

Michigan Acute Care Surgery CQI

MSQC/ASPIRE Collaborative Meeting

Virtual, MI

April 23, 2021

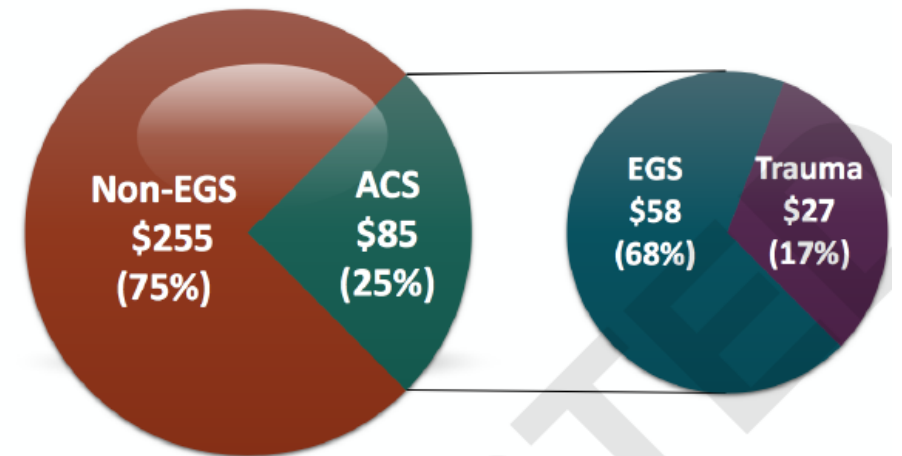
M·ACS

Acute Care Surgery

- Inadequate on-call coverage (2005, ACEP)
- Surgical society response - AAST
- Acute care surgery
 - Trauma
 - Surgical Critical Care
 - Emergent General Surgery
- Fellowship (2008)
- Model of care at many hospitals

Acute Care Surgery – Economic Footprint

- National Inpatient Sample
- ICD-9
 - Trauma
 - 16 Emergent General Surgery Conditions
- 29 million patients
 - 20% ACS diagnosis
 - 25% of US inpatient costs
 - \$85 Billion

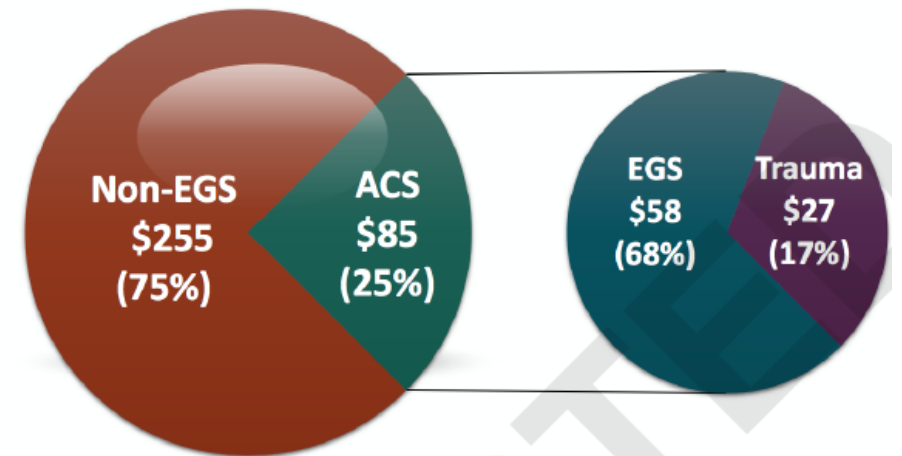


The Economic Footprint of Acute Care Surgery in the United States Implications for Systems Development

Knowlton, Lisa Marie, M.D., M.P.H.¹; Minei, Joseph, M.D., M.B.A.²; Tennakoon, Lakshika, M.D.¹; Davis, Kimberly A., M.D., M.B.A.³; Doucet, Jay, M.D.⁴; Bernard, Andrew, M.D.⁵; Haider, Adil, M.D., M.P.H.⁶; Tres Scherer, L.R. III, M.D., M.B.A.⁷; Spain, David A., M.D.¹; Staudenmayer, Kristan L., M.D., M.S.¹

