Enhanced Recovery After Surgery (ERAS) for Robotically-Assisted Minimally Invasive Direct Coronary Artery Bypass (MIDCAB) Clinical Pathway

Site Applicability

Vancouver General Hospital

Overall ERAS Goals:

- ↓ stress response to surgery
- Improve patient experience
- ↓ complications and length of stay

Specific ERAS Post-operative Goals:

1. Gum chewing x 15–60 minutes while awake, several times/day
2. Advance Diet as Tolerated (DAT) from post-operative day (POD) 0
3. Discontinue central venous catheter (CVC) POD 2
4. Discontinue indwelling urinary catheter POD 1 by noon
5. Saline lock intravenous (IV) POD 1 or IV at TKVO when drinking greater than or equal to 600mL/12hr
6. Capillary Blood Glucose TID, HS, and sliding scale insulin as ordered. If patient non-diabetic and all glucometer readings are less than 8.1mmol/L x 24 hrs, may discontinue glucometer
7. Ondansetron 4mg IV Q8H X 3 doses. First dose 8 hours after intra-op dose.
8. Mobility goals:
   POD 0: Dangle on edge of bed (if extubated) and hemodynamically stable with RN &/or PT
   POD 1: Walk to bathroom and sit up for meals as tolerated; Walk x 3 (minimum 5 meters/walk) a day
   POD 2: Walk to bathroom and sit up for meals; Walk in hallway minimum 3 times per day

Pathway Patient Goals:

Patient will recover from surgery with an expected 3 – 4 day length of stay (LOS) and experience a safe discharge home.

1. Post-operative complications will be prevented by:
   - Extubation within 4 hours post-op
   - Transfer out of CSICU POD 1
   - Discharge home by POD 3
2. Patient will report pain below 3/10 or adequate for mobilizing and DB+C exercises
3. Effective discharge planning and teaching provided to patient and caregivers for a safe discharge

Inclusion Criteria

- All patients having robotically-assisted MIDCAB surgery

Exclusion Criteria

- Open mitral valve procedures, aortic valve, tricuspid, coronary artery bypass surgery, ascending aorta repair, descending aorta repair, TEVAR, minimally invasive mitral valve repair or replacement surgery

Removal Criteria

- When significant deviations from expected outcomes are noted

Instructions

- Review pathway once per shift for patient care goals and expected outcomes
- A variance must be documented when expected outcomes have not been met or interventions not given. The variance is documented in the Electronic Health Record (Cerner) each shift until resolved.

Post- Operative Day 0 (CSICU)	
CARE CATEGORIES DAILY TASKS AND ACTIVITIES	**EXPECTED OUTCOMES**
Safety	• Bedside safety check completed
Key Diagnostics & Other Assessments • Blood work, ABG's as per orders • Glucose monitoring as per orders • Portable CXR, ECG (unless A-V, or V paced) on admission to unit	• The results of the following are within acceptable range: CBC, electrolytes, urea, creatinine, glucose, coagulation status • CXR completed and reviewed by MD • ECG completed and reviewed by MD
Central Nervous System • Sedation and analgesic administered as per orders • Monitor the patient as per Pain Assessment and Documentation Standards • Delirium screening as per nursing standard	• Patient reports pain control as adequate or 3/10 • Complete pain assessment as per Pain Assessment and Documentation Standards • Nerve block assessment and safety check completed as per protocol • No evidence of delirium
Cardiovascular System • Nursing assessment frequency as per unit standard • Maintain CI above 2.2 L/min/m^2 • Maintain SBP 90 to 120 mmHg (unless otherwise specified) • Maintain HR as per order • Temporary pacing as per nursing standards • Monitor CT drainage with vital signs	• Patient in stable cardiac rhythm • Normothermic within 2 hours post-op • Hemodynamically stable as per Critical Care Goals ordered in Patient Care section in Cerner • CT drainage less than 150 mL/h for the first 4 hrs; then less than 50 mL/h
Respiratory System • Maintain PaO_2 above 80 mm Hg • Maintain SpO_2 above 92% as per respiratory standard • Assess weaning criteria respiratory standard • Extubate within 4 hours post-op	• Lung sounds within normal parameters for patient • Chlorhexidine mouthwash pre/post extubation • Extubate within 4 hours post-op or as assessed
Gastrointestinal System • NPO • Complete "Adult Swallowing Screen" post extubation as per dysphagia assessment protocol • Start diet as ordered if safe post extubation and dysphagia screen	• Nausea and vomiting absent or controlled with antiemetic • Nursing Bedside Swallow Screen completed • Tolerating clear fluids post extubation and dysphagia screening • Gum chewing (15 mins TID) when awake post extubation
Genitourinary System • Maintain urine output between 0.5 to 1 mL/kg/h • CAUTI precaution (no dependent loop, secured catheter, change collecting container daily and label)	• Urine output is between 0.5 to 1 mL/kg/h • Secure catheter and provide pericare/catheter care Q shift
Skin • Complete skin assessment as per Braden Risk and Skin Assessment with first repositioning post-op • Dressings assessed as per nursing standard	• Skin integrity assessed as per Braden Risk Assessment • Keep dressings dry and intact. Do not change dressing until POD#3/as per order, unless saturated, otherwise outline drainage with a pen and reinforce as needed.

