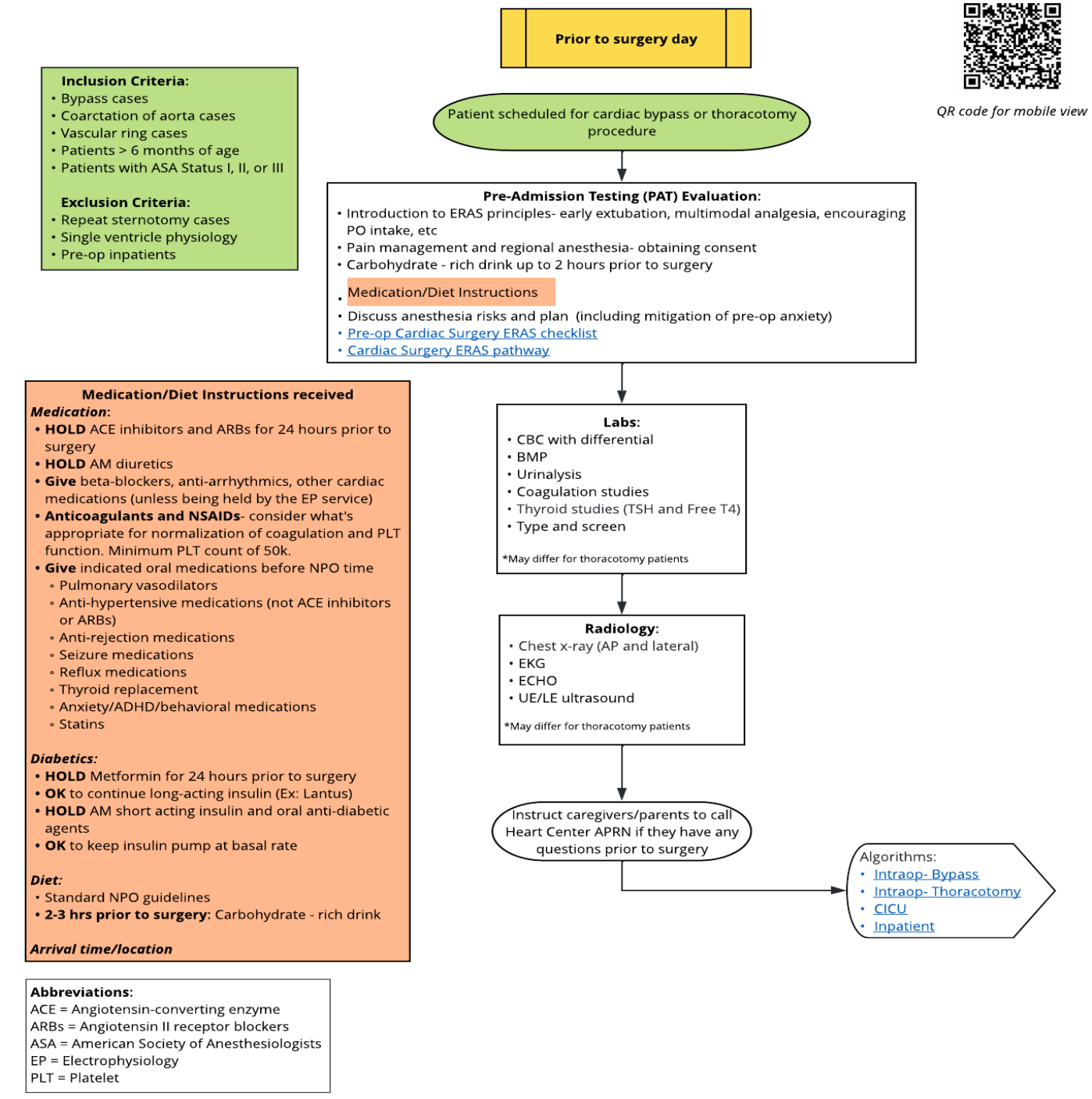
Cardiac Surgery – Bypass/Thoracotomy
Enhanced Recovery After Surgery Pathway Synopsis

