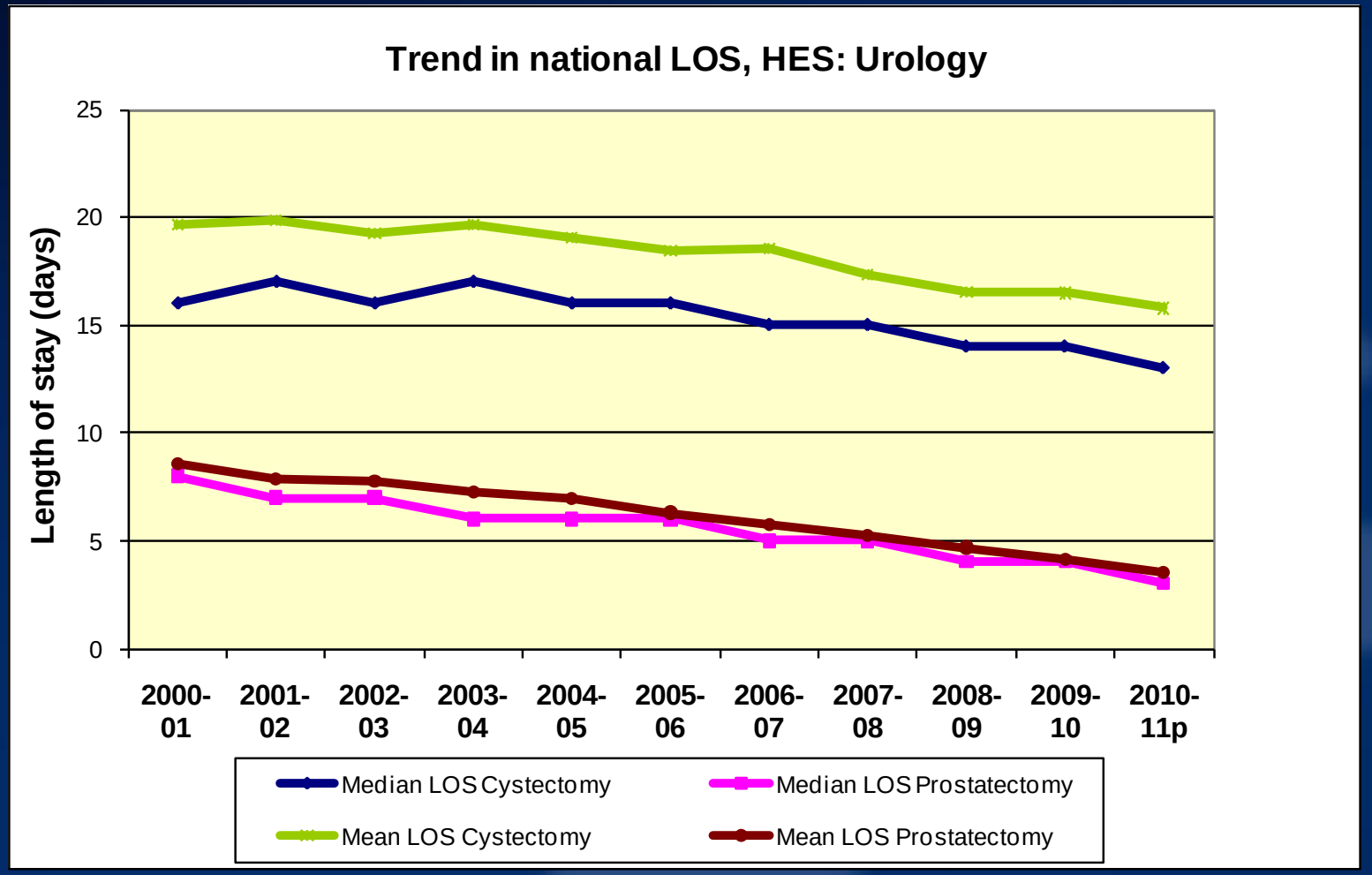
Robotic Cystectomy

- New service started 2013
- Single surgeon (with mentor)
- Small consistent team
- ERP written with input from the entire team

