Supplementary Material

AKI in Critically Ill Children and Subsequent CKD

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Supplemental Table 1: Non-exhaustive list of pediatric intensive care unit and hospitalization variables collected pertinent to this study and source of data.

Variable collected	Source of variable
Baseline Patient Characteristics	
Date of birth	Chart, RAMQ
Gender	Chart, RAMQ
Center	Chart
Hospital admission/discharge dates	Chart
PICU admission/discharge dates	Chart
Primary PICU diagnosis	Chart Each patient could only be classified in one category
PRISM score/PRISM Death Rate	Chart Collected values from the first 24-hours of PICU admission and calculated using published equations
Pediatric Medical Complexity Algorithm	RAMQ Algorithm includes ICD-9 codes to categorize patient. Used all diagnostic codes from index admission to classify the patient.
PICU treatment characteristics	
Nephrotoxic antibiotics	Chart Collected for every day of PICU admission (up to 21 days)
Vasopressors used	Chart Collected for every day of PICU admission (up to 21 days)
Steroids used	Chart Collected for every day of PICU admission (up to 21 days)
Mechanically ventilated (yes/no)	Chart Collected for every day of PICU admission (up to 21 days)
Renal Specific	
Serum creatinine	Chart Collected for every day of PICU admission (up to 21 days)
Urine output	Chart Collected for every day of PICU admission (up to 21 days) in 8 hour intervals
Dialysis (yes/no)	Chart Collected for every day of PICU admission (up to 21 days)

Abbreviations: *RAMQ:* Régie de l'assurance maladie du Québec (provincial health care body); *PICU*: Pediatric Intensive Care Unit; *PRISM:* Pediatric Risk of Mortality score

Supplemental Table 2: Broader and stricter CKD diagnostic code definitions tested to generate the algorithm.

Broader Definition		
Description	**ICD-9**	**ICD-10**
CKD	585	N18.x
Unspecified renal failure	586	N19
Hypertensive renal disease	403.9, 404.9	N12, I13
Chronic glomerulonephritis	582.8, 582.1, 582.0, 582.2, 582.9	N03.x
Miscellaneous other renal disease	581.8, 583.8	N08.3, N08.4, N08.5, N08.2, N08.8
Diabetic nephropathy	250.3	E102.0, E102.1, E102.2, E102.8, E112.0, E112.1, E112.2, E112.3, E112.8, E132.0, E132.1, E132.2, E132.3, E132.8, E142.0, E142.1, E142.2, E142.3, E142.8
Proteinuria	791.0	R80
Outpatient dialysis related	V451	Z992
Stricter Definition		
Description	**ICD-9**	**ICD-10**
CKD	585	N18.x
Unspecified renal failure	586	N19
Proteinuria	791.0	R80
Dialysis if present during a non-admission period	V451	Z992

Abbreviations: *CKD* = chronic kidney disease; *ICD-9/10* = International Classification of Disease codes 9th and 10th edition

Supplemental Table 3: Full description of final codes used from administrative health data for the pediatric CKD algorithm.

DIAGNOSTIC CODES (ICD-9/ICD-10)				
	Inpatient or Outpatient		**Outpatient only**	
Description	**ICD-9**	**ICD-10**	**ICD-9**	**ICD-10**
CKD	585	N18.x		
Unspecified renal failure	586	N19		
Proteinuria	791.0	R80		
Kidney Transplant Status	V42.0	Z94.0		
Kidney Transplant rejection	996.8	T86.100		
Kidney transplant failure	996.8	T86.101		
Renal tubulo-interstitial disorders in transplant rejection	590.8	N16.5		
Outpatient Dialysis			V45.1	Z99.2
Care involving dialysis Preparatory care for dialysis Extracorporeal dialysis Other dialysis (includes peritoneal dialysis)			 V53.9 V56.0 V56.8	 Z49.0 Z49.1 Z49.2
Mechanical complication of vascular dialysis catheter			996.1	T82.4
Unintentional cut, puncture, perforation or hemorrhage during surgical and medical care – during kidney dialysis or other perfusion			E87.02	Y60.2
Foreign object accidentally left in body during surgical and medical care - during kidney dialysis or other perfusion			E87.12	Y61.2
Failure of sterile precautions during surgical and medical care - during kidney dialysis or other perfusion			E87.22	Y62.2
Other medical procedures as the cause of abnormal reaction of the patient, or of later complication, without mention of misadventure at the time of the procedure – Kidney dialysis			E87.91	Y84.1
PROCEDURAL CODES (CCA/CCI)				
	Inpatient or Outpatient		**Outpatient only**	
Description	**CCA**	**CCI**	**CCA**	**CCI**
Bypass, artery with vein (creation of hemodialysis fistula)	5127	1KY76LA 1KY76LASJ 1KY76LAXXA 1KY76LAXXL		