Prior to Surgery Algorithm



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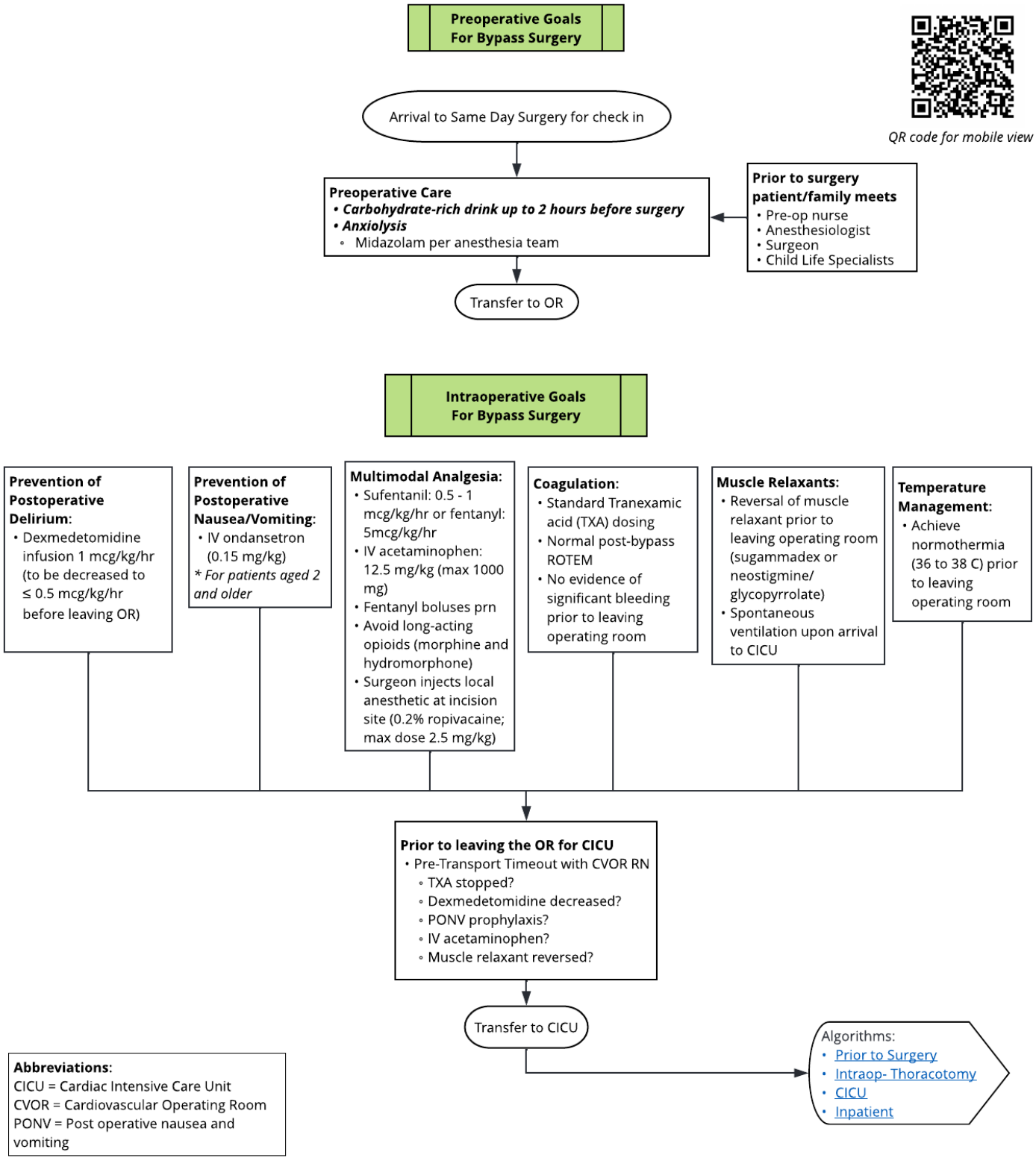
Intraoperative – Bypass Algorithm



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Intraoperative – Thoracotomy Algorithm

QR code for mobile view

Preoperative Goals For Thoracotomy Surgery

Arrival to Same Day Surgery for check in

Preoperative Care
- ***Carbohydrate-rich drink up to 2 hours before surgery***
- ***Anxiolysis***
  - Midazolam per anesthesia team

Prior to surgery patient/family meets
- Pre-op nurse
- Anesthesiologist
- Surgeon
- Child Life Specialists

Transfer to OR

Intraoperative Goals For Thoracotomy Surgery

Prevention of Postoperative Delirium:
- Dexmedetomidine infusion 1 mcg/kg/hr (to be decreased to ≤ 0.5 mcg/kg/hr before leaving OR)

Prevention of Postoperative Nausea/Vomiting:
- IV dexamethasone (0.1mg/kg)
- IV ondansetron (0.15 mg/kg)

** For patients aged 2 and older*

Multimodal Analgesia:
- Fentanyl boluses prn
- Avoid long-acting opioids (morphine and hydromorphone)
- IV acetaminophen: 12.5 mg/kg (max 1000 mg)
- Erector spinae plane (ESP) block
  - Single shot vs catheter in older (>5 yo) patients

Muscle Relaxants:
- Reversal of muscle relaxant prior to leaving operating room (sugammadex or neostigmine/ glycopyrrolate)
- Spontaneous ventilation upon arrival to CICU

Temperature Management:
- Achieve normothermia (36 to 38 C) prior to leaving operating room

Prior to leaving the OR for CICU
- Pre-Transport Timeout with CVOR RN
  - Dexmedetomidine decreased?
  - PONV prophylaxis?
  - IV acetaminophen?
  - Muscle relaxant reversed?

Transfer to CICU

Algorithms:
- Prior to Surgery
- Intraop - Bypass
- CICU
- Inpatient

Abbreviations:
CICU = Cardiac Intensive Care Unit
CVOR = Cardiovascular Operating Room
PONV = Post operative nausea and vomiting

