MINI-TALK SESSIONS

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OBJECTIVE RESULTS FROM THE LAPAROSCOPY IN BILIARY EXPLORATION RESEARCH AND TRAINING INITIATIVE (LIBERTI)

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Background: Choledocholithiasis is commonly diagnosed among patients undergoing laparoscopic cholecystectomy. Endoscopic retrograde cholangiopancreatography (ERCP) and laparoscopic common bile duct exploration (LCBDE) are the two main modalities for treatment. Both have shown equivalent safety and efficacy. Underutilization of LCBDE has been attributed to a lack of formal training curriculum. Simulation-based LCBDE curricula for resident and attending surgeons has resulted in improved confidence in LCBDE. The LIBERTI curriculum can be implemented at multiple institutions and increase utilization of LCBDE.

Objectives: To assess the impact of a simulator-based education curriculum on institutional utilization of LCBDE for treatment of choledocholithiasis.

Methods: This is a prospective, multi-center simulation based educational intervention that includes both resident and attending surgeons. Pre-curriculum surveys were collected to assess experience with LCBDE and numbers performed by each participant. Post-test surveys were obtained after completion of the curriculum.

Results: Twenty-seven participants were enrolled (11 residents,. 16 attending). Nineteen participants practiced in a university hospital, 3 at a community hospital, and 5 at a VA/military hospital. LCBDE performed within the previous year by study participants ranged from 1-4. At the primary institution utilization increased from 6 total LCBDE by two study authors (prior to curriculum implementation) to 16 total LCBDE by five attending surgeons within six months after completion of the curriculum.

Significant improvements in surgeon confidence were noted in the post-survey: effective and safe performance of trans-cystic and transcholedochoal LCBDE, gaining wire access, balloon dilation, choledochoscope insertion/maneuvering, stone capture, stone extraction. Significantly improved confidence scores were also observed in participants trained on the simulation.

Conclusion: Study results within 6 months of completion of a simulation curriculum demonstrate increased utilization and increased confidence levels in LCBDE by multiple resident and attending surgeons. Additional data analysis is expected to find that utilization of LCBDE decreases hospital length of stay and overall cost.

A contemporary review of incarcerated and strangulated obturator hernia repair

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Background: Obturator hernias usually present as a surgical emergency with open primary repair most commonly performed. Given the morbidity and high recurrence of this approach, we review the literature to evaluate the influence of operative approach on obturator hernia repair.

Objectives: We aim to review the literature focusing on outcomes comparing different techniques in obturator hernia repair.

Methods: A literature search via PubMed was performed. Inclusion criteria were studies that: (1) were written in English and published within 10 years; (2) included as keywords "obturator hernia" and/or "incarcerated" and/or "strangulated"; (3) reported the operative approach; (4) reported postoperative outcomes.

Results: 225 studies were identified, 53 met the inclusion criteria. Data from 425 patients were pooled. Open repair without mesh was performed in 239(56.2%) patients, 121(28.5%) had open repair with mesh, 44(10.4%) laparoscopic repair with mesh and 21(4.9%) laparoscopic repair without mesh. Open repair had mean hospital length of stay (LOS) of 13.4 days, 40.3% postoperative complications and 9.7% 30-day mortality rate while laparoscopic repair had mean LOS of 7.9 days, 3.1% postoperative complications and no deaths. Small bowel resection (SBR) was performed in 44.7% of open and 15.4% of laparoscopic repairs. Patients with SBR demonstrated higher morbidity and mortality compared to patients without SBR. In patients without SBR, laparoscopy had advantages over open surgery in LOS, complications and mortality rate. The overall recurrence rate was 7.7% with a mean follow up of 20.4 months. One (0.7%) recurrence was reported in mesh repair, while 28 (12.1%) were reported with tissue repair.

Conclusion: Obturator hernias are most commonly repaired open without mesh. Our literature review showed that laparoscopic obturator hernia repair is associated with enhanced postoperative recovery and the use of mesh was associated with less recurrence. Further studies are still necessary to determine the optimal approach for obturator hernia repair, but laparoscopic repair with mesh should be performed when possible.