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Takeaway

- Prevalence - high
- Expense - high
- Problems - many

- Small iterative savings/improvements have potential for large impact overall

MACS

- July 2019
 - Beaumont Dearborn > Sparrow Hospital (2020)
 - St. Joseph Mercy Ann Arbor
 - Spectrum Health
 - Michigan Medicine
- Data capture
 - Qualtrics
- Expansion
 - 2021 (DRH/Harper, Metro Health, McLaren Macomb, Borgess)
 - 2022 (4 more hospitals to total of 12)

Overview of Data Capture

◆ Diseases

- Acute Appendicitis
- Acute Gallbladder disease
 - ◆ Cholecystitis
 - ◆ Choledocholithiasis/Cholangitis
 - ◆ Gallstone pancreatitis
- SBO
 - ◆ Hernia (if present)
- Emergent Exploratory Laparotomy
- Operative and non-operative cases



Overview of Data Capture

- ◆ Non-operative
- ◆ Operative
- ◆ Readmission
- ◆ Index admit, collapse readmits to index

- ◆ Finding patients
 - Census (ACS service?)
 - Consults
 - Admits
 - Operations

Capture

- ◆ Demographics
- ◆ Comorbid Conditions
- ◆ Disease
- ◆ Operation(s)
- ◆ Studies
- ◆ IR
- ◆ Outcomes
- ◆ Disposition

Reports

- ◆ Summary
- ◆ Acute Appendicitis
- ◆ Acute Gallbladder Disease
- ◆ Small Bowel Obstruction
 - Hernia if present
- ◆ Emergent Exploratory Laparotomy

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Michigan Acute Care Surgery Report
Exploratory Laparotomy • UM • 7/1/19-3/5/21

<u>Index Admission</u>		Your Center		Aggregate	
		N =	132	N =	433
<u>Variable</u>		N	%	N	%
Total patients		132	30.5	433	100.0
Point of Entry	ED	78	59.1	265	61.2
	Transfer from Outside Hospital ED	31	23.5	91	21.0
	Transfer from Outside Hospital	16	12.1	27	6.2
	ED Only/Not Admitted	5	3.8	44	10.2
	Home/Direct Admit	2	1.5	6	1.4
	Other		0.0		0.0
Diagnosis (ICD10-based*)	Perforation	34	25.8	117	27.0
	Colon	27	20.5	80	18.5
	Small bowel	1	0.8	2	0.5
	Stomach/Duodenum	6	4.5	35	8.1
	Obstruction	50	37.9	184	42.5
	Hernia	22	16.7	57	13.2
	Malignancy	5	3.8	17	3.9
	Other (Volvulus, Intussusception)	23	17.4	110	25.4
	Ischemia	17	12.9	34	7.9
	Other	17	12.9	53	12.2
Studies	Abdominal x-ray	63	47.7	164	37.9
	CT scan performed	122	92.4	405	93.5
	CT scan findings: free air	28	23.0	111	27.4
	CT scan findings: free fluid	37	30.3	166	41.0
	CT scan findings: fecalization	1	0.8	12	3.0
	CT scan findings: pneumatosis	9	7.4	31	7.7
	CT scan findings: swirl sign	6	4.9	20	4.9
	CT scan findings: ischemic/dead bowel	29	23.8	47	11.6
	CT scan findings: obstruction	51	41.8	171	42.2
	CT scan findings: other	113	92.6	230	56.8
NEWS 2 Score Interpretation	High risk (7-20)	31	23.5	94	21.7
	Moderate risk (5-6)	84	63.6	292	67.4
	Low risk (≤4)	17	12.9	47	10.9
SIRS Criteria positive	WBC > 12,000, 10% bands	45	34.1	156	36.0
Goal directed therapy	Esophageal doppler		0.0		0.0
	Flo-Trac	0	0.0	3	0.7
	Serial ABG/Lactate, Goal Fluid Rx	65	49.2	126	29.1

*Diagnoses (ICD10-based):

Perforation - colon: K57.20, K63.1, K91.71, K91.72

Perforation - small bowel: S36.438A

Perforation - stomach/duodenum: K25.1, K25.2, K25.5, K26.5, K27.9, K28.5, K94.29

Obstruction - hernia: K40.30, K41.30, K42.0, K42.1, K43.0, K43.1, K43.3, K43.6, K44.0, K45.0, K45.8