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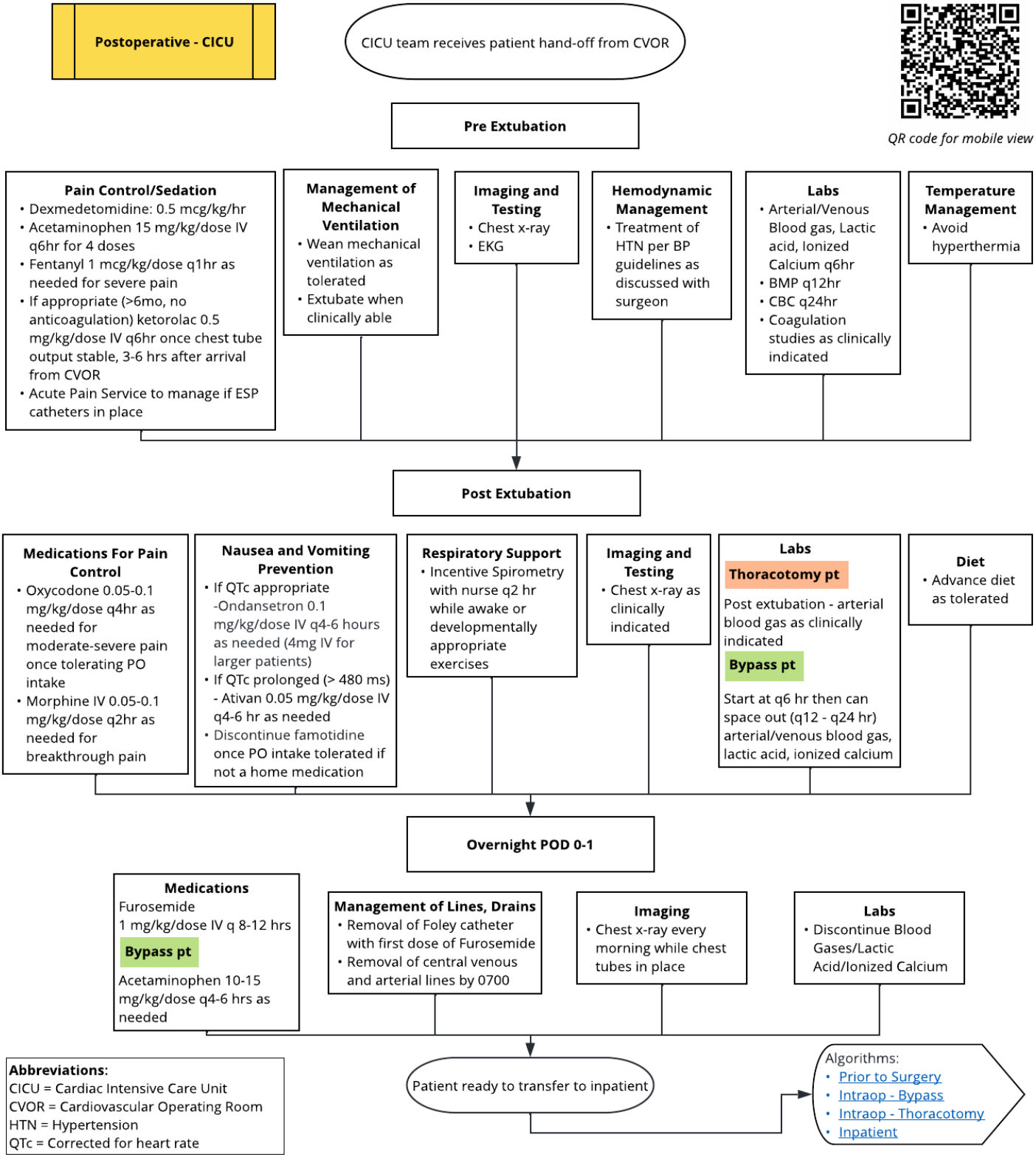
CICU Algorithm



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Inpatient to Discharge Algorithm