		1KY76LAXXN		
Repair artery with vein (repair of hemodialysis fistula)	5142	1KY80LA 1KY80LAXXA 1KY80LAXXK 1KY80LAXXN		
Bypass terminating in lower limb vein [e.g. femoral artery to saphenous vein for long term hemodialysis]	5129	1KG76MZXXA 1KG76MZXXN		
Removal of permanent catheter (peritoneal dialysis)	660	1SY55LAFT		
Transfer Kidney (autotransplantation)	6751	1PC83LA		
Transplant, Kidney	6759	1PC85LAXXJ 1PC85LAXXK		
Multi organ: pancreas with duodenum and kidney	6483	1OK85TNXXK 1OK85XTXXK 1OK85XUXXK 1OK85XVXXK		
Peritoneal Dialysis			6698	1PZ21HPD4
Hemodialysis			5195	1PZ21HQBR
Instructions for dialysis (dialysis training)			0789	7SC59QD
Implantation of catheter (peritoneal dialysis)			6693	1OT53DATS 1OT53HATS 1OT53LATS
MEDICATION CODES				
Category	**Drug name**	**Code**		
Erythropoietin	Epoetin alfa Darbepoetine alfa	46635, 47191 46828, 47441		
Activated Vitamin D	Calcitriol Alfacalcidol	40589 41642		
Potassium –removing agents	Polystyrene sodium sulfonate Calcium polystyrene sulphonate	07787 44931		
Phosphate binding agents	Lanthanum hydrate Sevelamer carbonate Sevelamer hydrochloride	47667 47859 46671, 47400		

Abbreviations: *CKD* = chronic kidney disease; *ICD-9/10* = International Classification of Disease codes 9th and 10th edition; *CCP* = Canadian Classification of Diagnostic, Therapeutic and Surgical Procedure; *CCI* = Canadian Classification of Health Interventions

Supplemental Table 4: Association of baseline and ICU characteristics with CKD stratified by AKI (yes/no)

Variables	No AKI		AKI	
	No CKD (N=1748)	CKD (N=23)	No CKD (N=444)	CKD (N=20)
Patient Characteristics				
ICU admission age, years	3.7 (10.3)	4.7 (12.8)	3.5 (10.6)	5.0 (10.0)
Female Gender	765 (44%)	17 (74%)*	201 (45%)	11 (55%)
Center 2	974 (56%)	14 (61%)	297 (67%)	13 (65%)
ICU diagnosis				
Cardiac surgery	159 (9%)	4 (17%)	164 (37%)	3 (15%)
Cardiac (non-surgical)	99 (6%)	1 (4%)	24 (5%)	3 (15%)
Trauma	179 (10%)	1 (4%)	34 (8%)	0
Infection (non-bronchiolitis)	294 (17%)	4 (17%)	68 (15%)	4 (20%)
Neurologic/neurosurgical	239 (14%)	4 (17%)	38 (9%)	0
Gastrointestinal[a]	44 (3%)	2 (9%)	17 (4%)	5 (25%)**
Oncologic	42 (2%)	1 (4%)	5 (1%)	2 (10%)*
Respiratory	186 (11%)	0	26 (6%)	2 (10%)
Diabetes	38 (2%)	1 (4%)	16 (4%)	0
Other[b]	468 (27%)	5 (22%)	52 (12%)	1 (5%)
Postoperative (non-cardiac)	574 (33%)	6 (26%)	80 (18%)	3 (15%)
PRISM death rate	1.9 (3.7)	1.4 (2.3)	4.9 (13.8)	4.3 (13.8)
Pediatric Medical Complexity Algorithm		*		
No chronic disease	332 (19%)	1 (4%)	51 (11%)	1 (5%)
Non-complex chronic disease	434 (25%)	2 (9%)	75 (17%)	0
Complex chronic disease	982 (56%)	20 (87%)	318 (72%)	19 (95%)
ICU Characteristics and Outcomes				
Nephrotoxic antibiotics in the ICU[c]	295 (17%)	9 (39%)*	144 (32%)	12 (60%)*
NSAIDs	175 (10%)	3 (13%)	88 (20%)	2 (10%)
Vasopressors used (yes/no)	174 (10%)	4 (17%)	208 (47%)	7 (35%)
Steroids used (yes/no)	437 (25%)	7 (30%)	133 (30%)	9 (45%)
Mechanically ventilated (yes/no)	690 (40%)	7 (30%)	317 (71%)	10 (50%)*
Length of mechanical ventilation, days	0 (2)	0 (1)	2 (6)	1 (3.5)
ICU length of stay, days	1.1 (1.9)	1.5 (3.2)	3.7 (6.9)	3.9 (9.3)
Hospital length of stay	7 (9)	13 (22)*	13 (17)	42 (60)**
Kidney related				
Baseline eGFR	120 (36)	120 (64)	120 (49)	120 (45.3)
Renal replacement therapy in ICU	0	0	3 (0.7%)	1 (5%)

