University of Virginia Health System
Clinical Pathway: Thoracic **FULL** Enhanced Recovery After Surgery (ERAS)
Targeted Procedure: Lobectomies, thoracotomies, segments, decortications, sternotomies, challenging anatomy, chronic pain, high chance of conversion, pneumonectomies
LOS: 4
Date of Origin/Revision: March 2016/July 2016/August 2016/April 2017/September 2017/February 2018

	SURGICAL CLINIC	**PETC**	**Day Prior to Surgery**	**Day of Surgery: SAS**	**Day of Surgery: Operating Room**	**Day of Surgery: PACU**	**Day of Surgery: TIMU**	**POD1: TIMU transfer to 4W**	**POD2 through Day of Discharge: 4W**
Assessment	-Identify pt as **ERAS Thoracic FULL** pt – create episode in EPIC -Ensure pt has CT scan and PET scan completed within 60 days -Ensure pt has documented DLCO or FEV -Vital signs, baseline height/wt -Screen for OSA, VTE and diabetes -Assess for tobacco and alcohol use -Screen for malnutrition -Screen for CAD/CKD -Verify home medications -Screen for aspiration risk/severe esophageal disease*	- Link PETC visit to **ERAS episode** -Stratify cardiac risk -Screen for OSA -Screen for aspiration -Screen for malnutrition -Screen for tobacco use, diabetes -Identify patient with positive antibody screen -Review home medications	-Phone screening and readiness assessment by ERAS nurses	- Link SAS visit to **ERAS episode** -Vital signs -Med weight		-Vital signs and monitoring per PACU protocol -Assess for aspiration risk (cognitive dysfunction, prior stroke, age >80)	-VS upon admission then Q1 x8hrs then Q2 (per TIMU protocol) -UOP Q2 per TIMU protocol -Continuous pulse oximetry with capnography x24hrs (following spinal duramorph injection)	-VS Q4 or per unit protocol - Daily weights -Monitor chest tube output -Strict I/O	-VS Q4 or per unit protocol -Daily weights -Monitor chest tube output (if still in place)
Consults & Referrals	-Refer for Cardiology consult if necessary (criteria: <4METS or unknown)	-Cardiology consult, if necessary (criteria: <4METS or unknown)		-Notify cardiology for pacemaker patients			-Consult ERAS Pain NP for ketamine infusion	-Consult ERAS Pain NP for ketamine infusion -Assess for inter-disciplinary consult needs: RT, SW, Nutrition, Chaplain, PT/OT	-Consult ERAS Pain NP for ketamine infusion -Finalize plan for community or home health needs with Case Manager

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Tests & Orders	-Use “Thoracic ERAS General SMARTSET” under the ordersets tab -EKG (M>50, F>60) -Labs: CBC, CMP, Mg, Phos, PT/INR, PTT, T&H (0 units) -HgB A1c if diabetic -ABG & PFTs if DLCO<50 and/or FEV<50	-EKG (M>50, F>60) -Labs: CBC, CMP, Mg, Phos, PT/INR, PTT, T&H (0 units) -HgB A1c if diabetic -ABG & PFTs if DLCO<50 and/or FEV<50		-Type and hold (0 units) if not done/expired		- Use designated orderset “ERAS PACU Focused” with specific section for Thoracic Full -Discontinue arterial line, if applicable	-Use “THORACIC ERAS Full Surgery Postop” for postop orders -Accuchecks if patient is diabetic -Labs: CXR, HCT, CMP	-No routine labs unless active bleeding, Cr+ bump, febrile or low UOP	No additional labs unless indicated (off pathway) -Use “Thoracic ERAS Discharge” order set
Add’l Actions	- CHG shower night before and morning of surgery	-Reinforce CHG shower night before and morning of surgery	-Reinforce CHG shower night before and morning of surgery	-Confirm CHG shower the morning of surgery			-Incentive spirometry q10/hr -Wean pt to 92%. For pts with DLCO <50 or hx of home O2 use, wean to 90%.	-Incentive spirometry q10/hr -Remove foley (ensure males >50yrs or with hx of prostate issues receive Tamsulosin p/t removal) -Consider removing chest tube per unit protocol	-Incentive spirometry q10/hr -Chest tube to water seal (if criteria met) -Consider DC if patient meets criteria
Activities							-Walk on night of surgery within 6hrs of arrival to unit -Head of bed at 30 degrees at all times	-Pt stands for am weight -OOB to chair at least 6 hours -Ambulate in hall X2	-Pt stands for am weight -OOB to chair at least 6 hours -Ambulate in hall X3