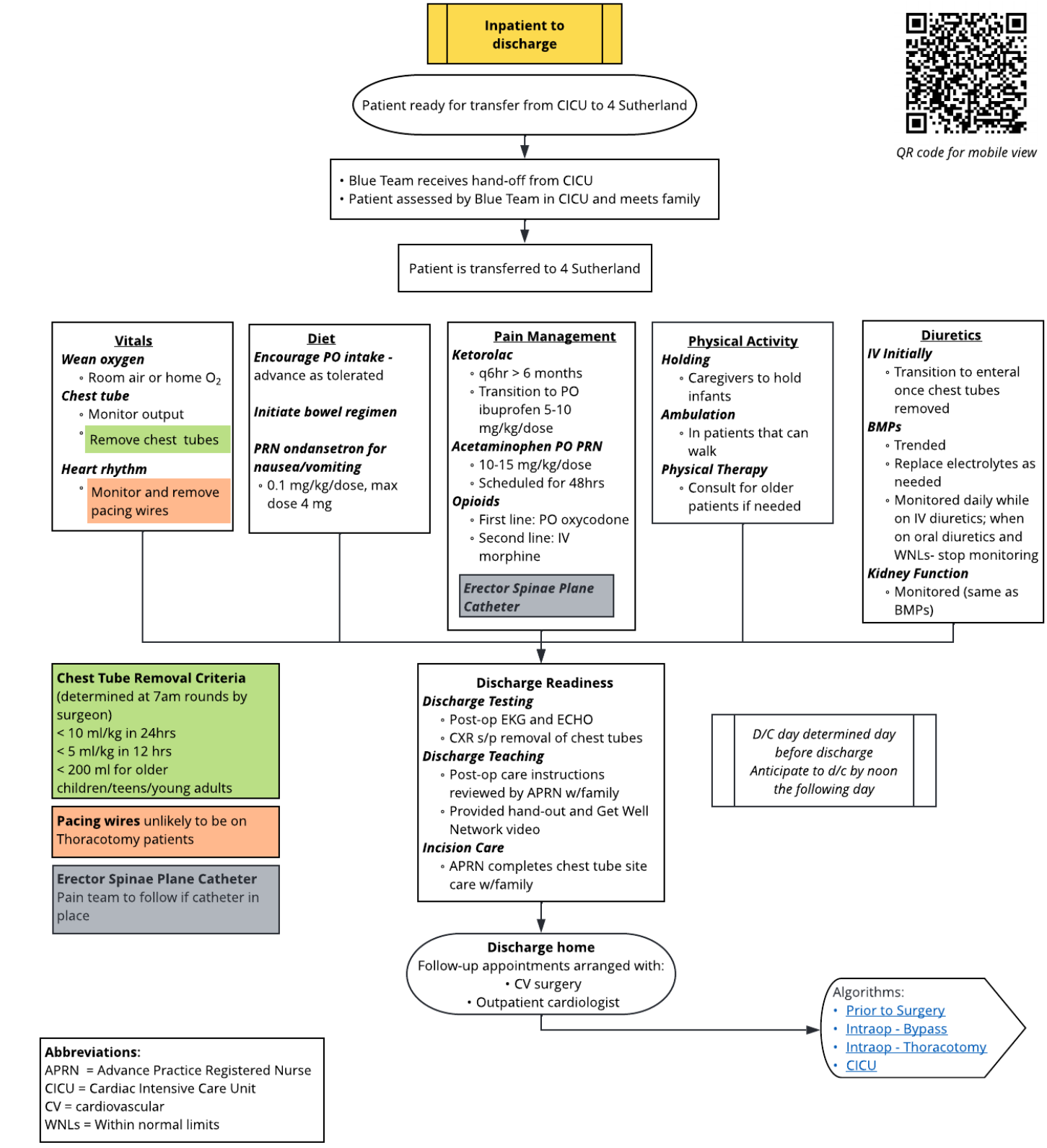

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Table of Contents

Objective of ERAS Model

The objectives for the Cardiac Surgery Enhanced Recovery After Surgery (ERAS) pathway are to minimize the variation of care for specific patients undergoing cardiac surgery starting with the pre-admission testing visit up until discharge.

Background/Epidemiology

Over the past several decades, cardiac surgery among the pediatric population has significantly improved the quality of life and survivability of congenital heart disease. ERAS pathways have become mainstream in the adult surgical world and now are gaining recognition and use in the pediatric surgical arena. Implementation of ERAS principles have shown significant improvements in various surgeries regarding length of stay, opioid use, pain control, and return to diet (Fearon 2005, Thiele 2014, Liu 2017). Key elements to ERAS include:

- Preoperative education of patients and family with an introduction to ERAS
- Oral carbohydrate load 2-3 hours before surgery
- Avoidance of prolonged fasting
- No additional bowel preparation
- Standardized anesthesia protocol including regional or neuraxial anesthesia when possible
- Goal-directed strict intraoperative intravenous fluid therapy guidelines to avoid hypo-or hypervolemia
- Minimize the use of long acting opioids
- Minimize use of drains and NG tubes when possible
- Initiate early feeding and ambulation

The most important aspect of ERAS is compliance. Although specific elements may need tailoring to patient needs, ERAS has been shown to be safe and improve outcomes in a wide variety of patients and will be an important part of helping patients and families through recovery.

Target Users

Anesthesiologists, Cardiovascular surgeons, Cardiac Intensivists, Cardiologists, Cardiology nurse practitioners, PAT nurse practitioners

Target Population

ERAS Inclusion Criteria

- Bypass cases
- Coarctation of aorta cases
- Vascular ring cases
- Patients > 6 months of age
- Patients with American Society of Anesthesiologists (ASA) Physical Status I, II, or III

ERAS Exclusion Criteria

- Repeat sternotomy cases
- Single ventricle physiology
- Pre-op inpatients

Core Principles of ERAS (Melnyk et al., 2011)

- Preoperative education of patients and family with an introduction to ERAS
- Reduced pre-operative fasting, with clear liquid oral carbohydrate loading until 2 hours prior to surgery
- Goal-directed strict intraoperative intravenous fluid therapy guidelines to avoid hypo-or hypervolemia
- Avoidance of routine nasogastric tube use
- Minimizing long-acting opioid analgesia, in favor of regional anesthesia with epidural and/or local anesthesia for intra-operative and postoperative pain control when appropriate and using alternative non-opioid medications when appropriate (e.g., non-steroidal anti-inflammatories or acetaminophen)
- Early post-operative mobilization
- Early post-operative enteral feeding

ERAS Management Recommendations:

Pre-Operative Care

- The beginning of this ERAS protocol begins well before the surgical date. The concept of ERAS is presented to the patient/family at the initial surgical appointment and pre-operative clinic visit and then reinforced during the pre-admission testing (PAT) clinic visit.
- At PAT, there are educational items discussed, including pre-op diet restrictions, medication management, and the risks of anesthesia.
- Also discussed some of the core concepts of ERAS, including the emphasis on early post-op PO intake and a multimodal pain management approach. Expectation management is crucial in the preoperative phase. A handout (Appendix A and B), approved by the Health Literacy Committee, is given to the family prior to departing PAT.
- On the morning of surgery, the patient drinks carbohydrate-rich liquids two hours before surgery start time.

Intra-Operative Care

- Pre-Incision Timeout
  - Discussion with surgeon and OR staff to determine if patient has been enrolled in ERAS pathway
- Prevention of Postoperative Nausea/Vomiting
  - Dexamethasone or ondansetron for patients > 2yrs old (dexamethasone not to be used with bypass patients)
  - Avoid placement of NG tube
- Prevention of Postoperative Delirium
  - Dexmedetomidine infusion during case with goal of < 0.5 mcg/kg/hr upon handoff in Cardiac Intensive Care Unit (CICU)
- Multimodal Analgesia
  - Sufentanil infusion during the procedure with discontinuation prior to exiting the operating room
  - IV acetaminophen 12.5 mg/kg (max 1000 mg)
  - Fentanyl boluses prn
  - Avoidance of long-acting opioids (morphine & hydromorphone)
  - Injection of local anesthetic at incision site by the surgeon at end of the procedure
- Coagulation
  - Standard tranexamic acid (TXA) bolus and infusion
  - Normal post-bypass ROTEM
  - No evidence of significant bleeding prior to leaving the operating room
- Temperature Management
  - Achieve normothermia prior to leaving the operating room
- Muscle Relaxants
  - Reversal of muscle relaxant prior to leaving the operating room with sugammadex or neostigmine/glycopyrrolate
  - Goal of spontaneous ventilation upon arrival to CICU