*p<0.05, **p<0.001

Comparisons made between patients with and without a CKD diagnosis 5-years post-discharge in the non-AKI and AKI population separately. Continuous variable presented as median (IQR) and categorical variables presented as number (percentage). Associations between continuous variables determined using Students t-test or Kruskal-Wallis test depending on the distribution. Categorical variables were evaluated using Chi^2 test or Fisher's exact test.

[a]Gastrointestinal includes liver, stomach, pancreas, intestine.

Supplemental Table 5: Baseline and ICU characteristics of patients with no serum creatinine or urine output measured during ICU admission (i.e. no AKI status defined) compared to patients with no AKI

	No serum creatinine or urine output measured (N= 402)	**Non-AKI (N= 1206)**
Baseline Patient Characteristics		
ICU admission age, years	5.6 ± 5.4 (3.1)	6.4 ± 5.8 (4.7)
Female Gender	159 (40%)	549 (46%)
Hospital Saint-Justine	145 (36%)	765 (63%)
PRISM death rate	2.5 ± 4.4 (1.4)	4.3 ± 7.7 (1.9)
Baseline GFR	105 ± 25 (120)	99 ± 28 (112)
ICU Characteristics and Outcomes		
Nephrotoxic antibiotics (yes/no)[a]	26 (7%)	262 (22%)
Vasopressors used (yes/no)	2 (0.5%)	74 (6%)
Steroids used (yes/no)	107 (27%)	323 (27%)
Mechanically ventilated (yes/no)	63 (16%)	489 (41%)
ICU length of stay, days	1.1 ± 1.3 (0.8)	3.1 ± 5.7 (1.3)
Hospital length of stay	8.9 ± 55.1 (4)	17.6 ± 53.2 (9)
Post-discharge characteristics		
5-7 year mortality	11 (3%)	62 (5%)

