Situation: There are no standard IV hydration ordering pathways in Epic for prevention of contrast related acute kidney injury (AKI) in high risk patients prior to receiving IV iodinated contrast for a CT scan.

Background: Volume expansion is thought to help reduce risk of contrast related AKI, especially in high risk patients and has been mentioned as treatment option by two different guidelines, the American College of Radiology Manual on Contrast Media and the Kidney Disease Improving Global Outcomes Clinical Practice Guidelines for Acute Kidney Injury. Isotonic IV fluids are preferred, such as sodium chloride 0.9%. While the volume and the IV rate have ranged in clinical trials, many of the trials suggest IV hydration should be started at least one hour before contrast exposure and continued for 3-6 hours after contrast media administration.¹,²,³,⁴ Of note, this policy deals specifically for minimizing potential risk of contrast related AKI prior to CT scan (not arterial contrast injection with angiography).

Assessment:
An order set/panel in Epic containing standard IV hydration for prevention of contrast related AKI prior to IV contrast is needed for a CT for both inpatients and outpatients (including ED) who are at high risk ⁵-¹⁴ based on available literature and key physician stakeholders input in Nephrology, Radiology, and Cardiology.

Recommendations: IV hydration for inpatients or outpatients with eGFR >30 mL/min/1.73m² is NOT routinely recommended prior to receiving IV iodinated contrast at doses given during CT scans⁵ with exception of some cardiac patients that may be at higher risk. Currently, YNHH, Bridgeport Hospital and Greenwich Hospital Radiology Departments have capability to offer hydration between 9am-3pm Monday-Friday for out-patients that qualify. An in-patient order set has also been created with a provider notification of availability if the patient’s eGFR is <30 and a CT scan with IV contrast is ordered. The inpatient recommendations assume no significant aortic stenosis or diminished ejection fraction. The recommendations below should NEVER supersede clinical judgment on the amount of IV volume a patient can handle.

- **Inpatients**: eGFR ≤30 mL/min/1.73m²: Sodium chloride 0.9% IV at 3 mL/kg/hr for 1 hr before IV contrast and 1 mL/kg/hr for 6 hours post IV contrast, BASED ON ACTUAL BODY WEIGHT
- **ED patients without history of CHF/Severe Aortic Stenosis**: eGFR ≤30 mL/min/1.73m²: Sodium chloride 0.9% IV at 3 mL/kg/hr for 1 hour before IV contrast and 3 mL/kg/hr for 1 hour post IV contrast. BASED ON ACTUAL BODY WEIGHT
- **ED patients with history CHF/Severe Aortic Stenosis**: eGFR ≤30 mL/min/1.73m²: Sodium chloride 0.9% IV at 3 mL/kg/hr for 1 hour before IV contrast and 3 mL/kg/hr for 1 hour post IV contrast, BASED ON IDEAL BODY WEIGHT
- **Outpatients without history of CHF/Severe Aortic Stenosis**: eGFR <30 mL/min/1.73m²: Sodium chloride 0.9% IV at 3 mL/kg/hr for 1 hour before IV contrast and 3 mL/kg/hr for 1 hour post IV contrast. BASED ON ACTUAL BODY WEIGHT
- **Outpatients with history CHF/Severe Aortic Stenosis**: eGFR <30 mL/min/1.73m²: Sodium chloride 0.9% IV at 3 mL/kg/hr for 1 hour before IV contrast and 3 mL/kg/hr for 1 hour post IV contrast. BASED ON ACTUAL BODY WEIGHT
- eGFR <30 mL/min/1.73m²: Sodium chloride 0.9% IV at 3 mL/kg for 1 hour before IV contrast and 3 mL/kg/hr for 1 hour post IV contrast, BASED ON IDEAL BODY WEIGHT
- eGFR between 30-45 mL/min/1.73m²: Sodium chloride 0.9% IV at 3 mL/kg/hr for 1 hour before IV contrast only, BASED ON IDEAL BODY WEIGHT

**Out-patient order screen shots**

New question added to all CT scan with IV contrast orders for OUT-PATIENTS

BPA that will launch after signing CT scan order if “Yes” button is clicked requesting IV hydration. Three order panels are available for OUT-PATIENTS with guidelines on which to use and ability to cancel BPA if clinician decided not to order any hydration after reviewing available order sets.
In-patient order screen shots
Screen shot of BPA that will fire for in-patients if eGFR (within 48 hours) is under 30 and CT scan with contrast ordered. This will allow clinician to launch order set if hydration is desired.

In-patient order set for fluids is one hour prior and six hours after CT scan with contrast. This should only be used in patients that can tolerate IV fluids.
ED patients will also have the 2 order sets available for patients with eGFR under 30.

CT technologists will receive this notification when scheduling exam for in-patients. This will allow for communication between CT department and nursing to properly time hydration in relation to scheduled time for CT scan. Schedulers will receive this notification when scheduling exam for out-patients.

References:
12. Davenport et al. AJR Am J Roentgenol. 2015; 204:1174-1181