Post-Operative Care

CICU

- Upon arrival to CICU, anesthesiologist gives in-depth hand-off to CICU, including key ERAS components.
- CICU team (attending intensivist, resident physicians, APRNs) and charge nurse assess patient after CICU handoff.
- Goals of care from CICU admission to enable transfer to inpatient floor in the post-op period:
  - **Post CVOR Hand-off**
    - ✓ Pain Control
      - Continue dexmedetomidine: < 0.5 mcg/kg/hr, discontinue if unable to wean ventilator support
      - Acetaminophen 15 mg/kg/dose IV every 6 hours for 4 doses
      - Fentanyl 1 mcg/kg/dose every 1 hour as needed for severe pain
      - If appropriate (> 6 months, no anticoagulation), ketorolac 0.5 mg/kg/dose IV every 6 hours once chest tube output is stable, 3-6 hours after arrival from CVOR
      - Last line opioids: morphine and hydromorphone

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- ✓ Management of Mechanical Ventilation
  - Wean Mechanical Ventilation as Tolerated
  - Extubate when clinically able
  - Goal extubation time from arrival in CICU is less than 6 hours
- ✓ Imaging/Testing
  - Chest X-Ray
  - EKG
- ✓ Hemodynamic Management
  - Treatment of hypertension per surgeon recommended parameters
- ✓ Labs
  - Arterial/Venous Blood gas, Lactic Acid, Ionized Calcium q6h
  - BMP q12h
  - CBC q24h
  - Coagulation studies as clinically indicated
- ✓ Temperature Management
  - Room Temperature, maintain normothermia

- **Post Extubation**
  - ✓ Medications
    - Pain Control
      - Oxycodone 0.05-0.1 mg/kg/dose every 4 hours as needed for moderate-severe pain once tolerating PO intake
      - Morphine IV 0.05-0.1 mg/kg/dose every 2 hours as needed for breakthrough pain
  - ✓ Nausea and Vomiting Prophylaxis
    - If QTc appropriate – ondansetron 0.1 mg/kg/dose IV every 4-6 hours as needed
    - If QTc prolonged (> 480 ms) – lorazepam 0.05 mg/kg/dose IV every 4-6 hours as needed
  - ✓ Discontinue famotidine upon resumption of normal diet
  - ✓ Respiratory Support
    - Incentive spirometry q2h while awake if developmentally appropriate
  - ✓ Imaging/Testing
    - Chest x-ray as clinically indicated
  - ✓ Labs
    - Thoracotomy patient - Post extubation Arterial Blood Gas as clinically indicated
    - Bypass patient - Can space out Arterial/Venous Blood gas, Lactic Acid, Ionized Calcium-
  - ✓ Diet
    - Advance diet as tolerated
- **Overnight POD 0-1**
  - ✓ Medications
    - Furosemide 1 mg/kg/dose IV every 8-12 hours
    - Bypass patient – Tylenol 10 – 15 mg/kg/dose every 4 –6 hours as needed
  - ✓ Management of Lines, Drains
    - Removal of Foley Catheter with first dose of Furosemide
    - Removal of Central Venous and Arterial Lines by 0700
  - ✓ Imaging
    - Chest X-ray every morning while chest tubes remain in place
  - ✓ Labs
    - Discontinue Blood Gases/Lactic Acid/Ionized Calcium

Inpatient floor/Blue Team/4 Sutherland

- In the ERAS patient population, the post CV surgery patient will likely meet criteria to transfer from the CICU to the floor on POD1-2
- Once patient meets criteria to transfer from CICU to 4Sutherland, CICU gives hand-off to Blue Team
- Blue Team providers (attending physician, resident physicians, APRNs) and charge nurse assess the patient in CICU and meet family in CICU prior to transfer to the floor.

- Blue Team provides family with information regarding expected progression towards discharge to home and explains the difference in staffing/monitoring on the floor vs. ICU setting
- Patient is transferred to the floor
- Goals of care on the floor to enable discharge to home in the post-operative period:
    - **Wean oxygen** support to room air or home oxygen support. Consider the use of incentive spirometry if the patient qualifies.
    - **Monitoring of chest tube** output and removal of chest tubes once they meet criteria of less than 10 ml/kg in 24 hours, or 5 ml/kg in 12 hours, or less than 200 ml for older children/teens/young adults
    - **Monitoring of heart rhythm** and removal of temporary pacing wires if not removed in CICU prior to transfer to the floor
    - **Advancing to home diet** – treatment of nausea/vomiting as needed, initiation of bowel regimen to enable promote the return of bowel function in post-op period by POD1-2, typically no IV fluids past POD1-2 to encourage PO intake
    - **Pain management**
        - Scheduled ketorolac q6hr in patients greater than six months if age
        - Transition to PO ibuprofen once taking PO – usually POD2, for a total of 7 days of NSAIDs for pain management and anti-inflammatory to prevent pericardial effusion
        - Acetaminophen PRN
        - Oxycodone PRN
        - Morphine PRN but long-acting IV opioid use is discouraged over other PRN options once on the floor
    - **Physical Activity** – encourage holding of infants by caregivers, ambulation in patients who can walk by POD1-2; Physical therapy evaluation and intervention for older children/teens/young adults if needed
    - **Diuretics** – initially IV, transitioned to enteral once chest tubes are removed, BMPs trended and electrolytes replaced as needed, kidney function monitored
    - **Discharge Testing** – post-op EKG and echocardiogram, usually the morning of discharge, and Chest X-ray after the removal of chest tubes (also likely AM of discharge)
    - **Discharge Teaching** for post-operative care provided via informational hand-out (Appendix C, D, and E) in discharge paperwork as well as through the Get Well Network video and reviewed by APRN with family
    - **Incision care** and chest tube site care and assessment
    - **Follow-up appointments** arranged with CV surgery and primary outpatient cardiologist – email/phone communication made at the time of discharge to ensure a smooth transition of care

Additional Questions Posed by the ERAS Committee

No clinical questions were posed for this review.