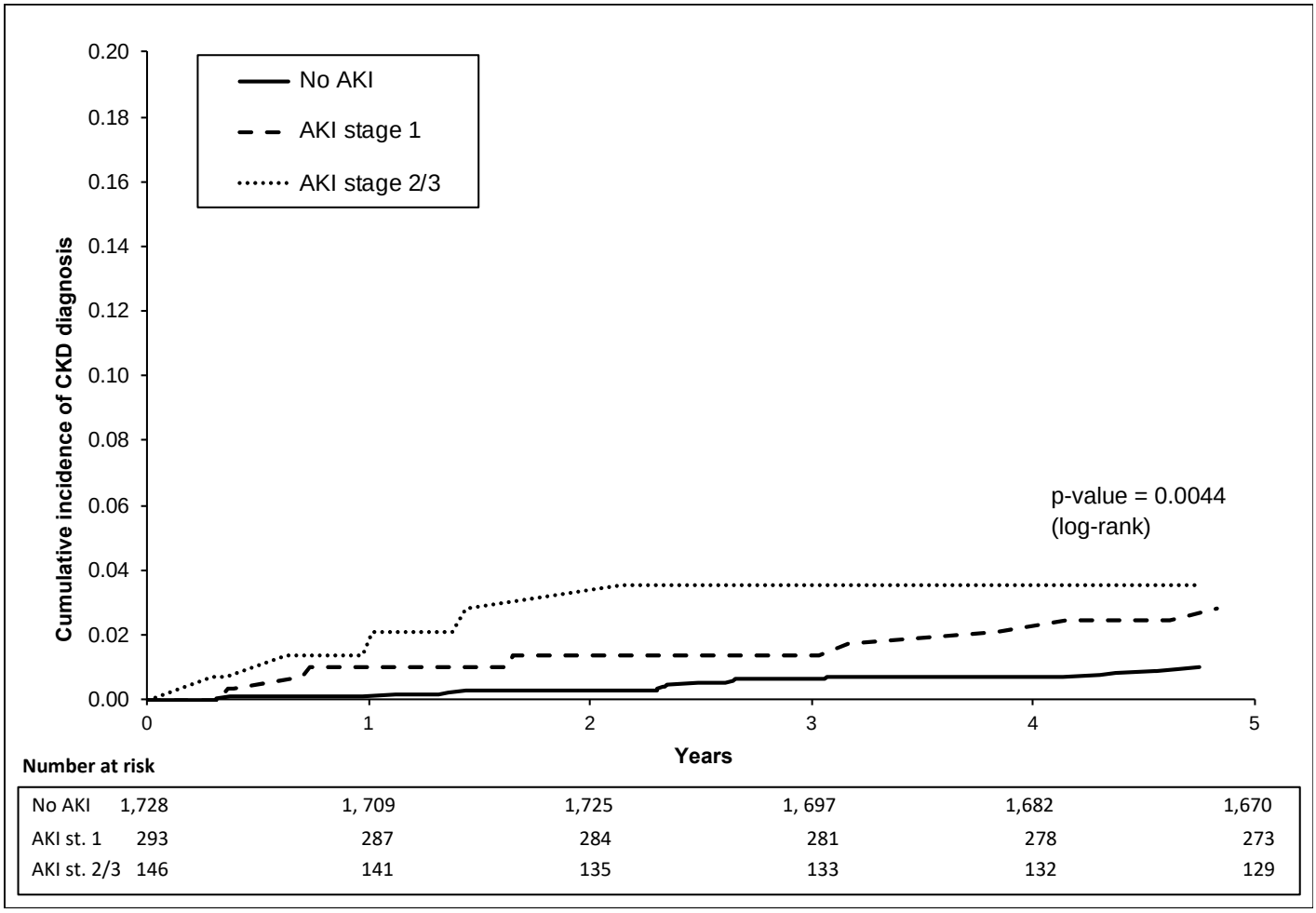
* $P < 0.05$; ** $P < 0.001$
Continuous variables expressed as mean ± standard deviation (median), categorical variables expressed as number (percentage).
[a]Includes aminoglycosides, acyclovir/ganciclovir, amphotericin, and vancomycin
Abbreviations: AKI =acute kidney injury; *ICU* = Intensive Care Unit; *PRISM* = Pediatric Risk of Mortality; *GFR* = Glomerular filtration rate

Supplemental Table 6: Sensitivity analysis results – multivariable analysis excluding patients without a serum creatinine or urine output measured in the pediatric intensive care unit

	Multivariable HR [95%CI]
No AKI (N = 1369) AKI (N = 297)	1.00 2.6 [1.3 – 5.0]*
No AKI/Stage1 (N=1675) Stage 2 or 3 (N=158)	1.00 2.1 [1.0 – 4.6]
No AKI (N=1369) Stage 1 (N=306) Stage 2/3 (N=158)	1.00 2.4 [1.1 – 5.2]* 2.8 [1.2 – 6.5]*

* P<0.05
Abbreviations: *AKI* = acute kidney injury; *HR* = hazard ratio; *CI* = confidence interval

Supplemental Figure 1: Cumulative incidence graphs excluding patients with a CKD diagnosis made within 90-days post-hospital discharge



Compares incidence of a CKD diagnosis in patients with no AKI (solid line), stage 1 AKI (dashed line) and stage 2-3 AKI (dotted line). Time zero is 90-days after hospital discharge date. Log-rank test used to compare groups.

Abbreviations: *CKD* = chronic kidney disease; *AKI* = acute kidney injury