Creation of a Critical Care Nephrology Research Database for Hospitalized Pediatric and Adult Patients

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Background

- Acute kidney injury (AKI) is common in both pediatric and adult patients and is associated with 1) increased mortality, 2) increased hospital length of stay, 3) increased hospital costs and 4) the development of chronic kidney disease
- There is a need to evaluate short and long-term outcomes and co-morbidities of patients who develop acute kidney injury
- Manual data extraction is cumbersome and costly
- Children's Hospital Colorado (CHCO) and UCHealth (UCH) have underwritten Health Data Compass (HDC) at the University of Colorado, Anschutz Medical Campus
- HDC is able to extract de-identified patient data from the electronic health record at both CHCO and UCH, compile the data, and serve as an honest broker to investigative teams
- IRB approval has been granted to enroll any hospitalized patient at CHCO or UCH who develops KDIGO

Overall Goal:

To create a research database for pediatric and adult patients that automatically extracts clinical data from the electronic health record for research and quality improvement work.

Methods

- IRB approval was sought to enroll any patient who met KDIGO criterial for AKI
- Waiver of informed consent was approved as the patients are enrolled after hospital discharged (rolling retrospective study)
- If there is no known baseline serum creatinine within 180 days of index admission, the bedside Schwartz equation is utilized to back-calculate a normal SCr in pediatric patients; while the first measured SCr during the index hospitalization is used as the baseline in adult patients
- Data can be extracted going back to 2007 when CHCO and UCH started to use the current electronic health record
- A multidisciplinary team worked together to identify clinical data of interest. Data includes clinical parameters, laboratory values, ICD-9/10 codes
- The multidisciplinary team consists of faculty and trainees in:

Pediatric nephrology
Adult nephrology
Neonatology
Pediatric Intensive Care
Pediatric Cardiac Intensive Care
Cardiothoracic Surgery
Infectious Diseases
Critical Care Nursing

- Team members at CHCO and UCH met with HDC coders to map the data extraction from each hospital
- A visual dashboard of high-level data regarding the Continuous Renal Replacement Therapy (CRRT) programs was created to provide information for key stakeholders at both hospitals and to enable quality improvement efforts
- Data extraction is currently being verified manually

Database Variables

- 2,365 variables have been coded to pull from the electronic health record at CHCO (pediatric patients) and UCH (adult patients)
- All variables are pulled during the index admission
- Mortality data in the State of Colorado is tied to Health Data Compass, so patient death after discharge is also captured
- Categories of variables, and examples are shown in **Table 1:**

Category	# of variables	Examples
Demographics	17	Age, gender, race, unit, primary diagnosis
Vitals/Severity of Illness	44	Weight, blood pressure, urine output
Co-morbidities	2,187	Chronic kidney disease, hypertension, fractures
Dialysis specific	61	Modality, prescribed dose, delivered dose
Laboratory Values	39	Serum creatinine, cystatin C, urine NGAL
Medications	78	nephrotoxins, pressors, immunosuppressants

Dashboard Visualization

- Visual dashboards have been created (Tableau) in order to present high-level program data for patients under-going CRRT at CHCO and UCH
- The dashboards can be filtered to display data by hospital, unit, CRRT modality, etc.

Figure 1: CRRT activity at CHCO by unit over time.

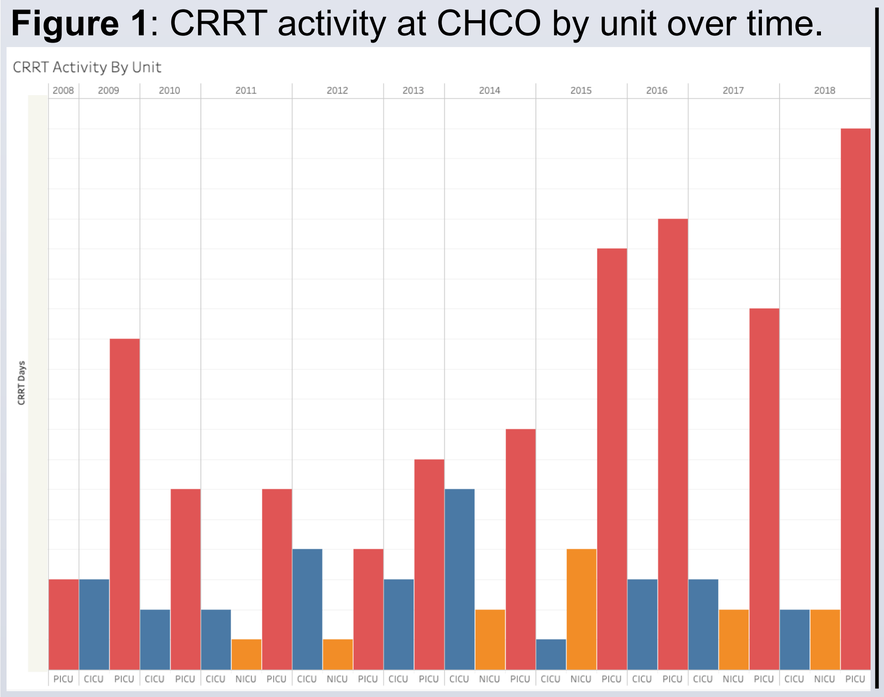
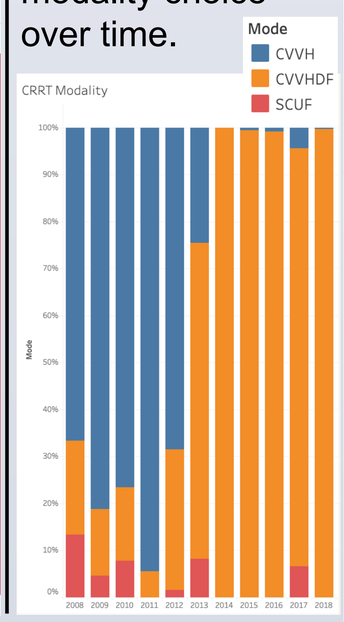


Figure 2: CRRT modality choice over time.



Conclusions

- We have created a Critical Care Nephrology database that automatically enrolls hospitalized pediatric and adult patients who meet KDIGO criteria for AKI
- Data can be filtered by hospital, unit, diagnoses, co-morbidities
- Data is currently being verified for accuracy of coding/data extraction
- The data is de-identified and secured
- If further data is needed to answer study questions, IRB approval may be sought and Health Data Compass will serve as an honest broker
- The visual dashboard permits key stakeholders to understand programmatic trends and developments and enables quality improvement work