Obstruction - malignancy: C18.2, C18.9, C20, C23, C49.A3, C77.2, C78.4, C78.6

Obstruction - other (volvulus, intussusception): K56.0, K56.1, K56.2, K56.50, K56.690, K56.699, K91.30

Ischemia: K55.019, K55.029, K55.049, K55.059, K55.1, K55.8, K55.9

Other: A04.72, A41.9, J95.812, K35.21, K35.33, K35.5, K57.11, K63.89, K65.1, K65.9, Q43.0, R10.9, T81.32XA, T81.42XA, Z43.3

Total Patients = 6,939

461

OW

2992

SH

967

SJ

2068

UM

442

SP

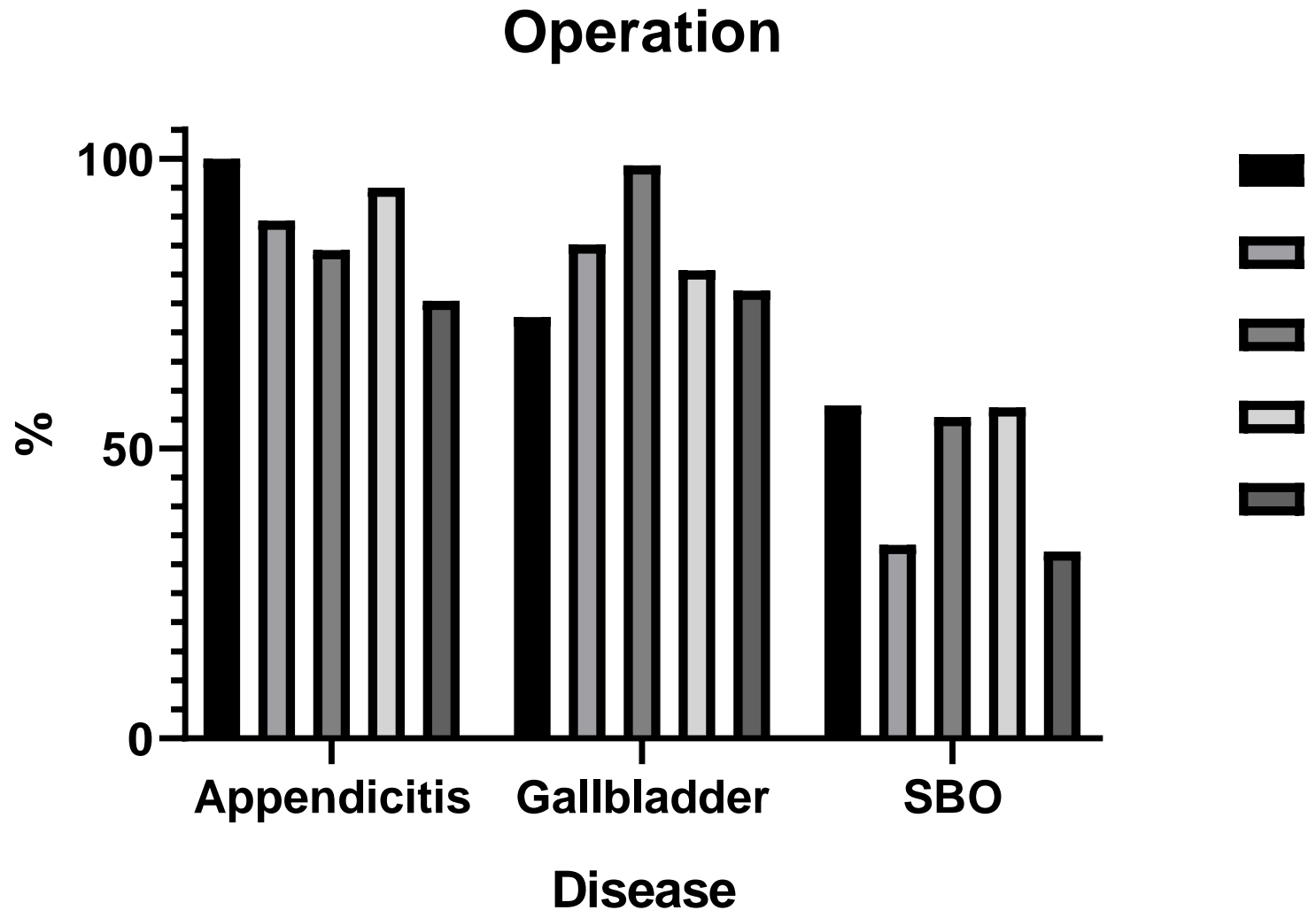
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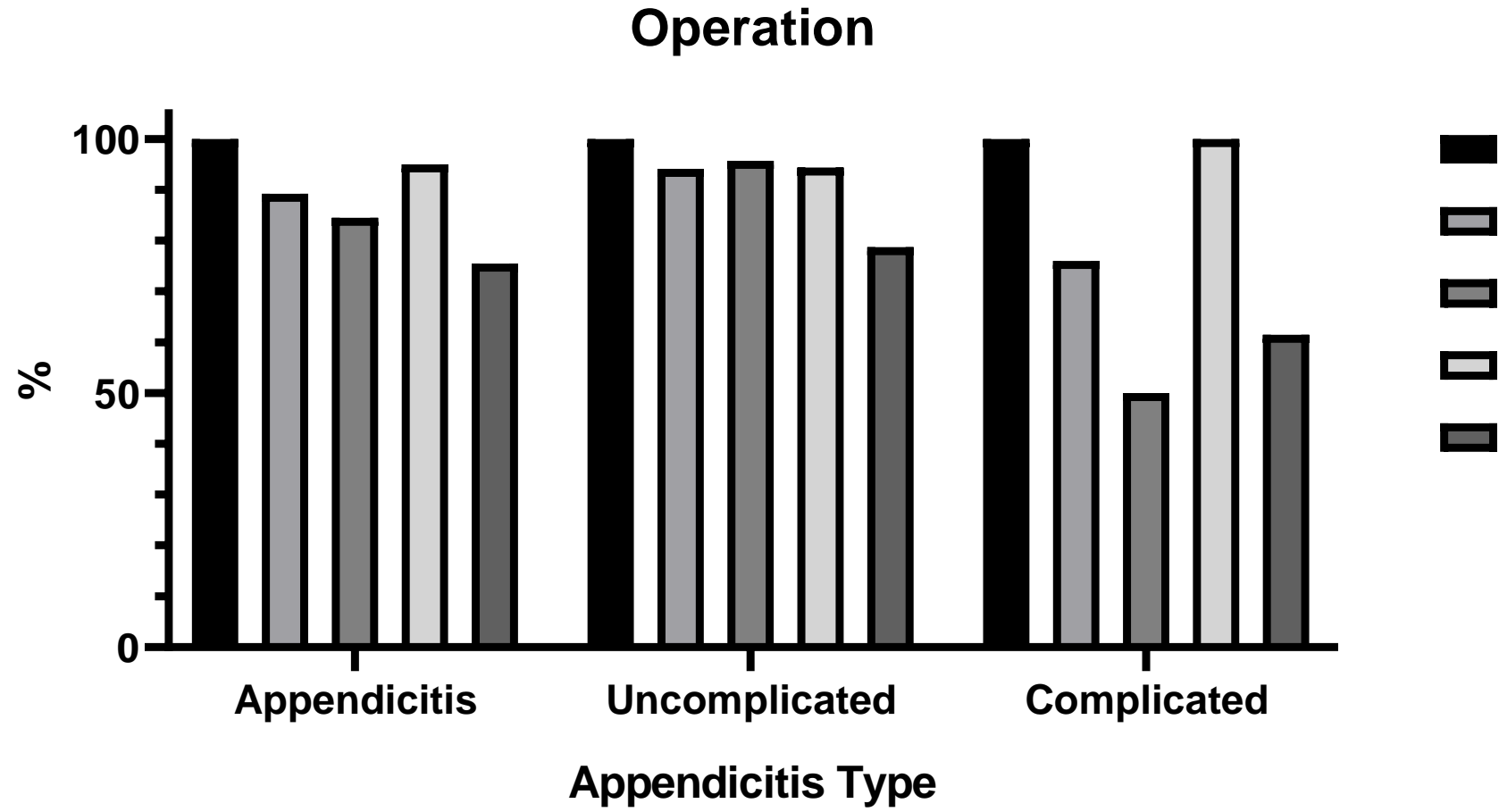
CPT – Operation, 15 most frequent