Mobility • Falls Risk Assessment prior to first mobilization • Dangle on edge of bed and stand if extubated and hemodynamically stable	• Fall prevention assessment completed and care plan in place if indicated • Dangle on edge of bed if able with RN or PT
Medications • Inotropes titrated to maintain hemodynamic parameters as per orders in the Critical Care Goals • IV insulin infusion or sliding scale insulin as ordered • Analgesics as ordered	• Inotropes weaned off • Blood glucose as per protocol • Achieve adequate (or 3/10) pain control with minimal opioids
Consult • As needed: POPS	• Consults performed as ordered
Patient/Family Teaching • Oriented to plan of care for the next 24 hours • Pain scale and use of analgesics • Deep breathing and coughing (ICOUGH protocol)	• Patient and family understand plan of care • Patient & family understand pain control management • Patient & family participate in deep breathing and coughing (ICOUGH protocol)

Post-Operative Day 1 (CSICU / WARD)	
CARE CATEGORIES DAILY TASKS AND ACTIVITIES	**EXPECTED OUTCOMES**
Safety	• Bedside safety check completed
Key Diagnostics & Other Assessments • Blood work as per orders • Nursing assessment frequency as per unit standard: Q4H and PRN • In CSICU: vital signs Q1H • On ward: vital signs Q4H x 24 hours	• Blood work results are within acceptable range • Temp 36° to 37.5° C
Central Nervous System • Analgesic administered as ordered • Monitor the patient as per Pain Assessment and Documentation Standards • Delirium screening as per nursing standard	• Patient reports pain control as adequate or 3/10 • Complete pain assessment as per Pain Assessment and Documentation Standards • Nerve block assessment and safety check completed as per protocol • No evidence of delirium
Cardiovascular System • Remove PA lines, chest tube(s) and arterial line if hemodynamically stable, as per nursing standard and MD orders • Epicardial pacing and care of wires as per nursing standards and as MD orders • **Ward:** ECG strips Q12H or with a change in rhythm • Chest X-Ray 2 hours following chest tube removal	• Patient in stable intrinsic cardiac rhythm • Hemodynamically stable as per Critical Care Goals ordered in Patient Care section in Cerner • Invasive monitoring lines removed • Chest tubes removed if less than 100ml for 4 over hours • Epicardial wires capped • Chest X-Ray 2 hours post CT removal and reviewed by MD
Respiratory • Wean from O_2 and maintain SpO_2 above 92% • Deep breathing & coughing Q1H (spirometer) • Mouth care: AM and HS + PRN (pneumonia prevention)	• No signs of respiratory complications • Patient reminded of mouth care after each meal
Gastrointestinal System • Complete "Adult Swallowing Screen" post extubation as per dysphagia assessment protocol if not completed on POD0 • Regular Diet (+/- Diabetes no sugar added if diabetic)	• Nursing Bedside Swallow Screen completed • Tolerating prescribed regular diet as tolerated • Gum chewing (15 mins TID) when awake post extubation • No nausea & vomiting • Bowel protocol initiated • Saline lock IV once patient is drinking well (i.e. 600mL/ 12 hour)
Genitourinary System • Daily weight • Remove Foley catheter before 12:00pm unless contraindicated • In + out catheterization as per order	• Foley removed • Voiding without difficulty • Patient has an adequate fluid balance. Refer to intake and output documentation • Measure urine output Q1 H (Q4H on the ward) until Foley catheter is removed