Key Metrics To Be Monitored:

Pre-Op	Intra-Op	Post-Op	
Carbohydrate-Rich Drink	Avoidance of long-acting opioids	**CICU**	**Inpatient**
	Administration of PONV prophylaxis	Time until Extubation	Chest Tube Removal
	Neuraxial Block/Regional Block/Surgeon prior to Incision	Avoidance of long-acting opioids	Avoidance of long-acting opioids
	Normothermia at time of transfer	Time to Transfer from CICU	Total Length of Stay
	IV Acetaminophen		
	Surgical Time		

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Value Implications

The following potential improvements may reduce costs and resource utilization for healthcare facilities and reduce healthcare costs and non-monetary costs (e.g., missed school/work, loss of wages, stress) for patients and families.

- Decreased inpatient length of stay
- Decreased unwarranted variation in care

Potential Organizational Barriers and Facilitators

Potential Barriers

- Variability of acceptable level of risk among providers
- Challenges with follow-up faced by some families

Potential Facilitators

- Collaborative engagement across care continuum settings during ERAS development
- High rate of use of ERAS pathways within the hospital setting

Power Plans

- There are no specific power plans associated nor developed for this ERAS pathway

Associated Policies

- There are no associated policies with the Cardiac Surgery ERAS pathway for bypass or thoracotomy procedures

ERAS Pathway Preparation

This ERAS pathway was prepared by the Department of Evidence Based Practice (EBP) in collaboration with the Cardiac ERAS committee composed of content experts at Children's Mercy Kansas City. The development of this ERAS pathway supports the Division of Quality Excellence and Safety's initiative to promote care standardization that is evidenced by measured outcomes. If a conflict of interest is identified, the conflict will be disclosed next to the committee member's name.

Cardiac Surgery ERAS Committee Members and Representation

- Joseph Huffman, MD, FASA | Anesthesiology | Committee Co-chair
- Christian Taylor, MD | Anesthesiology | Committee Co-chair
- William Douglas, MD | Cardiac Surgery | Committee Member
- Apurva Panchal, MD | Critical Care Medicine | Committee Member
- Lindsey Malloy Walton, DO, MPH | Cardiology| Committee Member
- Robin Hulse, MSN, APRN, PCNS, CPN | Anesthesiology | Committee Member
- Rebecca Juhl, DNP, APRN, CPNP-AC, CCRN | Heart Center | Committee Member
- Sarah Lagergren, APRN | Heart Center | Committee Member
- Melissa McGraw, MSN, RN, CPNP | Heart Center | Committee Member

EBP Committee Members

- Todd Glenski, MD, MSHA, FASA | Anesthesiology, Evidence Based Practice
- Andrea Melanson, OTD, OTR/L | Evidence Based Practice

Additional Review & Feedback

- The ERAS pathway was presented to each division or department represented on the ERAS committee as well as other appropriate stakeholders. Feedback was incorporated into the final product.

ERAS Development Funding

The development of this ERAS pathway was underwritten by the Departments of Evidence Based Practice, Anesthesiology, and Cardiac Surgery Departments.

Conflict of Interest

The contributors to the Endometriosis ERAS have no conflicts of interest to disclose related to the subject matter or materials discussed in this care process.

Approval Obtained:

Department/Unit	Date Approved
Anesthesiology	August 2023
Cardiology	August 2023
Cardiac Care	August 2023
Cardiac Surgery	August 2023
Evidence Based Practice	August 2023

Version History

Date	Comments
July 2022	Initial version- developed algorithms, synopsis, and hand-outs
August 2023	Updated medications for surgical care and formatted synopsis to include medication updates.

Date for Next Review:

- **August 2024**

Implementation & Follow-Up

- Once approved, this ERAS pathway was presented to appropriate care teams and implemented.
- Key metrics will be assessed and shared with the appropriate care teams to determine if changes need to occur.
- Education tools for patients and families were created for pre-surgery visits, including a preparation checklist and an overview of the ERAS pathway. The tools were reviewed by health literacy.
- This ERAS pathway is scheduled to be revisited by all teams yearly.

Disclaimer

When evidence is lacking or inconclusive, options in care are provided in the supporting documents and the power plan(s) that accompany the ERAS pathway.

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Appendix A

ERAS

Cardiac Enhanced Recovery After Surgery Pathway

Children's Mercy KANSAS CITY
HEART CENTER

BEFORE SURGERY	✓ Education ✓ Medical management of your child's heart condition ✓ Pre-operative surgery appointment	HOME CARDIOLOGY CLINIC
DAY OF SURGERY	✓ No solid food six hours before surgery ✓ *Carbohydrate-rich drink two hours before surgery* ✓ Pre-operative medication for anxiety	PRE SURGICAL AREA
DURING SURGERY	✓ Minimize blood transfusions ✓ Multiple approaches to treat pain and reduce opioid need ✓ Prevention of post-operative nausea ✓ Prevention of post-operative delirium ✓ Avoidance of hypothermia or hyperthermia	OPERATING ROOM
AFTER SURGERY	✓ *Early transfer out of CICU* ✓ Early removal of breathing tube ✓ Early removal of catheters, lines, and tubes ✓ Transition from IV to oral medications as soon as possible ✓ Combination of medications to treat pain ✓ Prevention of nausea ✓ Getting out of bed as soon as possible after surgery ✓ Return to a normal diet ✓ Continuous updates and communication from cardiac surgery nurse practitioner, including daily rounds with team	CARDIAC ICU and INPATIENT UNIT
FOLLOW UP	✓ Monitor recovery ✓ Satisfaction survey	HOME

Developed by Departments of Anesthesiology and Evidence Based Practice
7.18.22

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Appendix B

ERAS

Enhanced Recovery After Surgery

Patient Pre-Operative Checklist

ERAS program helps to:

- Promote overall healing from surgery
- Decrease opioid pain medicine use and side effects by using regional anesthesia
- Promote return to normal diet faster
- Decrease length of hospitalization

SURGERY	My child's heart surgery is scheduled on _____. Please be at the hospital and checked in to Same Day Surgery at – _____.	☐
FOOD	Your child should eat regular, healthy meals the day before surgery. Your child must stop eating or taking formula/fortified breastmilk at least 6 hours before surgery and plain breastmilk 4 hours before surgery starts.	☐
CARBO DRINK	Choose a clear, carbohydrate-rich drink like Gatorade or Pedialyte for your child to drink 2 hours before surgery. They must finish drinking it no later than 2 hours before the surgery time.	☐
MEDICINES	Give other medications on surgery day as instructed in PAT.	☐
QUESTIONS	We are here to help with your questions before surgery. If you have any questions, please call (816) 234- 3000, and ask for the Heart Center Procedural APN on call.	☐

Developed by Anesthesiology and Evidence Based Practice
7.18.22

Children's Mercy KANSAS CITY

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Appendix C

Going Home after Cardiac Surgery – Infant

Care of Your Child's Incision:

- Check the incision daily for signs of infection: redness, swelling, drainage and/or rash
- If concern for fever check your child's temperature. Contact on call Heart Center nurse practitioner for fever above 101°F (38.4°C)
- Sponge bathe your child for the first seven days after surgery
- Your child may begin taking tub baths or showers one week after their surgery, on _____
- When bathing your child, be sure to wash the incision and chest tube sites with soap and water. Dry thoroughly. Incision care will continue for 10 days post-operatively
- **DO NOT** put any lotion, cream, or powder on the incision area for at least one month
- The steri-strips will be removed after 7 days- this can be done at home or at follow-up if you are not comfortable removing yourself. If they fall off prior to removal this is okay
- Blake drain stitches will be removed at your follow-up doctor visit. This should be done one week after removal but should not remain in place greater than 14 days. If sutures fall out prematurely, they do not need to be replaced. Please have your provider call Children's Mercy at (816) 234-3880 and ask for Heart Center APRN if they have questions regarding the removal
- Once healed, be sure to use sunscreen on the scar as it is more likely to burn from UV exposure

Diet:

- Your baby can take as much breast milk or formula as he/she wants, unless otherwise instructed
- He/she may need extra calories because his/her heart may be working harder than most babies
- If your child needs higher caloric breast milk or formula, the nutritionist will talk with you before going home
- To make feeding time easier for your baby:
    - Hold your baby in a semi-upright position
    - Feed your baby smaller amounts more often
    - Limit feeding time to 30 minutes
    - Burp your baby frequently (after an ounce or 5 minutes of breast feeding)

Activity:

- Your child may resume normal activity after his/her cardiology follow-up appointment. Until then, follow these recommendations:
    - Long bouts of crying may tire your infant – Tend to your infant's needs quickly to prevent long periods of crying
    - When lifting your infant, **do not lift under the arms** for one month following surgery – "Scoop" to lift your baby and support his/her bottom with your hand
    - Your infant may do tummy time, as well as ride in his/her car seat with chest clip positioned across incision

Day Care:

Your child should not attend daycare until after their follow-up appointment. This may mean that you (parent) may have to arrange to be off work or provide other at home care.

Dental Care:

- Many children with heart defects require antibiotics prior to dental procedures to prevent infection
- Good tooth brushing and regular visits to the dentist are important since tooth decay can lead to heart infection
- Your cardiologist will advise you regarding precautions you may need to take with dental procedures

Immunizations:

- Let your child's primary care provider know your child had open heart surgery and blood transfusions before he/she receives his/her scheduled immunizations
- Please avoid non-live vaccines for 2 weeks and live vaccines for 7 months following surgery unless medically necessary. This does **NOT** include Synagis

Questions/Concerns:

Call if your child has:

- Fever > 101°F
- Rapid, heavy breathing
- Excessive sweating
- Unable to drink bottle or breast feed for 2 feedings in a row
- Puffiness of the eyes or face
- Extreme irritability
- Vomiting more than 3 times a day
- Decreased bowel movements or concern for constipation
- Less than 6 wet diapers in one day

Important Phone Numbers:

In case of a medical emergency, please call 911. Notify healthcare providers in ER that your child has recently had heart surgery.

The Heart Center Nurse Practitioners are available 24 hours a day. Call (816) 234-3000 and ask the operator to page the Heart Center Nurse Practitioner on call.

Cardiology Clinic: (816) 234-3880

Video Discharge:

Please visit the following link for video discharge instructions: https://youtu.be/TRFmXzz9ujQ

This information is provided as a public education service. The information does not replace instructions your primary care provider gives you. If you have questions about your child's care, please call your primary care provider or cardiologist's office.

