Renal Dysfunction Criteria in Critically Ill Children:

The PODIUM Consensus Conference

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Data Supplement

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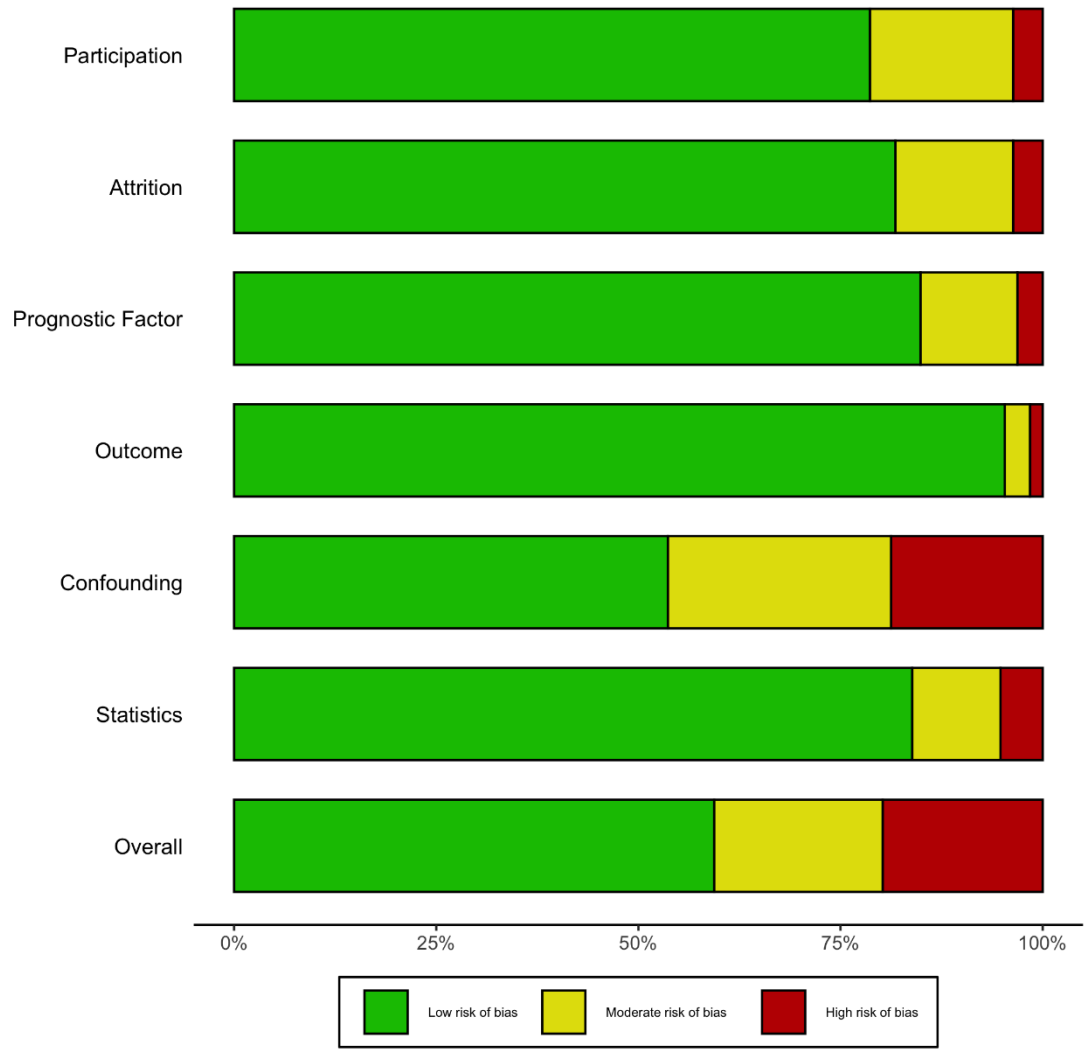

Supplemental Table 1. Studies Included in the PODIUM Renal Dysfunction Systematic Review (n=192 studies)