A CLEAN SWEEP: INITIAL EXPERIENCE WITH A NOVEL INTRACAVITY LAPAROSCOPIC CLEANING DEVICE

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Background: A frequently encountered problem in laparoscopic surgery is an impaired visual field. Observational studies have found that only 56% of laparoscopic OR time is spent with a clear visual field, with up to 7% of time spent cleaning the lens. The current gold standard solution requires between 20-60 seconds to remove, clean and replace the dirty lens, and this interruption occurs 3 to 10 times on average for each laparoscopic case. The Novel Intracavitary Laparoscopic Cleaning Device (NILCD) is designed to adequately clean a laparoscopic lens quickly and efficiently without requiring removal from the surgical cavity and is readily integrated into current operative workflow. It is essentially a windshield wiper for the laparoscope that works with existing laparoscopes and trocars. Animal and cadaver studies showed good efficacy and a short learning curve.

Objectives: This study aims to describe the efficacy and initial human experience with the device during actual laparoscopic operations. Intracorporeal lens cleaning could significantly impact the field of laparoscopic surgery by minimizing operative time and surgeon interruption/distraction, consequently decreasing operative complications and costs.

Methods: After receiving Federal Department of Agriculture clearance in 2020, the NILCD was used in 70 cases with surgeons at twelve different institutions in Texas, California and Massachusetts. The rate of scope removal in each case was examined. Following each trial, users were asked to rank the NILCD based company on ease of set up, insertion, adjustment, and cleaning efficacy. A survey was then used to evaluate surgeon satisfaction.

Results: The NILCD was tested in a variety of cases, including colorectal, gynecological, general, pediatric, hepatobiliary, thoracic, bariatric and foregut surgery. NILCD usage eliminated the need for scope removal in 89% of debris events, with only 45 removals in 426 events. A majority of users (86%) reported that using NILCD improved their visual field. When asked to rate specific qualities of the device using a Likert scale, surgeons gave an average score of 3.82 for ease of setup, 3.69 for ease of insertion, and 3.54 for ease of adjusting and cleaning efficacy.

Conclusion: In an initial analysis of 70 cases, the NILCD proved to be an effective and convenient method of cleaning the laparoscopic lens in-vivo across a variety of surgical disciplines and was associated with moderate surgeon satisfaction.

Mini Session I | Abstract | General Surgery

ASSESSMENT AND MODIFICATION OF THE EUROPEAN HERNIA SOCIETY STAGING SYSTEM OF VENTRAL HERNIAS

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Background: Ventral hernias are a common but heterogeneous disease. Communication among key stakeholders (e.g. patients, clinicians, administrators, payers, and researchers) is strained by the absence of a validated and widely utilized classification system. The European Hernia Society (EHS) proposed an expert-opinion based classification system based upon hernia type (primary versus incisional) and hernia width; however, this has yet to be validated by clinical evidence or widely adopted outside of Europe.

Objectives: To assess, validate, and refine the EHS ventral hernia classification system.

Methods: This was a multi-center cohort study of adult patients who underwent ventral hernia repair in the participating centers over a five-year period. The primary endpoint was adverse events defined as any major (deep or organ space) surgical site infection (SSI), abdominal reoperation, or hernia recurrence. Utilizing multivariable Cox regression, factors associated with adverse events were identified.

Results: A total of 2,385 patients were followed for a median (range) of 11.1 (1-61) months. Overall, 469 (19.7%) patients suffered 657 (27.5%) adverse events with 137 (5.7%) major SSIs, 288 (12.1%) hernia recurrences, and 232 (9.7%) abdominal reoperations. Using Cox regression models, both hernia type (primary versus incisional) and hernia width were strongly associated with outcomes. In addition, ASA≥3, low serum albumin, emergency repair, skin flaps, concomitant procedures, suture repair (i.e. no mesh), and surgical approach (laparoscopic, open, converted) were associated with adverse events. (Table)

Conclusion: In this study, we provide evidence-based validation of the EHS ventral hernia classification system. This allows a refined and nuanced discussion among hernia surgeons of different patients and hernias of varying complexity.