	N	%
47562, Laparoscopic cholecystectomy	1456	25.6
44970, Laparoscopic appendectomy	1013	17.8
44120, Resection of small intestine	171	3.0
44005, Freeing of bowel adhesion	133	2.3
47563, Lap cholecystectomy w IOC	113	2.0
47600, Open cholecystectomy	102	1.8
44160, Partial colectomy w TI	51	0.9
44143, Partial colectomy w colostomy	49	0.9
44140, Partial colectomy w anast	47	0.8
49561, Repair ventral/inc hernia	44	0.8
43840, Gastrorrhaphy, Graham patch	40	0.7
44950, Open appendectomy	31	0.5
49000, Exploration of abdomen	31	0.5
49587, Repair umbilical hernia	25	0.4
44050, Reduction volvulus, intussusception	24	0.4
All other	2361	41.5

Operative Intervention

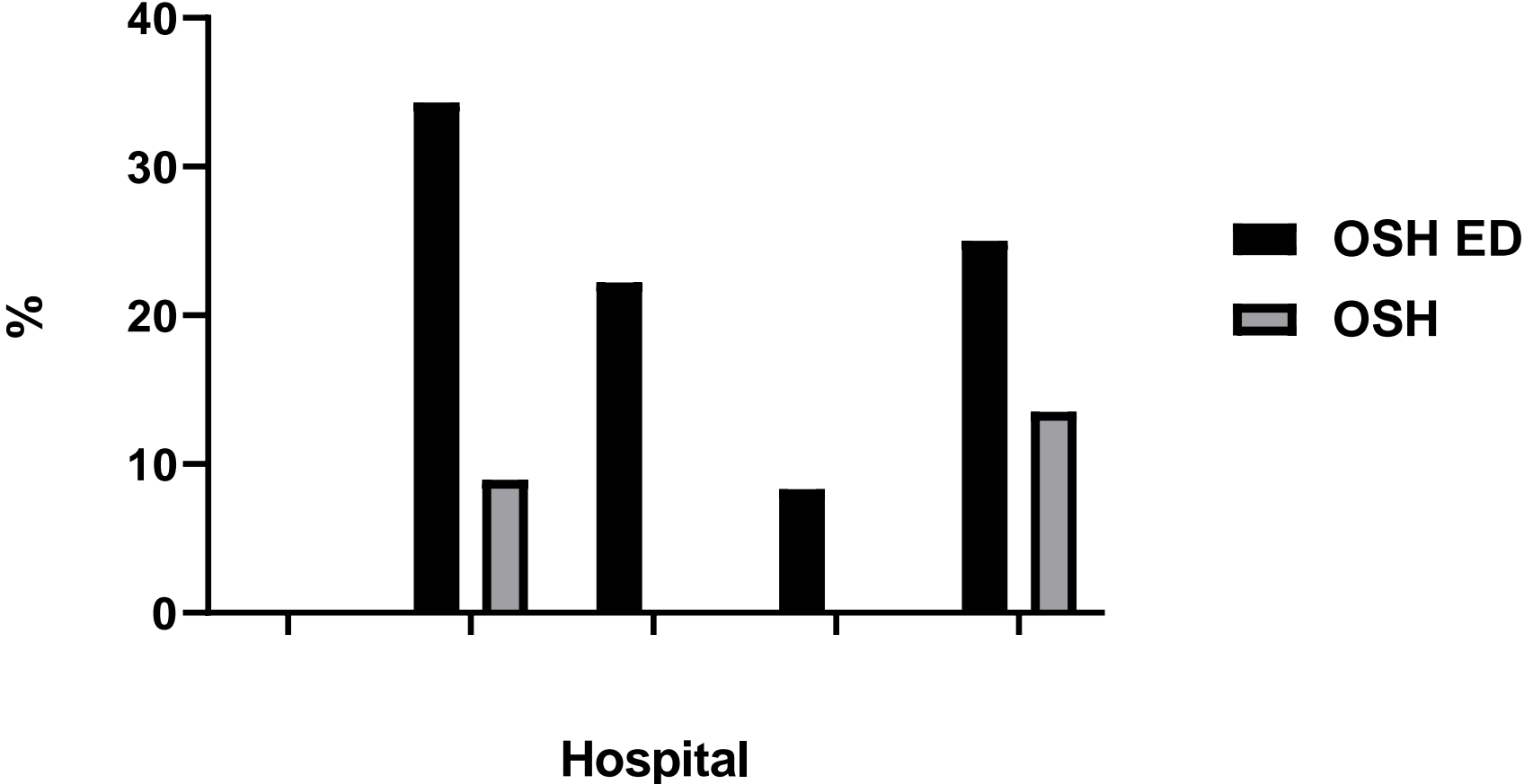


Acute Appendicitis



Emergent Exploratory Laparotomy

Transfer In



Emergent Exp. Laparotomy

- ◆ 433 Patients since May
- ◆ Point of Entry
 - Home: 1.4%
 - ED: 61%
 - OSH ED Transfer: 21%
 - OSH Transfer: 6.2%
 - ED Only, no admit: 10%

	N	%
Perforation	117	27.0
Colon	80	18.5
Small bowel	2	0.5
Stomach/Duodenum	35	8.1
Obstruction	184	42.5
Hernia	57	13.2
Malignancy	17	3.9
Other (Volvulous, Intussusception)	110	25.4
Ischemia	34	7.9
Other	53	12.2

Emergency Ex. Lap – Outcomes

	N	%
Any Complication	256	59.1
Incisional SSI	22	5.1
Organ space SSI	46	10.6
Sepsis or severe sepsis	86	19.9
Anastomotic leak	9	2.1
Wound disruption	5	1.2
Enterocutaneous fistula	3	0.7
Ileus	48	11.1
C. difficile colitis	11	2.5
VTE	9	2.1