Author (yr)	Funding	Study design	Location	No. of sites	Study years	Setting	Data source(s)	Simple size	Recruitment	Age categories[a]	Age details[b]
Abulebda (2014)	Govt.	Retrospective cohort	USA	17	NR	PICU of unknown composition	Registry	317	NR/Unable to determine	Neonates Infants Children	Median [IQR] 1.3 [0.2-4.5] and 2.9 [1.1-6.7] yr
Afroz (2017)	NR	Observational/ descriptive study, Other (Unable to assess article due to lack of access to full text in English)	Bangladesh	1	2013-2014	Other (Special Care Baby Unit)	NR/Unable to determine	44	NR/Unable to determine	Neonates	28 out of 44 neonates were ≤7days
Akcan-Arikan (2007)	NR	Prospective cohort	USA	1	NR	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	150	Consecutive	Infants Children Adolescents	Mean 6.4 (6.4)
Akcan-Arikan (2017)	Industry	Prospective cohort	USA	1	2012-2014	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	2830	Consecutive	Children Adolescents	Median 5.5 yr [IQR 1.3-12.9 yr]
Alcaraz (2013)	NR	Observational/ descriptive study	Spain	1	2010-2010	PCICU (cardiac only)	Prospective data collection	114	Consecutive	Neonates Infants Children Adolescents	25 [6-72] mo
Ali (2013)	NR	Case/control study (case matched)	USA	1	2010-2011	PCICU (cardiac only)	Prospective data collection	19 (100 in the parent study)	Other (Nested case-control study of a larger prospective cohort)	Neonates Infants Children Adolescents	Mean (SD) AKI 24.2 (40), no AKI 56.86 (69)
Alkandari (2011)	Govt. NGO	Retrospective cohort	Canada	2	2000-2007	PICU (non-cardiac only)	Chart review, Prospective data collection	2106	Consecutive	Neonates Infants Children Adolescents	Mean 5.8 (5.7)
Amini (2017)	NGO	Prospective cohort	Iran	1	2013-2016	PCICU (cardiac only)	Prospective data collection	519	Consecutive	Neonates Infants Children Adolescents	Mean age of males 40.3 (43.7) mo; Females 40.1 (45.9) mo
Arikan (2012)	NR	Retrospective cohort	USA	1	2004-2005	PICU (non-cardiac only)	Chart review	80	Consecutive	Neonates Infants Children Adolescents	Median 15.5 mo (95.5)
Asilioglu (2012)	NGO	Prospective cohort	Turkey	2	NR	PICU (non-cardiac only)	Prospective data collection	98	Consecutive	Neonates Infants Children Adolescents	Median 1.6 [0.1-16.9) yr

Askenazi (2019)	Govt. NGO	Retrospective cohort	Australia, USA, Canada, India	24	2014-2014	Other (NICU)	Registry	353	NR/Unable to determine	Neonates	Not reported (data for GA≥36wk detailed below)
Askenazi (2011)	NGO	Retrospective cohort	NR	110	1998-2008	PICU (non-cardiac only)	Registry	7941	Consecutive	Neonates Infants Children Adolescents	Neonatal nonsurvivors 3.3 (5.3) days; Neonatal survivors 2.5 (3.5) days; Pediatric Nonsurvivors 4.9 (5.9) yr; Pediatric Survivors 4.4 (5.5) yr
Aygun (2018)	NR	Retrospective cohort	Turkey	1	2016-2018	PICU of unknown composition	Chart review	447	Consecutive	Infants Children Adolescents	Mean 3.74 (4.70)
Bai (2018)	Govt. NGO	Prospective cohort	China	1	2012-2012	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	144	Consecutive	Neonates Infants Children Adolescents	Non-AKI (n=123): 12mo [4-48]; Mild AKI (n=10):30.5 mo [11.25-98]; Severe AKI (n=11): 59mo [4-98]
Baskin (2005)	NR	Case series	Turkey	1	NR	PCICU (cardiac only)	Chart review	64	Consecutive	Neonates Infants Children Adolescents	Median 4 mo [IQR 0-22 mo]
Basu (2017)	NR	Prospective cohort	Multiple (USA, Canada, multiple in Europe)	32	2014-2014	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	4000	Consecutive	Infants Children Adolescents	3 mo – 21 yr
Basu (2011)	Govt.	Prospective cohort	Multiple	11	NR	PICU (non-cardiac only)	Prospective data collection	179	Consecutive	Neonates Infants Children	2.4-2.7 yr
Basu (2014)	Govt.	Prospective cohort	Multiple	11	NR	PICU (non-cardiac only)	Prospective data collection	214	Consecutive	Neonates Infants Children	2.4-3 yr
Basu (2014)	NGO	Retrospective cohort	USA and Canada	13	NR	PICU (non-cardiac only)	Prospective data collection	584	Consecutive	Neonates Infants Children	1.5-3.8 yr
Bennett (2018)	Govt.	Prospective cohort	USA	1	NR	PICU (cardiac only)	Prospective data collection	101	NR/Unable to determine	Neonates Infants Children Adolescents	No AKI: median 3.9yr [0.7-6.6], AKI median 1.8 yr [0.5-5.3]
Bennett (2008)	Industry	Prospective cohort	USA	1	2004-2006	NR/Unable to determine	Prospective data collection	196	Consecutive	Neonates Infants Children Adolescents	Mean (SD) 3.2 (0.4) and 4.8 (0.5) yr
Bestati (2010)	Govt.	Prospective cohort	France, Canada, Switzerland,	7	1998-2000	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	1806	Consecutive	Neonates Infants Children Adolescents	NR