Multivariable Cox Regression for Adverse Events*

	Entire cohort n=2,385	Primary VH n=810	Incisional VH n=1,575
Variables	**HR (95% CI)**	**HR (95% CI)**	**HR (95% CI)**
Hernia-Specific			
Secondary (ref: primary)	1.59 (1.23-2.05)	-	-
Hernia size (width)			
Primary (ref: <1)			
1-3	1.02 (0.62-1.97)	1.13 (0.63-2.02)	-
>3	2.37 (1.53-4.25)	2.36 (1.41-3.96)	-
Secondary (ref: <4)			
4-10	1.35 (0.64-2.85)	-	0.98 (0.75-1.29)
>10	1.91 (1.02-3.56)	-	1.38 (1.00-1.90)
Patient- and Treatment-Specific			
ASA class≥3 (ref: 1&2)	1.19 (0.96-1.46)	1.69 (1.02-2.27)	1.35 (1.08-1.69)
Albumin <3.5 mg/dL	1.39 (1.04-1.85)	1.56 (0.99-2.17)	1.11 (0.69-1.41)
Emergent repair	1.49 (1.12-1.92)	1.97 (1.17-3.31)	1.33 (1.01-1.78)
Open repair	Ref	Ref	Ref
Laparoscopic repair	0.60 (0.46-0.79)	0.79 (0.42-1.47)	0.76 (0.56-1.05)
Converted to open	1.23 (0.53-2.85)	6.52 (1.72-24.59)	0.70 (0.21-2.03)
Skin flaps	1.50 (1.17-1.94)	1.11 (0.51-2.41)	1.58 (1.20-2.07)
Mesh Reinforcement	0.77 (0.60-0.99)	0.77 (0.47-1.25)	0.81 (0.60-1.09)
Concomitant Procedure	1.37 (1.09-1.73)	1.78 (1.09-2.90)	1.25 (0.967-1.619)
Harrell's C concordance**	**0.71**	**0.65**	**0.69**

CI=Confidence Intervals, HR=Hazard Ratios, VH= ventral hernia
*Adverse events=deep or organ space surgical site infection, hernia recurrence, or reoperation
**Harrell's C concordance quantifies the capacity of the estimated risk score in discriminating among subjects with different event times

LARGE PARAESOPHAGEAL HERNIA REPAIR DURABILITY IS IMPROVED WITH BIOSYNTHETIC MESH IN MED-TERM FOLLOWUP

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Background: Mesh augmentation of the hiatus with primary cruroplasty during paraesophageal hernia repair (PEHR) improves short term recurrence, but long-term data is lacking. Biosynthetic mesh offers improved tissue incorporation compared to biologic mesh and lacks the mesh-specific complications of permanent mesh. Resorption profiles vary widely however, and the ideal composition remains unclear. Additionally, long term outcomes for biosynthetic mesh use at the esophageal hiatus are lacking.

Objectives: We sought to compare the mid-term efficacy of routine mesh reinforced PEHR in large (>5cm) paraesophageal hernias. Implanted mesh was either rapid absorbing (Gore-BioA®, 6 months) or delayed absorbing (Phasix-ST®, 18 months)

Methods: Retrospective review of a prospectively maintained database identified 140 patients (BMI 28, average age 62 years, 34% Male) that underwent elective laparoscopic mesh reinforced PEHR for large PEH from April 2018 to Jan 2021. Preoperative workup included esophagram, endoscopy, manometry, and pH studies. Postoperative complaints of reflux and dysphagia were investigated with endoscopy and esophagram to determine hernia recurrence or need for further intervention.

Results: Mesh, either BioA® (n=85) or Phasix-ST® (n=55), was placed anteriorly in a upside down U-shape and secured with Tisseel® following posterior cruroplasty with permanent suture. At a median follow-up of 30 months, overall subjective hernia recurrence was 20% and dysphagia requiring endoscopic dilation was 12%. There was no significant difference in average age, BMI or gender between the two groups. Hernia recurrence occurred more often with BioA than Phasix, but the difference was not significant (23% vs 14.5%, p=0.18). Rates of dysphagia requiring endoscopic dilation also did not differ significantly between the two groups (8% vs 18%, p = 0.1). No mesh related complications occurred in either group.

Conclusion: Absorbable synthetic mesh provides improved midterm PEHR durability compared to historic rates of primary cruroplasty alone, especially in large paraesophageal hernias. Absorption profile does not significantly affect the rates of subjective recurrence or endoscopic dilation for dysphagia at 2.5 year follow-up. Further longitudinal study is needed to investigate the long-term repair durability, but short and midterm outcomes support the routine use of mesh-reinforcement in large PEHR.

ASSESSMENT OF PATIENT AND SURGEON PERCEPTIONS ON PROPHYLACTIC MESH: A STANDARD GAMBLE

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Background: Ventral incisional hernia (VIH) is a common complication after abdominal surgery. One option to prevent VIH, is the use of prophylactic mesh, however this comes with its own risks, including wound complications.

Objectives: Our aim was to determine what percent risk of wound complication would surgeons and patients be willing to accept with reduced risk of VIH through the use prophylactic mesh?