Pneumonia	37	8.5
Cardiac arrest	17	3.9
Post-discharge ED visit	52	12.0
Readmission	71	16.4
Mortality	72	16.6

ELPQuIC 2

This pathway should be started for ALL patients presenting with acute abdominal conditions that may need unscheduled surgery.

Patient name: _____
 NHS no: _____
 Hospital no: _____
 DOB: _____

1. Immediate assessment and resuscitation

- EWS within 30 minutes of admission
- MRCS grade surgical registrar review within 2 hours of referral (30 minutes if EWS > 3)
- Arterial lactate measurement to identify sick patients
- Early fluid resuscitation

2. Early antibiotics

- Within 1 hour of admission/referral if sepsis or suspected peritonitis/perforation

3. Rapid diagnosis and surgical plan

- Rapid CT scan - within 2 hours of request, verbal report within 1 hour
- Communication with consultant surgeon for within 1 hour of CT

4. Surgery within 6 hours of admission/referral for urgent/emergency cases

- Prioritise theatre – next available slot on CEPOD
- Consultant-led perioperative care

5. Clear management plan for 'expedited' cases, e.g. bowel obstruction

- CT scan within 12 hours to confirm diagnosis
- Regular review with consideration of lactate estimation if sepsis or possible ischaemic bowel
- 12 hourly consultant surgical review, 6 hourly MRCS registrar review if sepsis

6. Goal Directed Fluid therapy

- Stroke volume optimisation using cardiac output monitoring intra- and postoperatively