Bhaskar (2015)	NGO	Retrospective cohort	USA	1	2009-2010	Mixed PICU (cardiac and non-cardiac)	Chart review	114	Consecutive	Neonates Infants Children Adolescents	Median age 1.1y [IQR 0.0, 17.4]
Bjork (2019)	NR	Retrospective cohort	Netherlands, Belgium, France, Sweden	NR/Unable to determine	2004-2016	NR/Unable to determine	Registry	3408	NR/Unable to determine	Children Adolescents	Median 12.3yr, 2.5th%ile 2.6yr, 97.5th%ile 17.8yr
Bojan (2014)	NGO	Prospective cohort	France	1	2010-2011	PCICU (cardiac only)	Prospective data collection	200	Consecutive	Neonates Infants	Median [IQR] Normal 84 days [9-163], Severe AKI 74days [7.5-119], Very severe AKI 30days [11.7-72.7]
Bojan (2013)	NR	Retrospective cohort	France	1	2007-2010	PCICU (cardiac only)	Chart review	1467	NR/Unable to determine	Neonates Infants	The authors explored serum creatinine kinetics using a partitioning algorithm called Kml. They group the patients into a "decreasing", "increasing" and "severe" trajectory of change in serum creatinine. The mean (SD) for age of the 3 trajectories were: 5.7 (2) days for "decreasing", 5.7 (2.4) for "increasing", and 5.0 (3.0) for "severe"
Borasino (2018)	NR	Retrospective cohort	USA	1	2012-2015	PCICU (cardiac only)	Chart review	90	Consecutive	Neonates Infants	Median 11.9 days [IQR 6.2-56.1]
Bresolin (2013)	NR	Prospective cohort	Brazil	1	2008-2008	NR/Unable to determine	Prospective data collection	126	Consecutive	Infants Children Adolescents	No AKI vs AKI: 6.8 (5.4) vs. 2.3 (3.5)
Bucholz (2015)	Govt. Industry	Prospective cohort	Canada, USA	3	2007-2009	PCICU (cardiac only)	Prospective data collection	106	Consecutive	Infants Children Adolescents	No AKI 53.1 (64) mo; mild AKI 33.2 (45) Severe AKI 13.3 (23)
Burra (2018)	Other (None)	Prospective cohort	India	1	NR	PCICU (cardiac only)	Prospective data collection	51	Consecutive	Neonates Infants Children	AKI group (N=10) median 0.99 yr [IQR 0.17,1.99]. Non-AKI group (N=41) 0.75 yr [IQR 0.35, 1.4]
Cabral (2015)	NR	Retrospective cohort	Brazil	1	2009-2010	PICU of unknown composition	Chart review, Registry	375	Consecutive	Infants Children Adolescents	Median [IQR] 24.2 mo [6.8-81.8]
Cantinotti (2017)	NR	Prospective cohort	Italy	1	2012-2015	PCICU (cardiac only)	Prospective data collection	248	Consecutive	Neonates Infants Children	Median 6.5 mo [1.7, 40.1]