Appendix D

Going Home after Cardiac Surgery – Toddler/School Age

Care of Your Child's Incision:

- Check the incision daily for signs of infection: redness, swelling, drainage and/or rash
- If concern for fever check your child's temperature. Contact on call Heart Center nurse practitioner for fever above 101°F (38.4°C)
- Sponge bathe your child for the first seven days after surgery
- Your child may begin taking tub baths or showers one week after their surgery, on _____
- When bathing your child, be sure to wash the incision and chest tube sites with soap and water. Dry thoroughly. Incision care will continue for 10 days post-operatively.
- **DO NOT** put any lotion, cream, or powder on the incision area for at least one month
- The steri-strips will be removed after 7 days- this can be done at home or at follow-up if you are not comfortable removing yourself. If they fall off prior to removal this is okay.
- Blake drain stitches will be removed at your follow-up doctor visit. This should be done one week after removal but should not remain in place greater than 14 days. If sutures fall out prematurely, they do not need to be replaced. Please have your provider call Children's Mercy at (816) 234-3880 and ask for Heart Center APRN if they have questions regarding the removal
- Once healed, be sure to use sunscreen on the scar as it is more likely to burn from UV exposure

Diet:

- Offer your child his/her regular diet unless otherwise instructed
- Encourage a balanced diet of foods that promote healing: meats, milk, bread products, fruits, and vegetables

Activity:

- Your child may resume normal activity after about a month or after his/her cardiology follow-up appointment. Until then, follow these recommendations:
  - Most young children will limit their own activity when they become tired
  - However, your child should not swim, jump on a trampoline, climb, ride tricycles or big wheels, or roller-skate for one month after surgery
  - When lifting your child, do not lift under the arms for one month following surgery

Behavior:

- Due to your child's hospitalization and surgery, it is not unusual for him or her to go back to earlier childhood behaviors such as:
  - Bedwetting
  - Awakening during the night
  - Fussiness
  - Nightmares
  - Clinging to parents, etc.

These behaviors usually go away within a short period of time. It is important to set limits for your child and discipline appropriately for his/her age.

School/Day Care:

Your child should not attend school or daycare until after his follow-up appointment. This may mean that you (parent) may have to arrange to be off work or provide other at home care.

Dental Care:

- Many children with heart defects require antibiotics prior to dental procedures to prevent infection
- Good tooth brushing and regular visits to the dentist are important since tooth decay can lead to heart infection
- Your cardiologist will advise you regarding precautions you may need to take with dental procedures

Immunizations:
Let your child's primary care provider know your child had open heart surgery and blood transfusions before he/she receives his/her scheduled immunizations.

- Please avoid non-live vaccines for 2 weeks and live vaccines for 7 months following surgery unless medically necessary. This does **NOT** include Synagis

Call if your child has the following:

- Fever > 101°F
- Rapid, heavy breathing
- Excessive sweating
- Decreased Appetite
- Puffiness of the eyes or face
- New onset vomiting
- Decreased bowel movements or concern for constipation
- Urination less than 2 times in one day

Important Phone Numbers:

In case of a medical emergency, please call 911. Notify healthcare providers in ER that your child has recently had heart surgery.

The Heart Center Nurse Practitioners are available 24 hours a day. Call (816) 234-3000 and ask the operator to page the Heart Center Nurse Practitioner on call.

Cardiology Clinic: (816) 234-3880

Video Discharge:

Please visit the following link for video discharge instructions: https://youtu.be/TRFmXzz9ujQ

This information is provided as a public education service. The information does not replace instructions your provider gives you. If you have questions about your child's care, please call your primary care provider or cardiologist's office.

Appendix E

Going Home after Cardiac Surgery – Teenager/Young Adult

Care of Your Child's Incision:

- Check the incision daily for signs of infection: redness, swelling, drainage and/or rash
- If concern for fever check your child's temperature. Contact on call Heart Center nurse practitioner for fever above 101°F (38.4°C)
- Sponge bathe for the first seven days after surgery
- You may begin taking tub baths or showers one week after surgery, on _____
- When bathing your child, be sure to wash the incision and chest tube sites with soap and water. Dry thoroughly. Incision care will continue for 10 days post-operatively.
- **DO NOT** put any lotion, cream, or powder on the incision area for at least one month
- The steri-strips will be removed after 7 days- this can be done at home or at follow-up if you are not comfortable removing yourself. If they fall off prior to removal this is okay.
- Blake drain stitches will be removed at your follow-up doctor visit. This should be done one week after removal but should not remain in place greater than 14 days. If sutures fall out prematurely, they do not need to be replaced. Please have your provider call Children's Mercy at (816) 234-3880 and ask for Heart Center APRN if they have questions regarding the removal
- Once healed, be sure to use sunscreen on the scar as it is more likely to burn from UV exposure

Diet:

- You have no dietary restrictions
- We encourage a balanced diet of foods that promote healing: meats, milk, bread products, fruits and vegetables

Activity:

- You may resume normal activity after about a month or after your cardiology follow-up appointment. Until then, follow these recommendations:
    - You should avoid contact sports or activities such as bike riding, swimming, climbing, or rollerblading
    - You should ride in the back seat of vehicles and no driving for one month after surgery
    - You should not go to gym class for at least one month
    - You should not lift anything over 10 pounds

School:

You should not attend school until after your first follow-up appointment.

Dental Care:

- Many individuals with heart problems require antibiotics prior to dental procedures to prevent infection
- Good tooth brushing and regular visits to the dentist are important since tooth decay can lead to heart infection
- Your cardiologist will advise you regarding precautions you may need to take with dental procedures

Immunizations:

Let your primary care provider know you had open heart surgery and blood transfusions before you receive scheduled immunizations.

- Please avoid non-live vaccines for 2 weeks and live vaccines for 7 months following surgery unless medically necessary. This does **NOT** include Synagis

Call if you have the following:

- Fever > 101°F
- Rapid, heavy breathing
- Excessive sweating
- Decreased Appetite

** These pathways do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time. It is impossible to anticipate all possible situations that may exist and to prepare a pathway for each. Accordingly, these pathways should guide care with the understanding that departures from them may be required at times.*

- Puffiness of the eyes or face
- New onset of vomiting
- Decreased bowel movements or concern for constipation
- Urination less than 2 times in one day

Important Phone Numbers:

In case of a medical emergency, please call 911. Notify healthcare providers in ER that you recently had heart surgery.

The Heart Center Nurse Practitioners are available 24 hours a day. Call (816) 234-3000 and ask the operator to page the Heart Center Nurse Practitioner on call.

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