7. Postoperative ICU for patients with predicted mortality >5%

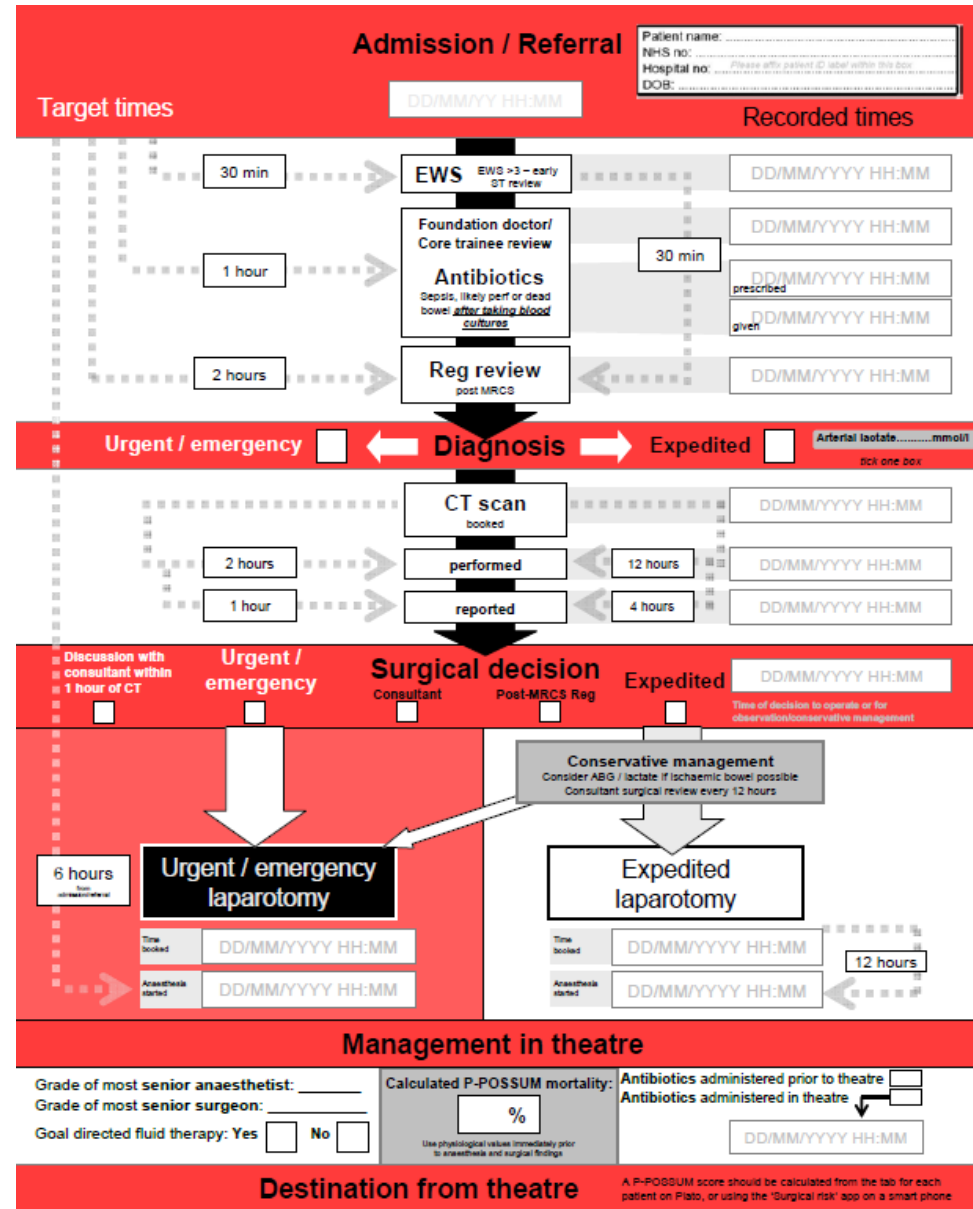
- ICU admission for all patients with P-POSSUM predicted mortality \geq 5%
- ICU admission for patients with P-POSSUM < 5% at discretion of perioperative team

P-POSSUM scores can be calculated from the tab for each patient on Plato, or using the 'Surgical risk' app on a smart phone

Emergency Laparotomy Pathway Version 2
 Approved by: Surgery and Critical Care Governance Groups
 Approved by Health Records Documentation Approval Group: Jan 2014
 Review date: June 2015

Health Records:
 Clinical Notes
 UID: _____

EMERGENCY LAPAROTOMY PATHWAY



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NEWS2 Score

- ◆ National Early Warning Score
 - Royal College of Physicians
 - England NHS
 - December 2017 update → NEWS2
- ◆ Why? NEWS was founded on the premise that
 - (i) early detection,
 - (ii) timeliness and,
 - (iii) competency of the clinical response comprise a triad of determinants of clinical outcome in people with acute illness.

NEWS2 Score

- ◆ National Emergency Laparotomy Audit (NELA)
 - Use NEWS2 for detection
 - RR, O2, Temp, SBP, HR, Consciousness
- ◆ Score
 - Range 0-20
 - Clinical Risk for Deterioration
 - ◆ Low: 0-4 10.9%
 - ◆ Medium: 5-6 67.4%
 - ◆ High: ≥ 7 21.7%

news2_class	Discharge Status		Total
	Alive	Dead	
→ High	64 68.09	30 31.91	94 100.00
Low	275 94.18	17 5.82	292 100.00
→ Med	33 70.21	14 29.79	47 100.00
Total	372 85.91	61 14.09	433 100.00