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Fluid management	-Instruct pt on oral fluids prior to surgery (as long as no severe esophageal disease*) - clear fluids/Gatorade up until 2hrs before scheduled surgery	-Instruct pt on oral fluids/Gatorade prior to surgery (as long as no severe esophageal disease*)	-Reinforce oral fluids prior to surgery – clear fluids/Gatorade up until 2hrs before scheduled surgery	-Carbohydrate drink 2 hours before surgery (Gatorade 20 ounces (50 grams of carbohydrate)) -Insert PIV and saline lock	-Fluid management is goal-directed intravenous fluid guided by MAP and PPV (see appendix "Thoracic Anesthesia Fluid Management Guide)	-D5% and 0.45% NS with KCL 20meq at 75 cc/hr	-D5% and 0.45% NS with KCL 20meq at 75 cc/hr -If MAP <60 give 250 cc bolus and call fellow/PA -If HR >120 call fellow/PA - UOP < 120 over 4 hours (and the patient is otherwise ok) 250 cc bolus - Call fellow/attending for bolus over 1 L in 24hrs	-Saline lock IV	
Medications	-Place intraop phase of care order for Exparel to be administered by surgeon	-Preop instructions for diabetic patients and anticoagulation pts	Follow orders re: Diabetic and anticoagulation medications	-SAS nurse to release preop to intraop phase of care meds for OR – Liposomal bupivacaine (Exparel)	-Cefazolin injection 1g 0-60 minutes before incision (Vancomycin/clindamycin if PCN allergic) upon entry into the room -DVT prophylaxis – Heparin 5000U SQ -Consider rapid sequence induction if patient is diabetic		-Ancef 1g or 2g Q8 x2 to begin 8hrs after last dose in OR -Afib Prophylaxis for patients NOT on home Beta Blocker and over age 50 – Diltiazem 30mg PO Q6 x 48hrs -Home medications (particularly antihypertensives) with exception of hypoglycemic -Tamsulosin 0.4mg daily for men >50 and for those with hx of prostate issues -Pepcid 40mg PO BID -Bowel regimen – Senna 17.2mg PO nightly. Mag-Ox 400mg PO BID, and Miralax 17g PO daily	-Afib Prophylaxis for patients NOT on home Beta Blocker and over age 50 – Diltiazem 30mg PO Q6 x 48hrs -Restart home medications -Continue bowel regimen -VTE prophylaxis based on risk stratification	-Afib Prophylaxis for patients NOT on home Beta Blocker and over age 50 – Diltiazem 30mg PO Q6 x 48hrs then 120mg PO Extended Release x30 days -Restart anticoagulation, if appropriate -Continue bowel regimen