Skin • Dressing assessment and care daily	• Skin integrity assessed as per Braden Risk Assessment • No evidence of skin breakdown • Dressings dry and intact. Do not change dressing until POD#3/as per order, unless saturated. Reinforce dressings as needed
Mobility • Falls Risk Assessment as required • Mobilize as per ERAS pathway • Up in chair for all meals as tolerated	• Fall prevention assessment completed and care plan in place if indicated • Walk x 3 (minimum 5 meters/walk) a day • Up in chair for meals as tolerated
Medications • Wean inotropes off • Insulin siding scale as ordered • Assess and initiate anticoagulation as ordered • Analgesics as ordered • Resume pre-op medications as appropriate	• Inotropes weaned off (document time) • Blood glucose as per protocol • Anticoagulation as per orders • Achieve adequate (or 3/10) pain control with minimal opioids
Consults • As needed: Psychiatry, Endocrine, Social Work • Clarify with surgeon if patient requires PCI during this admission	• Seen by consultants as ordered
Patient/Family Teaching • Oriented to plan of care for the next 24 hours • Patient and family reviewing ERAS booklet **Review:** • Pain scale and use of analgesics • ICOUGH protocol	• Patient and family understand plan of care • Patient & family participate in the ICOUGH protocol • **ERAS Robotically-Assisted Minimally Invasive Direct Coronary Artery Bypass Surgery Booklet:** o Patient and family have this booklet at bedside or electronic version o Reviewed and reinforced pain management
Discharge Planning • Discuss length of stay • Discuss goals for the day (i.e.: exercises, pain management, rest) • Initiate teaching as applicable: anticoagulation, smoking cessation, heart failure	• Assess patient need for additional services • **ERAS Robotically-Assisted Minimally Invasive Direct Coronary Artery Bypass Surgery Booklet:** o Patient and family have ERAS booklet at bedside or electronic version o Patient reviewed daily goals o Patient is aware of discharge criteria

Post-Operative Day 2 (Ward)	
CARE CATEGORIES DAILY TASKS AND ACTIVITIES	**EXPECTED OUTCOMES**
Safety	• Bedside safety check completed
Key Diagnostics & Other Assessments • Blood work as ordered • MD/NP or Pharmacist to determine target INR and required anticoagulation • Nursing assessment Q8H and PRN	• MD/NP aware of abnormal results • Anticoagulation, INR discussed; target set • Temp 36° to 37.5° C
Central Nervous System • Delirium screening as per nursing standard • Monitor the patient as per Pain Assessment and Documentation Standards • Analgesic administered as ordered	• No evidence of delirium • Complete pain assessment as per Pain Assessment and Documentation Standards • Patient reports pain control as adequate or 3/10
Cardiovascular System • Vital signs Q8H (0200h assessment at nurse discretion) • ECG strips Q12H or with a change in rhythm • Epicardial pacing and care of wires as per nursing standard and as per MD/NP orders • Remove CVC if hemodynamically stable and insert peripheral IV if not in situ.	• Vital signs within normal limits for patient • Patient in stable intrinsic cardiac rhythm • Epicardial wires capped • CVC removed. Peripheral IV inserted (if not in situ).
Respiratory System • Wean from O_2 and maintain SpO_2 above 92%	• Mouth care of each meals • No signs of respiratory complications
Gastrointestinal System • Regular Diet (+/- Diabetes no sugar added if diabetic) • If no BM x 24 hrs, follow protocol	• Tolerating prescribed diet • Gum chewing (15 mins TID) when awake • No nausea & vomiting • Bowel movement daily
Genitourinary System • Daily weight	• Voiding without difficulty • Patient has an adequate fluid balance. Refer to intake and output documentation
Skin • Incision assessment and care daily	• No evidence of skin breakdown • Skin integrity assessed as per Braden Risk Assessment • Dressings dry and intact. Do not change dressing until POD#3/as per order, unless saturated. Reinforce dressing as needed.
Mobility • Falls risk assessment • Encourage independent mobilization	• Fall prevention assessment completed and care plan in place if indicated • Walk in hallway minimum 3 times a day • Up in chair for meals or TID and to washroom PRN
Medications • Anticoagulation initiated as ordered • Glycemic control as per orders • Analgesics as ordered • Diuresis to target weight as per orders	• Anticoagulation initiated as per MRP orders • Blood glucose as protocol • Achieve adequate (or 3/10) pain control with minimal opioids