Robotic Cystectomy

- Minimally invasive surgery
  - Initially open diversions now mostly intracorporeal
- Spinal analgesia (Diamorphine)
- Goal directed fluid therapy
- HDU post-op
- Early mobilisation
- Normal diet + chewing gum
- Early removal of pelvic drain (day 2)

LOS Trend 2000/01 – 2010/11 for Urology



Robotic Cystectomy - Results

- 137 patients
- LoS 5 days – overall.
- For 50+ patients 2016 = 4 days
- Median blood loss 200mls
- Morbidity 30.9%
  - Ileus 7%
- Mortality – 1.45%
- 10.3% Readmissions

x2 Robotic Cystectomies – Ileal Conduits

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OG - Visit to Virginia Mason, Seattle

Multidisciplinary Team

- Surgeon
- Intensivist
- Anaesthetist
- Nurse Specialist
- Physiotherapist
- Surgical Directorate Manager
- Dietician
- Intensive Care Sister

Initial Results

Outcome	USA Virginia Mason [1]	UK Guildford Pre-ER Pathway [2]	UK Guildford Non - ER Pathway [3]	UK Guildford ER Pathway [4]	P value
Patients Mobilising on Day 1 Post -op (%)	93	8.3	42	100	>0.99 [1vs4] <0.05 [2vs4] 0.16 [2vs3]
Complications (All cause %)	47.3	75	75	33.3	0.53 [1vs4] <0.05 [2vs4]
ICU Stay (days)	1 (0-22)	4 (2-20)	3 (2-9)	3 (1-5)	<0.05 [1vs4] < 0.05 [2vs4]
Hospital Stay (days)	8 (6-54)	17 (12-30)	13 (8-22)	7 (6-37)	0.25 [1vs4] <0.05 [2vs4]

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Mobilization

- Patient is head up
- Patient standing and mobilizing

- Pulmonary Function
- Also muscle activity reduces post operative insulin resistance

Aids to Mobilization

- Non slip socks
- Chest drains that can be inverted
- All drips on 1 stand
- Regular walks charted

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Emergency Laparotomy

The scale of the problem.