Methods: "We performed a cross-sectional standard gamble on participating surgeons and patients. Standard gamble is the gold standard in understanding imperfect healthcare choices as each choice is associated with a certain amount of risk. In a healthcare context, standard gamble asks what percent risk of the worst complication a patient would be willing to accept for complete resolution of a disease.

Three scenarios were provided: abdominal surgeries at low, medium, and high-risk of VIH and wound complications. Each scenario began with a case description and photo demonstration of three possible outcomes: (1) 'success' where the patient had no VIH or wound complications, (2) VIH, and (3) post-operative wound complications. Participants were given an option of suture or mesh closure and provided the estimated mean risk of VIH with either technique. In a step-wise fashion, participants were provided increasing risks of wound complications until they chose suture over mesh.

Estimated mean risk of VIH and wound complications were compiled through systematic review of randomized controlled trials and ACS-NSQIP risk calculator."

Results: Overall, 35 surgeons (8 VIH specialists and 27 general surgeons) and 9 patients were surveyed. For all three scenarios, surgeons reported risk-tolerance of prophylactic mesh far below the ACS-NSQIP risk calculator risk of even suture closure. Specialists were willing to accept more risk than general surgeons. Patients were willing to accept substantially more risk than surgeons, however, their responses were more variable. (Figure 1, 2, 3).

Conclusion: Surgeons and patients have different risk tolerances for different types of complications. Most surveyed surgeons do not have realistic assessment of complication rates and were only willing to accept wound complication risks lower than even cases without mesh. Patients were more willing to accept wound complications to prevent VIH. Substantial education is needed for both surgeons and patients prior to widespread adoption of prophylactic mesh. Additionally, as surgeons and patients have differing risk tolerances, shared decision-making tools are needed so that surgeons do not impose their biases and preferences on patients.

Figures

Figure 1. Patient and surgeon (stratified by experts versus generalists) responses to the low-risk scenario

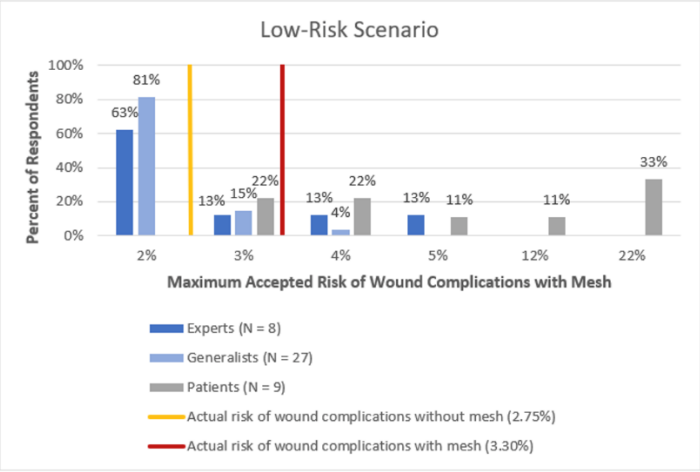


Figure 2. Patient and surgeon (stratified by experts versus generalists) responses to the medium-risk scenario

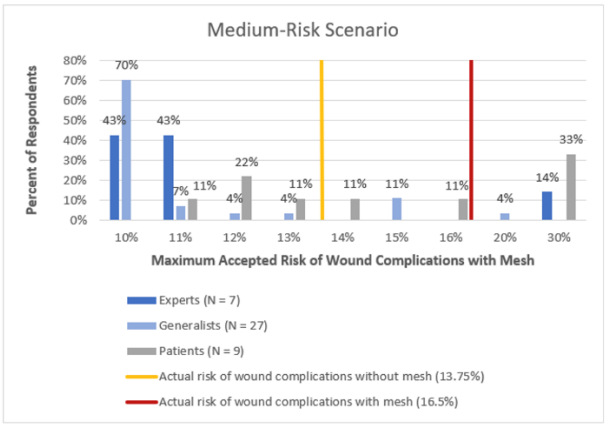
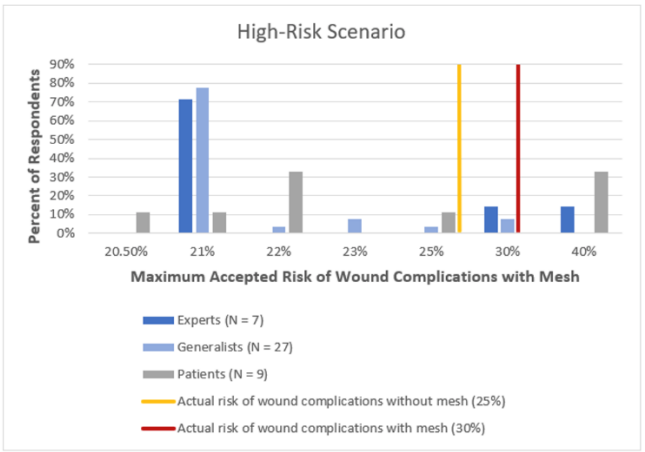