										Adolescents	
Cantinotti (2012)	Industry	Prospective cohort	Italy	1	2010-2011	PCICU (cardiac only)	Prospective data collection	135	Consecutive	Neonates Infants Children Adolescents	Median age 7 mo [IQR 1-49 mo]
Cavallin (2019)	NR	Prospective cohort	Italy	1	2009-2016	Other (NICU)	Prospective data collection	NR	Consecutive	Neonates	Newborns
Chiravuri (2011)	NR	Case/control study (case matched)	USA	1	1998-2006	PCICU (cardiac only)	Chart review, Other (Institutional database query)	494	Other (Case control, selected from nephrology consult database)	Neonates Infants Children Adolescents	Mean 1.45 (3.6)
Choi (2017)	NR	Retrospective cohort	Korea	1	2009-2015	Mixed PICU (cardiac and non-cardiac)	Chart review	123	Consecutive	Neonates Infants Children Adolescents	Mean 9.5 (7.2)
Colasacco (2011)	NR	Prospective cohort	USA	1	2017-2017	PCICU (cardiac only)	Prospective data collection	48	Consecutive	Neonates Infants	NR
D'Ariezo (2019)	Govt.	Retrospective cohort	Canada	2	2003-2005	Mixed PICU (cardiac and non-cardiac)	Other (Administrative data)	1696	Consecutive	Neonates Infants Children Adolescents	AKI mean 7.3 yr (5.9), no AKI (6.5 (5.9)
De Fontnouvelle (2017)	Govt.	Prospective cohort	USA	3	2007-2010	Mixed PICU (cardiac and non-cardiac), PCICU (cardiac only)	Prospective data collection	412	Consecutive	Infants Children Adolescents	Stratified by age: <2 yr mean 0.5 yr (0.3); >2yr mean 6.2 (4)
de Galasso (2016)	NR	Retrospective cohort	Italy	1	2000-2012	PICU of unknown composition	Chart review	131	Consecutive	Neonates Infants Children	Median 7 yr [2-13]
de Melo Bezerra (2013)	NR	Retrospective cohort	Brazil	1	2010-2011	Other (NICU)	Chart review	312	Consecutive	Neonates	NR
Deep (2018)	Govt.	Prospective cohort	UK	1	2010-2014	PICU (non-cardiac only)	Prospective data collection	73	Consecutive	Infants Children Adolescents	Mean 7 yr
Dent (2007)	Industry	Prospective cohort	USA	1	2004-2006	PCICU (cardiac only)	Prospective data collection	120	NR/Unable to determine	Neonates Infants Children Adolescents	Mean (SD) 3.4 (0.5) and 4.9 (0.7) yr
Devarajan (2010)	NR	Prospective cohort	USA	1	2004-2007	PCICU (cardiac only)	Prospective data collection	395	Other (Consecutive consenting)	Neonates Infants Children Adolescents	Controls mean 3.9 yr (4.5), AKI mean 3.6 yr (4.6)
Diaz (2017)	Other (None)	Prospective cohort	USA	1	2007-2007	PICU (non-cardiac only)	Registry	224	Consecutive	Infants Children Adolescents	Median 3.3 [IQR 0.7-9.9] yr

