Primary Objective
Standardize management of patients post-operatively after elective Fontan procedure in the Cardiac Care Unit (CCU) and effectively transition to an outpatient setting with a goal of reducing chest tube duration, reducing hospital length of stay, and decreasing need for hospital re-admission.

Recommendations
• Patient population: All elective Fontan procedures, extubated in the operating room or shortly after CICU admission, off all vaso-pressors > 4 hours at 0700 AM POD 1 (excluding prophylactic vasopressin at 0.0002 mcg/kg/min).
• Patients will be initiated on the following regimen:

F – IV FUROSEMIDE 1mg/kg every 8h on POD 1. Spironolactone/hydrochlorothiazide (aldactazide) 1mg/kg PO every 12 hours to be initiated when taking enteral liquids. Transition to PO TID furosemide after chest tubes are removed. Diuretics will be weaned prior to discharge with a goal at discharge of 3-4 doses per day of diuretic. Goal for patients is to maintain electrolyte evidence of mild dehydration (near normal electrolytes, mild elevation in BUN, and normal creatinine).

O – Do not wean OXYGEN below 0.5 L/min via nasal cannula until chest tubes are removed. PT/OT should be consulted to assist with ambulation; okay for patient to be off oxygen while ambulating.

N – Initiate ENALAPRIL 0.05mg/kg/dose every 12h when taking PO fluids. Dose to be titrated up as needed for hypertension.

T – CHEST TUBES will be removed when drainage is < 2ml/kg/day for a single chest tube.

A – ANTICOAGULATION Patients will be placed on a heparin drip POD 0 (when 4 hours post op and chest tube output < 1 ml/kg/hour), maintain therapeutic Anti-Xa (0.3-0.7) until they are walking. Start aspirin on POD 1 when taking PO fluids. If patient is not taking PO on POD#1, start aspirin as soon as they are tolerating enteral liquids. ALTERNATIVELY, consider rivaroxaban instead of aspirin once CTs are removed for a duration of 6 months (heparin should be stopped when rivoxaban started).

N – NUTRITION and fluids: On POD 1-3, when PO is initiated, restrict total fluids to 80% of maintenance and maintain on a on fat free diet (<3 grams of fat). On POD #4 increase to maintenance fluids until chest tubes are removed and increase to fat allowance to < 30% of total calories until 4 weeks post op.

S – SET-UP Discharge: Verbal hand-off to referring cardiologist. Patients should be instructed to maintain fluid restriction (~1.5 L/day) until seen by outpatient cardiologist. A CXR and BMP will be obtained 3 days after discharge for the referring cardiologist to review; expected cardiologist clinic visit within 1 week.
Executive Summary

Physician Owner(s): Dr. Laura Ortman, Dr. John Cramer, Dr. Melissa Wehrmann, Dr. Camille Hancock-Friesen

Rationale
- Safety: Will be maintained by close communication between CICU physician, ICU cardiologist, CT surgeon, CT surgery advanced practice providers, inpatient Cardiologist and inpatient Cardiology nurse
- Quality: Will be improved by reducing practice variation
- Cost: Will be reduced by reducing practice variation in treatment which can lead to potential increased LOS, morbidity and readmissions
- Engagement: Is created and supported by involvement of providers across the continuum of care that evaluate and treat cardiology patients
- Patient/Family Satisfaction: Shall be improved by providing the highest quality care based on established guidelines and the latest evidence available in the literature

Metrics
Process metrics:
- Increase percent of patients started on aspirin on POD 1.
- Increase percent of patients discharged on a minimum of three times daily diuretics

Outcome metrics:
- Maintain median chest tube time of no more than 4 days.
- Decrease percent of patients readmitted for pleural effusions.

Balancing metric:
- No increase in number of patients readmitted for electrolyte derangements

Team Members
Champions: Laura Ortman, MD (Cardiology) & John Cramer, MD (Cardiology)
- Melissa Wehrmann, MD (Cardiology)
- Camille Hancock-Friesen, MD (Cardiothoracic Surgery)
- Emily McLouth, PharmD (Pharmacy)
- Brandi Robinson, APP (CCU)
- Kady Condrey, (Dietician)
- Katelyn Anderson, RN (CCU Nurse Navigator)
- Abbie Vollers, RN (Fontan Coordinator)
- Kristy Cook, APRN (Fontan Program)

Evidence
1. Pike NA, Okuhara CA, Toyama J, Gross BP, Wells WJ, Starnes VA. Reduced pleural drainage, length of stay, and readmissions using a modified Fontan pathway.

Disclaimer: Pathways are intended as a guide for practitioners and do not indicate an exclusive course of treatment nor serve as a standard of medical care. These pathways should be adapted by medical providers, when indicated, based on their professional judgement and taking into account individual patient and family circumstances.

ChildrensNebraska.org/clinical-pathways
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