Figure 3. Patient and surgeon (stratified by experts versus generalists) responses to the high-risk scenario



RETENTION OF FOCUSED ABDOMINAL SONOGRAPHY FOR TRAUMA (FAST) SKILLS IN A PREHOSPITAL AEROMEDICAL PROGRAM

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Background: The use of focused abdominal sonography in trauma (FAST) to localize bleeding in critical trauma patients is rapid, effective, and has largely supplanted diagnostic peritoneal lavage. With advances in ultrasound technology, FAST is increasingly common in the prehospital (PH) setting. After the introduction of FAST into a prehospital aeromedical program in 2014, sensitivity of the study was calculated to be 46%, specificity 94%, positive predictive value (PPV) 55%, and negative predictive value (NPV) 92%. These values were consistent with other studies of PH FAST.

Objectives: FAST skill retention in the prehospital setting is not well described. We hypothesized that FAST accuracy would remain similar six years after its introduction into an aeromedical EMS system.

Methods: Retrospective study of all highest activation trauma patients arriving at an urban level 1 trauma center by air ambulance between 1/1/2019 and 12/31/2019. Demographic, mechanism, and injury-related data were collected, as were results from any FAST exam performed by aeromedical personnel. Emergency department (ED) FAST exams were collected for comparison. Cross-sectional imaging results and operative reports for emergency operations served as a reference standard for each FAST examination. PH FAST results were compared to the reference standard for that examination to calculate test diagnostics (sensitivity, specificity, PPV, NPV).

Results: 280 patients were enrolled. Mean age 41 (±18) years, 82% male gender, 71% blunt trauma mechanism, mean Injury Severity Score 23 (±16). All had at least one abdominal view of the FAST exam performed in the prehospital setting. 229 (85%) of these patients also had a FAST exam performed in the ED. For the PH abdominal exams, sensitivity was calculated to be 31%, specificity 93%, PPV 65%, and NPV 78%. For the cardiac exams: sensitivity 25%, specificity 100%, PPV 100%, and NPV 99%. For the lung exams: sensitivity 11%, specificity 98%, PPV 75%, and NPV 72%. For the complete FAST exam (combining abdomen and cardiac): sensitivity 32%, specificity 93%, PPV 65%, and NPV 78%. By comparison, ED FAST exam sensitivity was calculated to be 47%, specificity 94%, PPV 75%, and NPV 82% (TABLE).

Conclusion: Six years after its introduction, the accuracy of PH FAST has declined. By comparison, the accuracy of ED FAST is unchanged and is more sensitive than the PH FAST. These findings suggest a need for altered training and quality assurance to improve and maintain reliability.

TABLE. Diagnostic accuracy of FAST examinations performed by aeromedical providers in the prehospital setting in 2014 (top) and in 2019 (bottom). Individual ultrasound exam components (abdomen, cardiac, and lung) are presented. Abdomen and cardiac results are combined to create the classic FAST examination result. Only complete examinations with a gold standard reference are included.

	Sensitivity	Specificity	PPV	NPV	# of Exams
2014 Press et al results					
Abdomen	46%	94%	55%	92%	200
Cardiac	0%	100%	0%	99%	240
Lung	19%	99%	80%	93%	491
FAST	46%	94%	55%	92%	200
2019 results					
Abdomen	31%	93%	65%	78%	249
Cardiac	25%	100%	100%	99%	237
Lung	11%	98%	75%	72%	275
FAST	32%	93%	65%	78%	230

Biologic versus Synthetic Mesh in Ventral Hernia Repair: Participant-Level Analysis of Two Randomized Controlled Trials at One Year

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Background: Biologic mesh has been increasingly utilized in complex ventral hernia repair despite limited evidence at low risk of bias supporting its growth. We hypothesized biologic mesh would have fewer major complications at one year post-operative.

Objectives: The aim of this study was to analyze participant data of randomized controlled trials (RCTs) comparing biologic mesh versus synthetic mesh in complex open ventral hernia repair.