Incidence of emergency laparotomy 1:1000 per annum

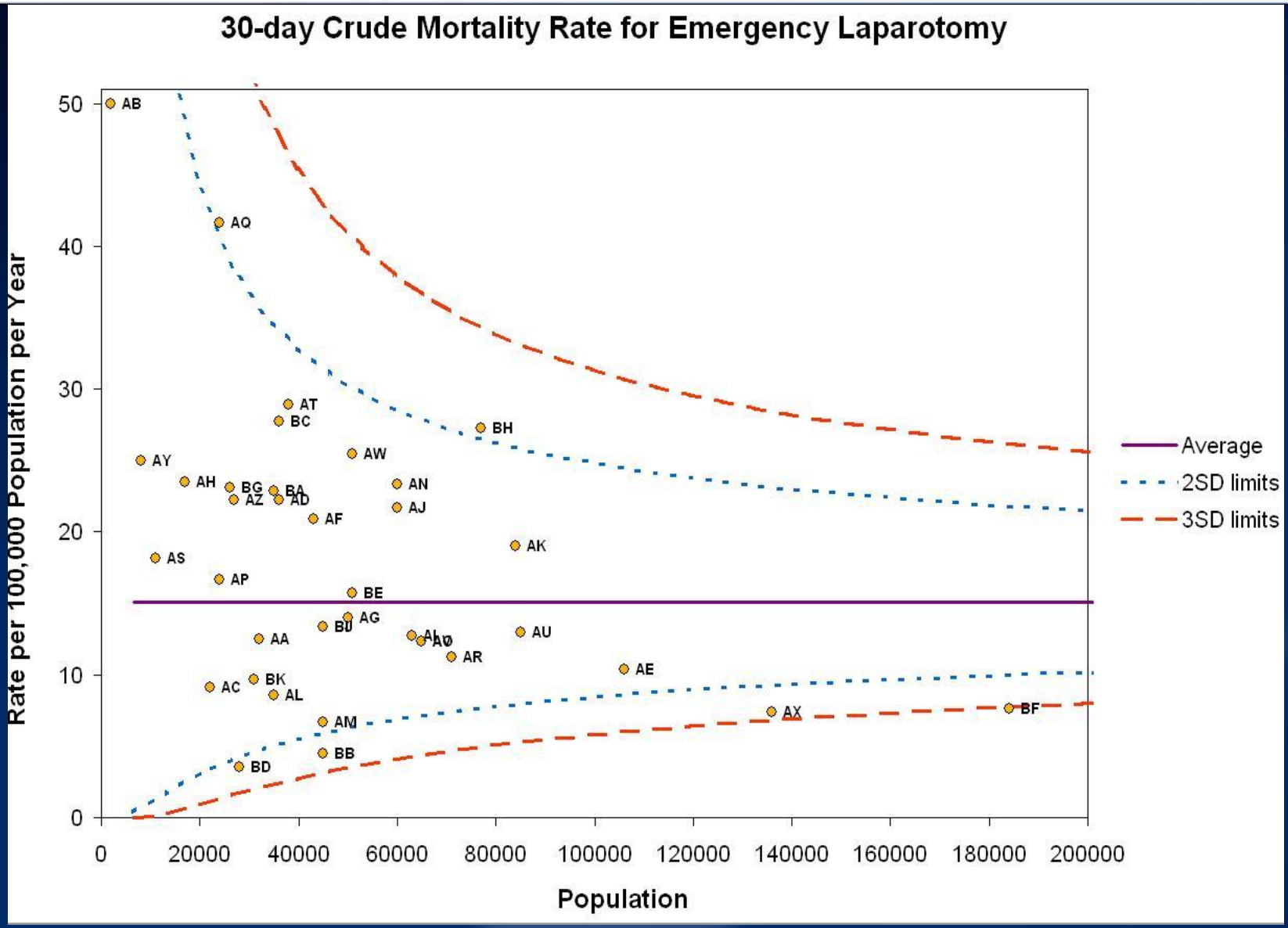
Mortality rate UK 15%

(Elective surgical outcomes 1-2%)

UK 9000 deaths per annum (2000 deaths per annum RTA)