Consults • Reassess need for additional consults	• No additional consults required • New consults initiated as ordered
Patient/Family Teaching Review: • Incision care • Mood changes • Deep breathing and Coughing • Pain management • Activity after discharge	**ERAS Robotically-Assisted Minimally Invasive Direct Coronary Artery Bypass Surgery Booklet:** ○ Patient and family have reviewed this booklet with nurse and understand post-op care and management ○ Reviewed and reinforced pain management
Discharge Planning • Discuss length of stay and transportation plans home • Goals of the day • Discuss who is their support person when they are discharged? • Arrange PT/OT equipment PRN • Coordinate TST needs with CML	• Discussion on these topics took place • **ERAS Robotically-Assisted Minimally Invasive Direct Coronary Artery Bypass Surgery Booklet:** o Patient and family have reviewed daily goals o Patient is aware of discharge criteria

Post-Operative Day 3	
CARE CATEGORIES **DAILY TASKS AND ACTIVITIES**	**EXPECTED OUTCOMES**
Safety	• Bedside safety check completed
Key Diagnostics & Other Assessments • Blood work as per orders • Nursing assessment Q12H and PRN • Vital signs Q12H **unless** otherwise indicated	• MD/NP aware of abnormal results • Vital signs within normal limits for patient
Central Nervous System • Delirium screening as per nursing standard • Monitor the patient as per Pain Assessment and Documentation Standards • Analgesic administered as per orders	• No evidence of delirium • Complete Pain assessment as per Pain Assessment and Documentation Standards • Patient reports pain control as adequate or 3/10
Cardiovascular System • ECG strips Q12H and with a change in rhythm • Epicardial pacing wires removed by MD/NP with nursing care as per standard (IV saline lock remains until discharge) • Discontinue telemetry if NSR x 24 hours	• Patient in stable intrinsic cardiac rhythm • Epicardial pacing wires removed by MD/NP
Respiratory System • Maintain SpO2 above 92% on room air	• Mouth care after each meals • No signs of respiratory complications
Gastrointestinal System • Regular Diet (+/- Diabetes no sugar added if diabetic) • If no BM x 48 hrs, follow protocol and notify MD/NP	• Tolerating diet • Gum chewing (15 mins TID) when awake • No nausea & vomiting • Bowel movement daily
Genitourinary System • Daily weight	• Voiding without difficulty
Skin • Incision assessment and care daily • Mepilex removed before 10:00 am and incision cleaned, well approximated, dry + intact. Incision left exposed	• Skin integrity assessed as per Braden Risk Assessment • No evidence of skin breakdown • Surgical incision well approximated, dry and intact
Mobility • May shower (insulate epicardial wires if still in place) • Encourage mobilization	• Fall prevention assessment completed and care plan in place if indicated • Walk independently in hallway minimum 3 times per day • Up in chair for meals or TID and to washroom PRN
Medications • Glycemic control as per orders • Analgesics as ordered • Diuresis to target weight as per orders	• Achieve adequate (or 3/10) pain control with minimal opioids
Consults • Reassess need for additional consults	• No additional consults required • New consults initiated as ordered