Methods: We performed a participant-level meta-analysis of published RCTs comparing biologic to synthetic mesh at one-year. Primary outcome was major complication (composite of mesh infection, recurrence, reoperation, or death) at one-year post-operative. Secondary outcomes included length of index hospital stay, surgical site occurrence, and surgical site infection. Outcomes were assessed using frequentist generalized linear models.

Results: A total of 252 patients from two RCTs were included, 126 patients randomized to the intervention arm of biologic mesh and 126 patients randomized to the control of synthetic mesh. Median follow-up was 15 (12, 27) months. Major complication occurred in 41 (33%) patients randomized to biologic, and 44 (35%) patients randomized to synthetic mesh, (relative risk [RR] 0.91, 95% confidence interval [CI] 0.54-1.55, p-value 0.740). There were 36 total recurrences, 23 (18%) in the biologic arm, and 13 (10%) in the synthetic arm (RR 1.83, 95% CI 0.84-3.99, p-value 0.130). The remainder of outcomes demonstrated no statistically significant differences.

Conclusion: The risk of major complication did not differ between biologic versus synthetic mesh. In patients undergoing ventral hernia repair, there was no clinical benefit with biologic mesh as opposed to synthetic mesh at one-year post-operative.

SINGLE INSTITUTION PRE-IMPLEMENTATION REVIEW OF OPERATIVE REPORTS IN PREPARATION FOR NEW COMMISSION ON CANCER OPERATIVE STANDARDS 5.3-5.6: LESSONS LEARNED

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Background: Background: Updates to the 2020 American College of Surgeons (ACS) Commission on Cancer (CoC) accreditation standards will include requirements for synoptic operative reports for certain operations (standards 5.3-5.6). This will require that certain elements of the case are directly addressed, and that the report is written in a synoptic format.

Objectives: Objectives: In order to generate actionable recommendations for surgeons performing oncologic resections, we analyzed our institution's documentation practices in comparison to CoC standards 5.3-5.6 for breast sentinel node biopsy (SLNB), breast cancer related axillary dissection, wide local excision (WLE) of cutaneous melanoma, and colectomy over the past year.

Methods: Methods: We reviewed all melanoma, breast, and colon cancer operations at a single institution during 2020 and compared the operative reports' contents to CoC Operative Standards 5.3-5.6. The presence of specific elements from the standards was assessed and compared between cases with and without a synoptic operative report.

Results: Results: Over 2020, a total of 88 SLNB, 12 axillary dissections, 3 WLE for melanoma, and 19 colectomies were identified for which new CoC standards were applicable. We found broad variation in the percentage of required elements documented among the different operations. New CoC standards were met in 29.5%, 25.0%, 66.7%, and 0.0% of reports for SLNB, axillary dissection, WLE for melanoma, and colectomy respectively. Absence of a synoptic format was the most common reason for not meeting CoC standards, only present in 35.2%, 25.0%, 66.7%, and 0.0% of operative reports. If the specific requirement for a synoptic report was eliminated, all required elements of a correct operative report were present in 34.1%, 58.3%, 100.0%, and 52.6% of operative notes, respectively. Most commonly missing elements included documentation of the following: removal of all colored nodes in SLNB (46.6%), appropriate resection boundaries in axillary dissection (58.3%), and performance of lymphovascular resection at the base of the appropriate vessel during colectomy (52.6%). The presence of required elements for each standard are detailed in Table 1. There was a trend towards improved element inclusion in operative reports that utilized a synoptic format.

Conclusion: Conclusions: Our internal review of 2020 cases revealed important documentation deficits in elements of new CoC standards 5.3-5.6 that will be required starting in 2023. Lack of compliance was often due to absence of a synoptic operative report, but we also identified specific elements that are seldom addressed by surgeons in their operative report. These findings will direct physician education efforts regarding implementation of documentation meeting requirements for the 2024 CoC site visits.