Dobiliene (2019)	NR	Prospective cohort	Lithuania	1	2013-2016	PICU (non-cardiac only)	Prospective data collection	107	Consecutive	Infants Children Adolescents	AKI Median 30 mo [IQR 12-180] (approximately, see Figure 1)
Dong (2017)	Govt.	Case/control study (case matched)	USA	1	2004-2007	PCICU (cardiac only)	Chart review, Prospective data collection	150	Consecutive	Neonates Infants Children Adolescents	Not available for whole cohort
Dubey (2000)	NR	Case/control study (case matched)	India	1	NR	Mixed PICU (cardiac and non-cardiac), Other (Controls from clinic)	Prospective data collection	50	NR/Unable to determine	Infants Children	Mean 4.7 (3.9)
Elella (2017)	NR	Retrospective cohort	Saudi Arabia	1	2011-2016	PCICU (cardiac only)	EMR query	59	NR/Unable to determine	Neonates Infants Children Adolescents	Mean 11 (16.5)
El-Gamasy (2018)	NR	Case/control study (case matched)	Saudi Arabia	4	2016-2017	PICU of unknown composition	Prospective data collection	180	Convenience	Infants Children	Mean 40 (44)
Esch (2015)	NGO	Retrospective cohort	USA of America	1	2003-2009	PCICU (cardiac only)	Chart review	211	Consecutive	Children	Median 2.7 yr [IQR 2.2-3.3]
Fang (2018)	Govt.	Prospective cohort	China	1	2016-2016	PICU (non-cardiac only)	Prospective data collection	510	Consecutive	Neonates Infants Children Adolescents	Survivors: 1.37 [0.33-16] mo; non-survivors: 0.97 [0.33-13.5]
Fargason (1993)	NR	Retrospective cohort	USA	1	1984-1988	Mixed PICU (cardiac and non-cardiac), Hospital floor outside the ICU	Chart review	31	Other (Selected from nephrology consultation cases)	Infants Children Adolescents	9.6 [range 1 mo-19 yr]
Ferah (2019)	NR	Retrospective cohort	Turkey	1	2005-2017	PICU (non-cardiac only), Hospital floor outside the ICU	Chart review	51	Consecutive	Infants Children Adolescents	Mean 6.4 (4.6) yr
Fernandez (2005)	NR	Prospective cohort	Spain	1	1996-2002	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	53	NR/Unable to determine	Neonates Infants Children Adolescents	Mean 37.1 (48.7) mo
Ferrer (2018)	NR	Prospective cohort	Brazil	1	2014-2014	PCICU (cardiac only)	Prospective data collection	86	Consecutive	Neonates Infants Children Adolescents	Median 0.8 [0.4-4.0] yr
Fitzgerald (2016)	Govt.	Prospective cohort, Cross-sectional study	NR	100	2013-2014	PICU (non-cardiac only)	Chart review	493	Consecutive	Neonates Infants Children Adolescents	NR

Flores (2008)	NR	Prospective cohort	USA	13	2001-2005	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	51	Consecutive	Neonates Infants Children Adolescents	Mean 11.24 (0.97)
Flori (2011)	Govt.	Retrospective cohort	USA	2	1996-2000	PICU of unknown composition	Registry	313	NR/Unable to determine	Neonates Infants Children Adolescents	Median 3.4 yr [IQR 1 day-18 yr]
Foland (2004)	NR	Retrospective cohort	USA	1	1997-2003	PICU (non-cardiac only)	Chart review	113	Other (Patients on CRRT)	Infants Children Adolescents	Median 9.6 [2.5, 14.3] yr
Fuhrman (2019)	NGO	Prospective cohort	USA	1	2016-2018	PICU (non-cardiac only)	Prospective data collection	17	Consecutive	Infants Children Adolescents	Median 102 [23-177] mo
Gawadia (2019)	Other (No funding)	Prospective cohort	India	1	2017-2017	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	162	Other (Consecutive but informed consent was required)	Infants Children	RAI+ 7 (3-24) RAI-ve 24 (4-60) mo, total cohort not reported
Gillespie (2004)	Govt.	Retrospective cohort	USA	1	1993-2002	Mixed PICU (cardiac and non-cardiac)	Chart review	88	Consecutive	Neonates Infants Children Adolescents	Mean 5.1 yr (5.7)
Gil-RuizGil-Esparza (2014)	NR	Retrospective cohort	Spain	1	2008-2010	Mixed PICU (cardiac and non-cardiac)	Chart review	409	Consecutive	Neonates Infants Children Adolescents	No AKI median 15.5 mo [6-60], Early AKI 7.5 [3-60], Late AKI 8 [5-73]
Giordano (2017)	Other (Unfunded)	Prospective cohort	Italy	1	2014-2016	PCICU (cardiac only)	Chart review, Prospective data collection	29	Consecutive	Neonates	Mean 8.1 days (3.5)
Gist (2016)	Govt. NGO	Prospective cohort	USA	1	2011-2012	PCICU (cardiac only)	Prospective data collection	106	Consecutive	Neonates Infants Children	Median 22 [7-69] days (this is NIRS reduction group only)
Goldstein (2005)	Industry	Prospective cohort	USA	7	2001-2003	PICU of unknown composition	Registry	116	Consecutive	Neonates Infants Children Adolescents	Mean 8.5 yr (6.8)
Goldstein (2001)	NR	Retrospective cohort	USA	1	1996-1998	PICU (non-cardiac only)	Chart review	21	Consecutive	Neonates Infants Children Adolescents	Survivors: 8 (5.3), non-survivors: 9.4 (7.1)
Greenberg (2015)	Govt. NGO	Prospective cohort	Canada, USA	3	2007-2010	PCICU (cardiac only)	Prospective data collection	106	Consecutive	Infants Children Adolescents	No AKI, Mild AKI and Stage 2 AKI: 53 (64), 33 (45), 13 (23) mo
Haase (2011)	Govt. NGO	Other (Pooled analysis of multiple observational studies)	Canada, USA	4	NR	Mixed PICU (cardiac and non-cardiac)	Other (This was a pooled analysis of prospective observational studies, 4 of	483 for plasma ngal across pediatric studies;	Other (Pooled analysis of many studies. Will not review	NR/Unable to determine	See comment above