Patient/Family Teaching • Review any topics patient and family have questions about and education as needed • **Review:** Medications • Cardiac Rehab program • When to call doctor or 911	• **ERAS Robotically-Assisted Minimally Invasive Direct Coronary Artery Bypass Surgery Booklet:** ○ Patient and family have reviewed this booklet with nurse and understand post-op care and management
Discharge Planning • Discharge teaching • Provide: "Patient Discharge Handout", and discharge prescription if applicable • If patient is discharged with chest tube sutures, inform patient to follow up with family physician/ walk in clinic for suture removal within 5 days • Patient aware of follow up information	• Discharge teaching done • Documentation given • Suture removal instructions provided to patient (if applicable) **ERAS Robotically-Assisted Minimally Invasive Direct Coronary Artery Bypass Surgery Booklet:** ○ Patient and family have reviewed daily goals ○ Patient is aware of discharge criteria

Post-Operative Additional Day	
CARE CATEGORIES DAILY TASKS AND ACTIVITIES	**EXPECTED OUTCOMES**
Safety	• Beside safety check completed
Key Diagnostics & Other Assessments • MD/NP or pharmacist to determine target INR and required anticoagulation	• INR at target
Central Nervous System • Delirium screening as per nursing standard • Monitor the patient as per Pain Assessment and Documentation Standards • Analgesic administered as per orders	• No evidence of delirium • Complete pain assessment as per Pain Assessment and Documentation Standards • Patient reports pain control as adequate or 3/10
Cardiovascular System • Nursing assessment Q12H and PRN • Vital signs Q12H • Epicardial pacing and care of wires as per nursing standards and as MD/NP orders	• Vital signs within normal limits for patient • Epicardial pacing wires removed by MD/NP • Patient in stable intrinsic cardiac rhythm
Respiratory	• Mouth care after each meals • No signs of respiratory complications
Gastrointestinal System	• Tolerating diet • No nausea & vomiting • Gum chewing (15 mins TID) when awake • Bowel movement daily
Genitourinary System • Daily weight	• Voiding without difficulty
Skin • Surgical incision exposed to air • Remove chest tube sutures 3 days following chest tube removal if site is dry and incision is well approximated, or as otherwise directed by MD/NP. Apply steri-strips as needed	• Skin integrity assessed as per Braden Risk Assessment • No evidence of skin breakdown • Incisions dry and intact • Chest tube sutures removed 3 days after chest tube removal, incision well approximated, and steri-strips applied (if applicable)
Mobility • Activity as tolerated • Independent personal care	• Fall prevention assessment completed and care plan in place if indicated • Patient independent with personal care and walking as tolerated
• **Medications** • Anticoagulation as per orders • Glycemic control as per orders • Analgesics as ordered • Diuresis to target weight as per orders	• Achieve adequate (or 3/10) pain control with minimal opioids
Consults • Reassess need for additional consults	• No additional consults required • New consults initiated as ordered
Patient/Family Teaching • Review any topics patient and family have questions about and educate as needed • Review: Medications • Cardiac Rehab program • When to call doctor or 911	• **ERAS Robotically-Assisted Minimally Invasive Direct Coronary Artery Bypass Surgery Booklet:** o Patient and family have reviewed this booklet with nurse and understand post-op care and management

Discharge Planning • Discharge teaching • Provide: "Patient Discharge Handout", and discharge prescription if applicable • If patient is discharged with chest tube sutures, inform patient to follow up with family physician/ walk in clinic for suture removal within 5 days • Patient aware of follow up information	• Discharge teaching done • Documentation given • Suture removal instructions provided to patient (if applicable) • **ERAS Robotically-Assisted Minimally Invasive Direct Coronary Artery Bypass Surgery Booklet:** ○ Patient and family have reviewed daily goals ○ Patient is aware of discharge criteria

Developed By

Effective Date:	
Posted Date:	
Last Revised:	
Last Reviewed:	
Approved By:	VCH
	Endorsed By: • Gurdip Bhatti, Clinical Nurse Educator, Cardiac Surgery Intensive Care Unit, VGH • Tina Oye, Clinical Nurse Educator, Cardiac Ward, VGH **Final Sign Off:**
Owners:	VCH
	Cardiac Surgery **Developer Lead(s):** • Gurdip Bhatti, Clinical Nurse Educator, Cardiac Surgery Intensive Care Unit, VGH • Tina Oye, Clinical Nurse Educator, Cardiac Ward, VGH