TABLE 1: Results of Chart Review.	All Cases	Cases without synoptic report
SLNB (5.3)	N=88	N=57
Neoadjuvant therapy use documented	42/88 (47.7%)	46/57 (80.7%)
Substrate documented	73/88 (83%)	15/57 (26.3%)
Documentation that colored nodes were removed	41/88 (46.6%)	16/57 (28.0%)
Documentation that radioactive nodes were removed	75/88 (85.6%)	12/57 (21.0%)
Documentation that there were no palpable nodes on reinspection	46/88 (52.3%)	36/57 (63.1%)
Documentation that clipped nodes were removed	16/16 (100%)	N/A
All synoptic report elements present and adequate	30/88 (34.1%)	-
Axillary Dissection (5.4)	N=12	N=9
Resection boundaries adequate	7/12 (58.3%)	4/9 (44.4%)
Long thoracic and thoracodorsal nerve identified and protected	11/12 (91.7%)	8/9 (88.9%)
Level III nodes were taken and a reason is documented	2/2 (100%)	1/1 (100%)
All synoptic report elements present and adequate	7/12 (58.3%)	-
WLE of Cutaneous Melanoma (5.5)	N=3	N=1
Original Breslow thickness of lesion reported	3/3 (100%)	1/1 (100%)
Clinical margin width reported	3/3 (100%)	1/1 (100%)
Depth of excision reported	3/3 (100%)	1/1 (100%)
Clinical margin appropriate for depth	3/3 (100%)	1/1 (100%)
All synoptic report elements present and adequate	3/3 (100%)	-
Colectomy (5.6)	N=19	N=19
Tumor location reported	19/19 (100%)	
Extent of lymphovascular resection reported	18/19 (94.7%)	
Lymphovascular resection appropriate for location	12/19 (63.2%)	
Lymphovascular resection documented at vessel base	10/19 (52.6%)	
All synoptic report elements present and adequate	10/19 (52.6%)	

RULE OF FOUR: A VALUE-BASED APPROACH TO AORTIC STENT-GRAFT INVENTORY CREATION FOR THE TREATMENT OF BLUNT THORACIC AORTIC INJURIES USING REAL PATIENT AORTIC MEASUREMENTS

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Background: As blunt thoracic aortic injury (BTAI) treatment has shifted from open to thoracic endovascular aortic repair (TEVAR), logistical challenges exist in creating and maintaining inventories of appropriately sized stent-grafts, including storage demands, shelf-life management and cost.

Objectives: We hypothesized that most injured aortas can be successfully repaired with a narrow range of stent-graft sizes and present a value-based anatomic approach to optimizing inventory.

Methods: CT-scans of all patients with BTAI admitted to our Level I trauma center from Apr/2010-Dec/2018 were reviewed. Patients with anatomy incompatible with TEVAR were excluded. For each patient, after aortic sizing a set of two stent-grafts most likely to be utilized was selected from a list of twenty commercially available stent-graft sizes by the manufacturer with the longest history of FDA approval for BTAI. Stent-graft sizes were then ranked based on the number of cases they would be suitable for.

Results: Twenty-eight patients with BTAI were identified and three were excluded based on anatomic considerations. Most patients were male (68%), mean age 42.3 ± 20.2 years, mean ISS 37.0 ± 9.8. Overall mortality was 25%. Table I summarizes the percentages of patients successfully treated by each combination of stent-graft sizes. Of the 20 available stent-graft options, a select combination of four stent-grafts would successfully treat 96% of the patients in this study.

Conclusion: Based on actual CT-scan aortic measurements, we demonstrated that an inventory of four sent-graft sizes was sufficient to successfully treat 96% of patients with BTAI. These data can be utilized as a value-based approach to aortic stent-graft institutional inventory creation and maintenance.

Vessel	Diameter (mm±SD)
Aorta, at L carotid a. ostium	23.4 ± 3.4
Aorta, at L subclavian a. ostium	22.2 ± 3.9
Aorta, proximal to injury	20.6 ± 4.3
Aorta, distal to injury	20.3 ± 4.5
Common iliac a.	9.1 ± 1.9
External iliac a.	7.4 ± 1.6

Graft size combinations	% Cases
26, 26-21, 28, 31 mm	96
26, 26-21, 28 mm	84
26, 28, 31 mm	84
26, 28 mm	72
26 mm only	52
28 mm only	44
26 - 21 mm only	36
31 mm only	28

EVALUATING THE QUALITY OF ONLINE THORACIC OUTLET SYNDROME WEBSITE FOR PATIENTS

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Background: The internet has become a leading resource for patients to research information about their medical conditions. Access to inaccurate information can lead to miscommunication, poor patient satisfaction and affect shared decision making with the provider.

Objectives: This study seeks to evaluate the quality and readability of patient resources that appear in the top search results for Thoracic Outlet Syndrome (TOS).