Modest improvement in outcomes save many lives

In UK evidence of ‘substandard’ care


30-day Crude Mortality Rate for Emergency Laparotomy
Rate per 100,000 Population per Year
Population
0
10
20
30
40
50
0
20000
40000
60000
80000
100000
120000
140000
160000
180000
200000
AB
AQ
AT
BC
BH
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Average
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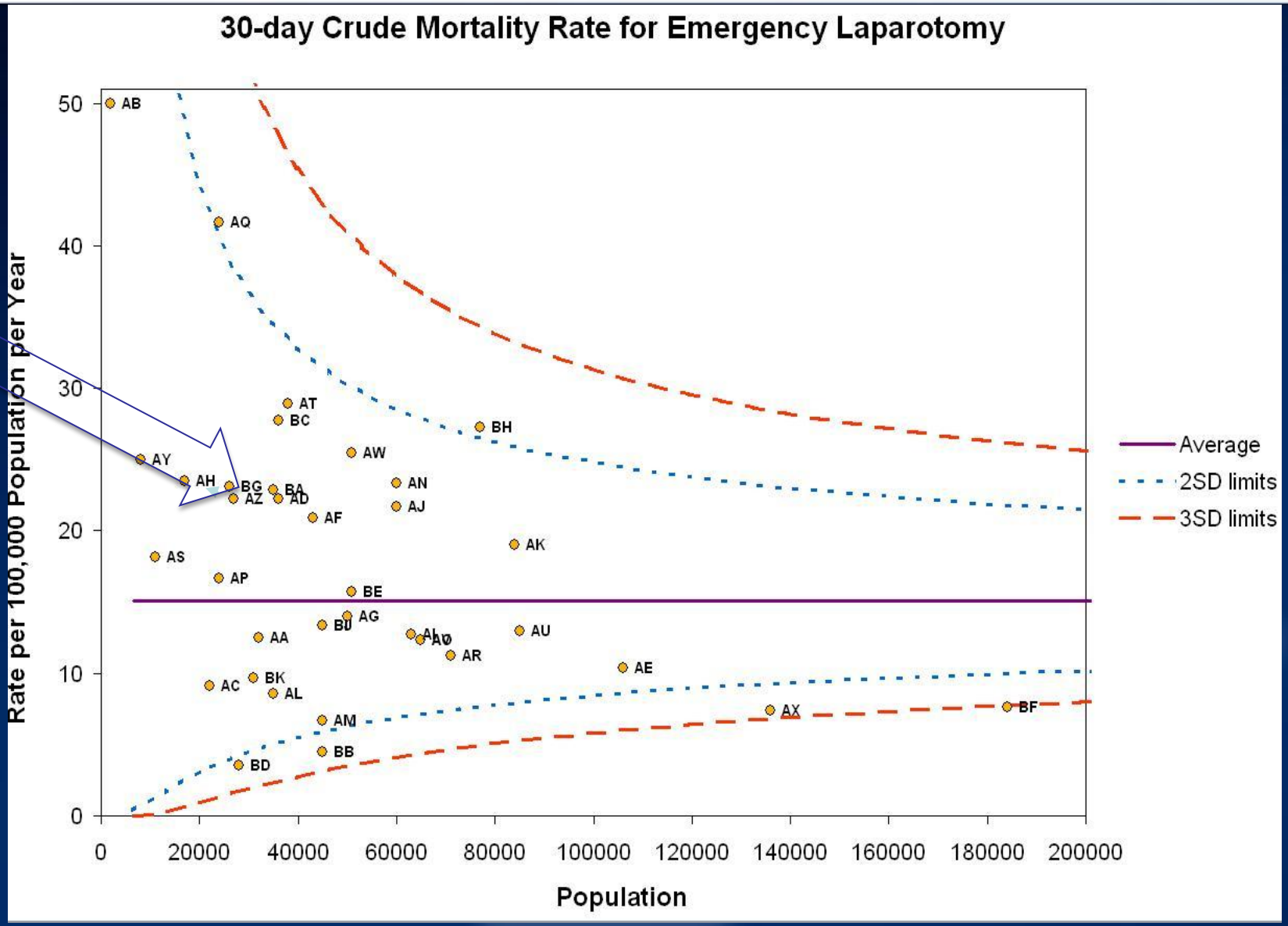