							which were pediatric)	416 for urine ngal	each study individually)		
Hamed (2013)	NR	Prospective cohort	Egypt	1	2011-2011	PICU of unknown composition	Prospective data collection	32	Consecutive	Neonates Infants Children Adolescents	Median 7 mo
Han (2008)	Govt.	Case/control study (case matched), Cross-sectional study	USA	2	2004-2005	PCICU (cardiac only), Hospital floor outside the ICU	Chart review, Prospective data collection, Other (Residual samples)	29 inpatient adults, 15 outpatient adults; case-control = 20 post-CPB children with AKI, 20 controls post-CPB without AKI	Consecutive	Neonates Infants Children Adolescents	AKI Mean 2 yr (1.2), no AKI 4.4 yr (1.3)
Hassinger (2014)	NGO	Prospective cohort	USA	1	2009-2010	PCICU (cardiac only)	Prospective data collection	98	Consecutive	Neonates Infants Children Adolescents	Early fluid overload (n=30) 6.5mo [4-29.5]; No early FO (n=68) 60.5mo [6.3-143.5]
Hassinger (2012)	NGO	Prospective cohort	USA	1	2009-2010	PCICU (cardiac only)	Prospective data collection	100	Consecutive	Neonates Infants Children Adolescents	Elevated pre-op ADMA level (n=29) 4mo [4-6.5]; normal pre-op ADMA level (n=71) 61mo [21-144]
Hassinger (2012)	NGO	Prospective cohort	USA	1	2009-2010	PCICU (cardiac only)	Prospective data collection	100	Consecutive	Neonates Infants Children Adolescents	AKI group 37.5 mo [8.3-122.3], no AKI 29.5 mo [4-96.5]
Hayes (2009)	NR	Retrospective cohort	USA	1	2000-2005	PICU (non-cardiac only)	Chart review	76	Consecutive, Other (On CRRT)	Neonates Infants Children Adolescents	Median 5.8 [range 0-18.9]
Hazle (2013)	Other (Division of Pediatric Cardiology)	Prospective cohort	USA of America	1	2009-2010	PCICU (cardiac only)	Prospective data collection	49	Convenience	Neonates Infants	NR