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Pain Management	Place SAS orders: -Celecoxib 200 mg PO (NOT for pts with CKD OR for those scheduled for PLEURODESIS procedure) -Gabapentin 600 mg PO -Acetamin-ophen 975mg PO	-Chronic pain patients should continue home pain medications until surgery	-Chronic pain patients should continue home pain medications until surgery	-Multimodal analgesia: 1. -Celecoxib 200 mg PO (NOT for pts with CKD OR for those scheduled for PLEURODESIS 2.Gabapentin 600 mg PO 3. Acetamin-ophen 975mg PO	-Injection of Liposomal bupivacaine (Exparel) by thoracic surgeon –NO LIDOCAINE INFUSION TO FOLLOW -No additional intraoperative opioids without attending approval -IV analgesia: ketamine 5-10 ucg/kg/min -Lower ketamine infusion rate to 2.5mcg/kg/min before PACU transfer	- Continue ketamine infusion at 2.5mcg/kg/min before PACU transfer	- Continue ketamine infusion at 2.5mcg/kg/min -Acetaminophen 975 mg PO q6 -Celecoxib 100 mg PO BID in patients (NOT for pts with CKD OR for those scheduled for PLEURODESIS procedure) -Gabapentin 300mg or 100mg TID -Oxycodone 5mg or 10mg PO q4 PRN (VAS 4-6/VAS 7-10) ****No additional opioids, no PCA** (without attending's approval)	-Discontinue ketamine infusion before transitioning to 4W from TIMU -Continue scheduled non-narcotic meds: Acetaminophen 975mg PO Q6 hours -Celecoxib 100mg PO BID (use Naproxen 500mg if CAD) -Gabapentin 300mg or 100mg TID -Oxycodone 5mg or 10mg PO q4 PRN (VAS 4-6/VAS 7-10)	-Continue all other meds -Discharge with Gabapentin 300mg or 100mg TID for 30days
Nutrition		Instructions on regular diet until midnight the day before surgery. Clear liquids up until arrival (as long as no severe esophageal disease*)	-No food after midnight -Clears until 2 hours p/t surgery (as long as no severe esophageal disease*)	-Clears until 2 hours prior to surgery -Carbohydrate drink for morning of surgery (20oz Gatorade)		-Clear liquids as tolerated	-Clear liquids as tolerated	-Clear liquids to transitional diet as tolerated	-Transitional diet to regular diet as tolerated
Education	-Provide patient with ERAS notebook -Reinforce expectations around surgery and recovery	-Reinforce diet/NPO for ERAS patients -Smoking cessation information	-Reinforce ERAS expectations -Remind to bring ERAS notebook and (if used) CPAP machine to hospital	-Ask patient if they have their notebook and review ERAS pathway			-Postop activity and incentive spirometry	-Postop activity and nutrition goals and progress	-Postop activity and nutrition goals and progress -Home chest tube teaching, if applicable (any home supplies needed)

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Discharge Planning	-Assess for discharge needs, social work needs and advanced directives -Schedule patient's postop visit for 2-4 weeks after surgery	-Assess d/c needs including insurance needs						-Case Manager assesses for discharge needs	-DC planning finalized
Outcomes	Preop assessment initiated Understanding of procedure	Preop-assessment complete	Patient demonstrates readiness for surgery	Fluid and electrolyte balance maintained Pain management is effective Patient demonstrated hemodynamic stability Patient is ready for surgery	Fluid and electrolyte balance maintained Pain management is effective Patient demonstrated hemodynamic stability	Fluid and electrolyte balance maintained Pain management is effective Hemodynamic stability	Fluid balance maintained (< 1 kg wt gain) Pain management is effective Patient demonstrated hemodynamic stability OOB	Transitional diet and fluids discontinued Foley and chest tube out for patients meeting criteria Fluid balance maintained Adequate pain control OOB > 6 hours Bowel functioning	Tolerates regular diet Fluid balance maintained Adequate pain control Ambulating Bowel functioning < 15% readmission rate

ALTERNATIVE PATHWAY OR PLAN OF CARE INITIATED FOR THIS PATIENT ON: DATE ________________________ INITIALS _____________________

Guidelines are general and cannot take into account all of the circumstances of a particular patient. Judgment regarding the propriety of using any specific procedure or guideline with a particular patient remains with that patient's physician, nurse, or other health care professional, taking into account the individual circumstances presented by the patient.

*Criteria for severe esophageal disease includes motility disorders, history of esophagectomy, gastroparesis, poorly controlled DM, severe symptomatic GERD, achalasia, nutcracker esophagus, diffuse esophageal spasm or paraesophageal hernia.