3SD limits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200000
AB
AQ
AT
BC
BH
AW
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AH
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BA
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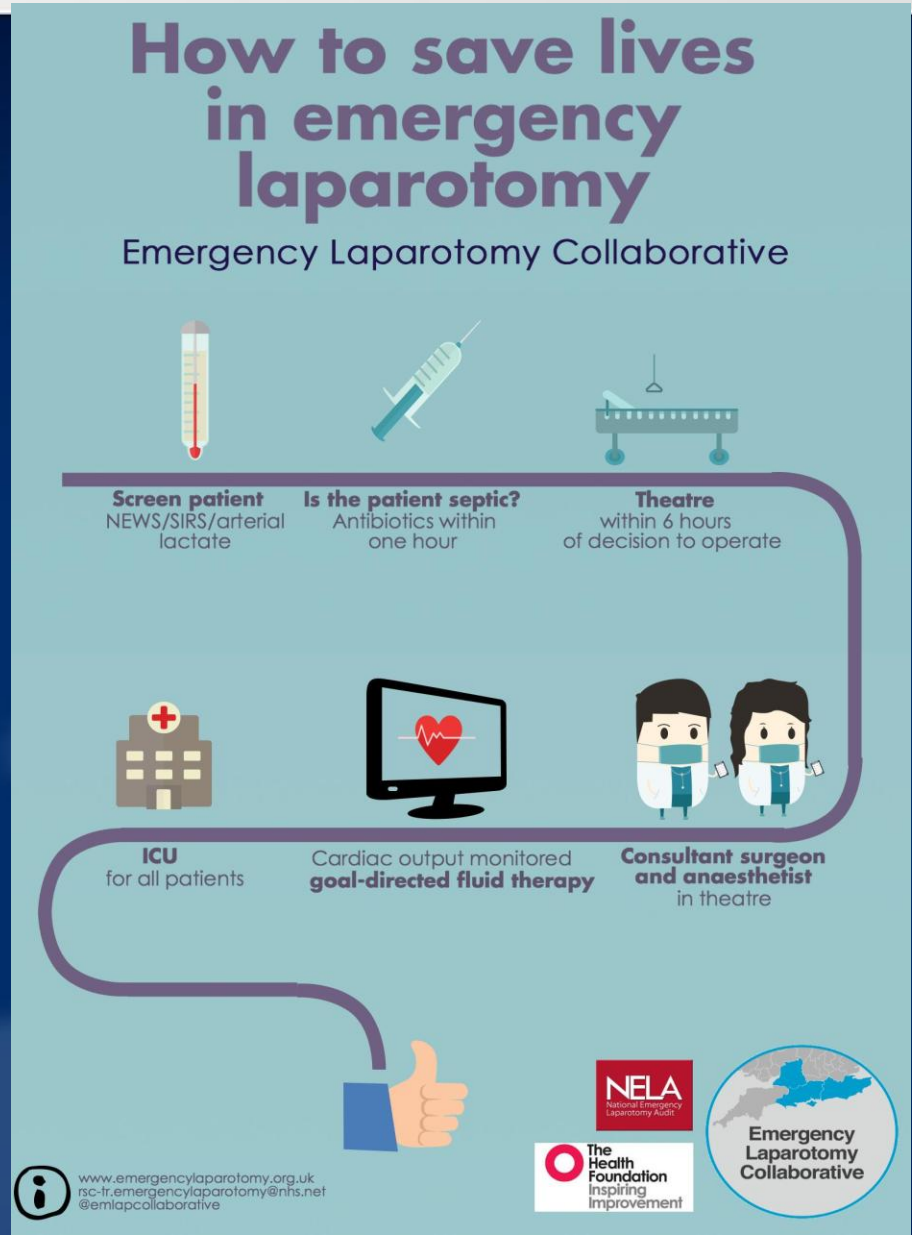
AZ
AD
AJ
AF
AK
AS
AP
BE
AG
BU
AA
AU
AR
AE
AC
BK
AL
AM
AX
BF
BB
BD
Average
2SD limits
3SD limits