Care Bundle - ELPQuiC

- ◆ Identification
- ◆ Timely consult (Surgeon)
- ◆ Timely antibiotics
- ◆ Prompt diagnosis (CT scan)
- ◆ Goal directed resuscitation
- ◆ Early operation (6 hrs from decision to operate)
- ◆ ICU care

SBO - Gastrografin

◆ Prior SBO

center	Gastrografin Challenge		Total
	Yes	No	
	0	15	15
	0.00	100.00	100.00
	87	129	216
	40.28	59.72	100.00
	1	74	75
	1.33	98.67	100.00
	0	2	2
	0.00	100.00	100.00
	66	93	159
	41.51	58.49	100.00
Total	154	313	467
	32.98	67.02	100.00

center	Gastrografin Result			Total
	Positive	Negative	Other	
	68	16	3	87
	78.16	18.39	3.45	100.00
	0	1	0	1
	0.00	100.00	0.00	100.00
	55	10	1	66
	83.33	15.15	1.52	100.00
Total	123	27	4	154
	79.87	17.53	2.60	100.00

center	operation		Total
	0	1	
	10	9	19
	52.63	47.37	100.00
	0	1	1
	0.00	100.00	100.00
	6	5	11
	54.55	45.45	100.00
Total	16	15	31
	51.61	48.39	100.00

SBO - Gastrografin

◆ No Prior SBO

center	Gastrografin Challenge		Total
	Yes	No	
	1 0.96	103 99.04	104 100.00
	139 41.74	194 58.26	333 100.00
	3 3.00	97 97.00	100 100.00
	1 20.00	4 80.00	5 100.00
	78 38.42	125 61.58	203 100.00
Total	222 29.80	523 70.20	745 100.00

center	Gastrografin Result			Total
	Positive	Negative	Other	
	0 0.00	1 100.00	0 0.00	1 100.00
	97 69.78	39 28.06	3 2.16	139 100.00
	2 66.67	1 33.33	0 0.00	3 100.00
	1 100.00	0 0.00	0 0.00	1 100.00
	60 76.92	16 20.51	2 2.56	78 100.00
Total	160 72.07	57 25.68	5 2.25	222 100.00

center	operation		Total
	0	1	
	1 100.00	0 0.00	1 100.00
	16 38.10	26 61.90	42 100.00
	1 100.00	0 0.00	1 100.00
	6 33.33	12 66.67	18 100.00
Total	24 38.71	38 61.29	62 100.00

Panel Discussion

- John LaGorio, MD - Mercy Health Muskegon
- Lena Napolitano, MD - Michigan Medicine
- Wayne VanderKolk, MD - Mercy Health St. Mary's

Panel Questions

1. What diseases/operations would you most like information on with regard to emergent general surgery?

Panel Questions

2. Where do you see variability in how surgeons treat emergent general surgery patients?

- a. Selection of operative vs. non-operative
- b. Peri-op optimization
- c. Who to transfer, where, and when

Panel Questions

3. What happens to patients whom get a cholecystostomy tube for acute cholecystitis?

Panel Questions

4. Should surgeons offer patients non-operative treatment for acute appendicitis?

Panel Questions

4. Should surgeons offer patients non-operative treatment for acute appendicitis?
 - a. Age considerations
 - b. Follow up considerations

Panel Questions

5. How should peri-operative resuscitation be performed? What are your resuscitation parameter endpoints or metrics? Are there specific anesthesia concerns that must be addressed in emergent/urgent EGS patients?

Panel Questions

6. Who provides critical care for your EGS patients?

Panel Questions

7. Operative techniques

- a. How do you do a small bowel anastomosis in EGS patients?
- b. How do you do a colon anastomosis in EGS patients?
- c. Who should have the abdomen left open temporarily? Any tips?
- d. What patients do you divert with a colostomy or ileostomy?

Panel Questions

8. The concept of zero preventable deaths has been applied to trauma, does it apply to EGS?

- a. What or who is an appropriate patient to offer operative intervention to?
- b. How should the data be captured for withdrawal of care and/or patients in whom operative intervention was or would be likely futile?

Panel Questions

9. Emergent exploratory laparotomy interventions

- a. Do these patients merit a dedicated OR team (Anesthesia, nursing, eg transplant or cardiac)?
- b. Should there be a clinical decision support tool for choosing or not choosing a staged operative course?

Questions