Methods: Searches were performed for "TOS" and "Thoracic Outlet Syndrome" on Google, Yahoo, Bing, Yippy, and Dogpile. Websites were screened for exclusion and evaluated by two reviewers for accountability, interactivity, structure/organization, and content. Exclusion criteria included duplications, no original content on TOS, resources not intended for patients, foreign language, and inaccessible websites. Reviewers came to a consensus on scoring discrepancies. Four indices were used to evaluate readability. Statistical analysis was performed using Rstudio with Kruskall-Wallis.

Results: In total, 44 websites met inclusion criteria. There were 25 hospital/healthcare organization websites (57%), 11 open access (25%), 5 government agency (11%), 2 professional medical society (5%), and 1 industry sponsored (2%). Median scores were 5.00 out of 16.00 for Accountability (IQR: 1.50-8.75), 1.50 out of 5.00 for Interactivity (IQR:1.50-1.50), 3.00 out of 4.00 for Structure/Organization (IQR: 2.00-3.13), 10.00 out of 25.00 for Content (IQR: 7.90-12.63) and 20.25 out of 50.00 for Total Score (IQR: 16.73-27.75) (Table 1).
Websites performed well describing TOS with 98% of websites providing a definition, 90% providing an etiology, 93% providing description or images of the anatomy, 98% providing symptoms of neurogenic TOS, 93% providing symptoms of venous TOS, and 93% providing symptoms of arterial TOS. Physical therapy was the most discussed treatment option (91%) followed by decompression surgery (86%), thrombolysis (41%), vascular repair (39%), interscalene injections (18%), and embolectomy (11%). There was no significant difference across website types for any category other than accountability where Open Access scored the highest (Table 2). Readability was difficult with median Flesch Reading Ease formula score correlating to a college level (IQR: 10th to 12th grade-college), median Flesch-Kincaid Grade Level of 10 (IQR: 9th -12th grade), median Standardized Measure of Gobbledygook (SMOG) grade of 10 (IQR: 9th-11th grade), and median Dale-Chall Readability Formula Score correlating to 11th to 12th grade (IQR: 11th to 12th – college grade level). There was no significant difference between website types for readability.

Conclusion: The top web results for TOS have varying degrees of quality with a clear gap in certain areas of information. While websites performed well explaining the disease, they lacked discussion of the full scope of treatment that may be offered. Additionally, readability was poor across all website types which will not help patients' understanding of their condition. Providers should take into account the variability in websites when entering into shared decision-making discussions with patients.

Table 1. Breakdown of Median Website Scores	
Type of Website	**Percentage of Website Type**
Open Access	25%
Hospital/Healthcare Organization	57%
Government Agency	11%
Professional Medical Society	5%
Industry Sponsored	2%
Quality Scores (Potential Points)	**Median (IQR)**
Total (50)	20.25 (16.73-27.75)
Accountability (16)	5.00 (1.50-8.75)
Interactivity (5)	1.50 (1.50-1.50)
Structure (4)	3.00 (2.00-3.13)
Content (25)	10.00 (7.90-12.63)
Readability Index	**Median (IQR)**
Flesch Reading Ease	47.65 (42.58-55.38)
Flesch-Kincaid	10.88 (9.98-12.15)
SMOG	10.30 (9.44-11.25)
Dale-Chall	8.65 (8.10-9.20)

Table 2. Categorical Scores by Website Type						
Website Type	**Open Access**	**Hospital/Healthcare Organization**	**Government Agency**	**Professional Medical Society**	**Industry-Sponsored**	**P Value for Kruskal-Wallis ANOVA**
Total: Median (IQR)	27.50 (21.75-31.00)	18.00 (15.50-25.00)	24.00 (18.00-24.50)	19.50 (19.25-19.75)	16.80 (16.80-16.80)	0.082
Accountability: Median (IQR)	11.00 (7.00-13.50)	1.50 (1.50-4.00)	8.50 (7.00-8.50)	4.50 (3.75-5.25)	7.00 (7.00-7.00)	0.001
Interactivity: Median (IQR)	1.50 (1.50-1.50)	1.50 (1.50-2.00)	1.50 (1.50-1.50)	2.00 (1.75-2.25)	1.50 (1.50-1.50)	0.625
Structure and Organization: Median (IQR)	2.50 (2.00-3.50)	3.00 (2.00-3.00)	3.00 (2.00-3.00)	3.50 (3.25-3.75)	4.00 (4.00-4.00)	0.388
Content: Median (IQR)	10.50 (9.00-13.00)	10.00 (8.00-13.00)	10.50 (7.50-11.50)	8.50 (8.00-9.00	3.30 (3.30-3.30)	0.35