Emergency Laparotomy Pathway Quality Improvement Care Bundle

- Small group developed ‘care bundle’ ELPQuiC
- Five elements
- Evidence based
- Measurable



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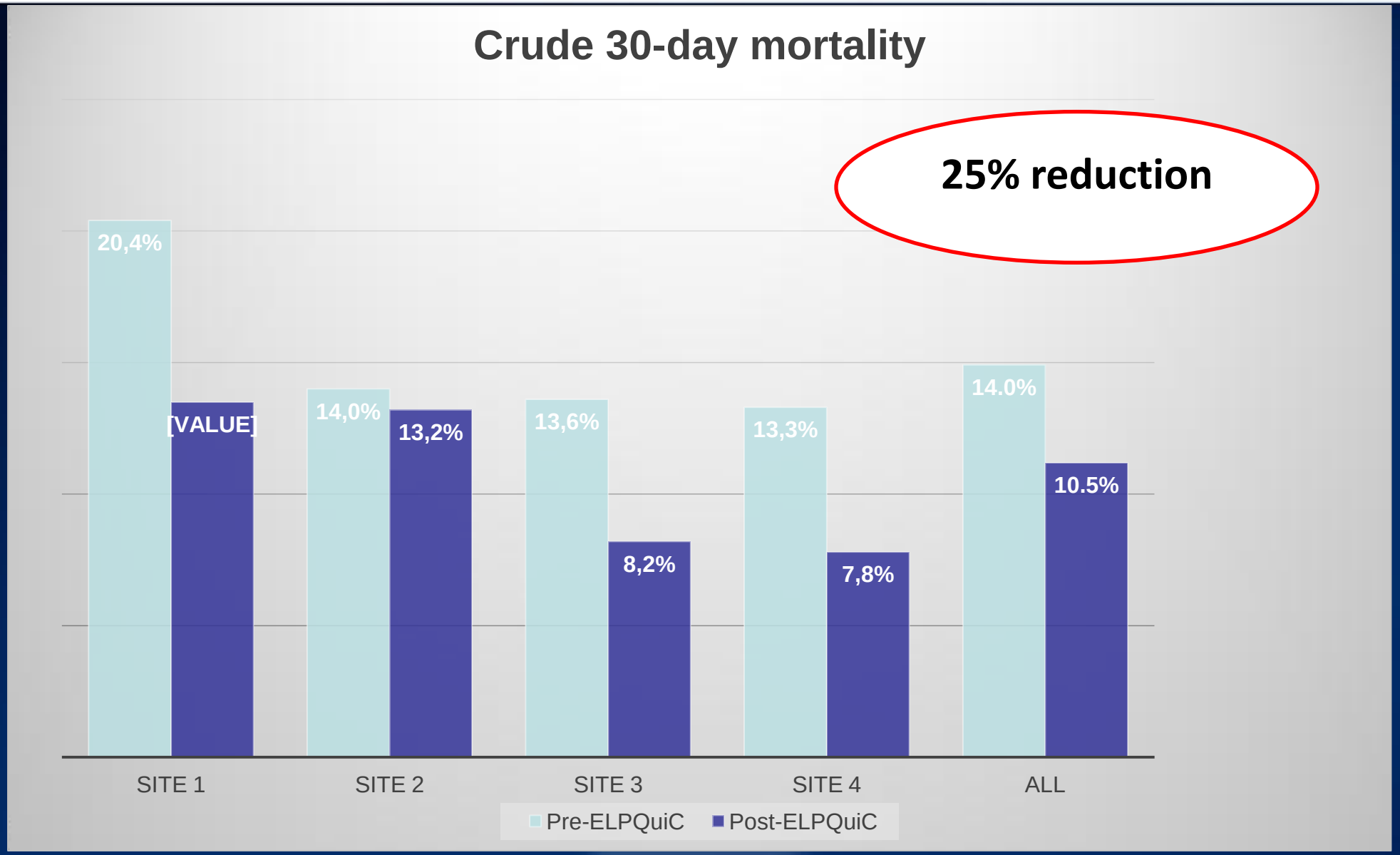
Emergency Laparotomy Quality Improvement Care Bundle

- All emergency admissions to surgical assessment area have an EWS completed. Outreach to review all patients with EWS of 4 or more.
- Broad spectrum antibiotics to be given to all patients with suspicion of peritoneal soiling or with septic shock.
- Once decision is made to carry out laparotomy patient takes next available slot on emergency list (or within 6 hours of decision made).
- Start resuscitation using goal directed techniques as soon as possible or within 6 hours of admission.
- Admit all patients after emergency laparotomy to ICU.

Emergency Laparotomy Pathway Quality Improvement Care Bundle

- Four general hospitals in England
- Baseline data for 299 patients
- Eight month prospective data collection (427 patients)
- Use of ‘statistical process control’ to identify changes
- Meet every 4-6 weeks for results/learning

Results


Crude 30-day mortality
25% reduction
20,4%
[VALUE]
14,0%
13,2%
13,6%
8,2%
13,3%
7,8%
14.0%
10.5%
SITE 1
SITE 2
SITE 3
SITE 4
ALL
Pre-ELPQuiC
Post-ELPQuiC

Royal Surrey County Hospital NHS
NHS Foundation Trust
mattu

Results

30 day outcomes

- Pooled data risk adjusted mortality 15.6 to 9.6% (38% reduction)
- 6.0 additional lives saved per 100 patients treated
- NNT 16.4

In hospital outcomes

- Pooled data risk adjusted mortality 17.4 to 10.1% (42%)
- 8.1 additional lives saved per 100 patients treated
- NNT 12.4

Summary – ERAS Pathways

- Get all Stakeholders together and devise a patient centered pathway that everyone can agree to (not necessarily 100%)
- Some items may remain variable between surgeon – don't make that a deal breaker?
- Surgeon & Anaesthetist must work together
- Get Management buy in (literally)
- Empower and teach staff
- Remember the patient is central to success
- Audit what you do and review as a team

SUMMARY

- ERAS Pathways are now established as a Standard of Care in Guildford
- ERAS Culture takes time to develop
- Team working and team building
- Need to empower staff to deliver the key elements of ERAS

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