Herbert (2015)	NGO	Prospective cohort	USA	1	2011-2012	PCICU (cardiac only)	Prospective data collection	17	NR/Unable to determine	Neonates Infants	Median 76 [range 5-272] days
Hessey (2017)	Govt. NGO	Retrospective cohort	Canada	2	2003-2005	Mixed PICU (cardiac and non-cardaic)	Chart review, EMR query, Other (Provincial administrative healthcare data)	538	Consecutive	Neonates Infants Children Adolescents	Mean 6.4 (5.9)
Hessey (2018)	Govt.	Retrospective cohort	Canada	2	2003-2005	PICU (non-cardiac only)	Chart review	1622	Consecutive	Neonates Infants Children Adolescents	Mean 6.5yr (5.8)
Hoffman (2013)	NR	Prospective cohort	USA	1	2010-2011	Other (NICU – but only on term newborns)	Prospective data collection	35 cases	Other (Consecutive with verbal consent)	Neonates	Term newborns (median GA 39 weeks)
Hollander (2016)	Other (No external funding)	Retrospective cohort	USA	1	2007-2013	PCICU (cardiac only)	Chart review	88	Consecutive	Neonates Infants Children Adolescents	Median 6.3 yr [IQR 0.03 - 18.5]
Hornik (2014)	Govt. Industry	Prospective cohort	Canada USA	3	2007-2009	PCICU (cardiac only)	Prospective data collection	277	Consecutive	Infants Children Adolescents	Mean 3.8 (4.5) yr
Hui (2013)	NR	Observational/ descriptive study	Hong Kong	1	2005-2007	PICU (non-cardiac only)	Chart review	140	Other (With Foley, no CKD)	Infants Children Adolescents	Mean 8.5 (6.4) yr
Jayakumar (2013)	Govt. NGO	Observational/ descriptive study, Other (Secondary analysis from a parent biomarker study)	USA	1	2006-2007	PCICU (cardiac only)	Prospective data collection	60	Consecutive	NR/Unable to determine	Mean 4 (4.5) yr
Jhang (2014)	NR	Prospective cohort	Korea	1	2005-2011	NR/Unable to determine	Prospective data collection	87	Consecutive	NR/Unable to determine	Mean 7.85 (6.37) yr
Joffe (2018)	Industry	Prospective cohort	Canada	1	2013-2015	PCICU (cardiac only)	Prospective data collection	66	Consecutive	Infants	Median 5.9 mo [4.6-11.5]
Kaddourah (2017)	NGO	Prospective cohort, Observational/ descriptive study	NR	32	2014-2014	PICU (non-cardiac only)	Prospective data collection	4984	Consecutive	Infants Children Adolescents	Median 66 mo [IQR 18.8-151.1]
Kakajiwala (2017)	NR	Retrospective cohort	USA	1	2013-2015	PCICU (cardiac only)	Chart review	568	Consecutive	Neonates Infants	Median [IQR] 18 [5-107] and 89 [5.75-150] days
Kari (2018)	NGO	Prospective cohort	Saudi Arabia	1	2014-2015	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	40	NR/Unable to determine	Infants Children Adolescents	Median 30 mo [IQR 8-78]

Kaur (2018)	NR	Prospective cohort	India	1	NR	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	413	Consecutive	Infants Children Adolescents	Mean 5.89 (5.31) yr
Kavaz (2012)	NR	Prospective cohort	Turkey	1	2009-2010	Mixed PICU (cardiac and non-cardiac)	Chart review, Prospective data collection	189	Consecutive	Neonates Infants Children Adolescents	Mean 45.9 mo (54.7)
Krawczeski (2010)	Govt. NGO	Prospective cohort	USA	1	2004-2007	PCICU (cardiac only)	Prospective data collection	376	Consecutive	Neonates Infants Children Adolescents	Only reported for AKI: Mean 1.5 yr (2.9) and non-AKI Mean 4.4 yr (5.4) subgroups
Krawczeski (2011)	NR	Prospective cohort	USA	1	2004-2007	PCICU (cardiac only)	Prospective data collection	220	Other (Consecutive with consent)	Neonates Infants Children Adolescents	No AKI 3.3 yr [IQR 0.5, 6.0]; AKI 0.6 yr [IQR 0.4, 1.8]
Krawczeski (2011)	Industry	Observational/ descriptive study	USA	1	2004-2007	PCICU (cardiac only)	Prospective data collection	374	Consecutive	Neonates Infants Children Adolescents	Range 0.2-3.5 yr (mostly neonates)
Krishnamurthy (2013)	Other (None)	Prospective cohort, Observational/ descriptive study	India	1	2010-2011	PICU (non-cardiac only)	Prospective data collection	54	Consecutive	Infants Children	Median 21 mo [range 1-144]
Lagos-Arevalo (2015)	Govt. NGO	Prospective cohort	Canada	1	2007-2010	PICU (non-cardiac only)	Chart review, Prospective data collection, EMR query	160	Consecutive	Infants Children Adolescents	AKI: Mean 4 (5.5); nonAKI: Mean 5.3 (5.8)
Lee (2017)	NR	Retrospective cohort	Korea	1	2011-2011	PCICU (cardiac only)	Chart review	135	Consecutive	Neonates Infants Children Adolescents	Mean 480.01 (903.86) days
Lex (2014)	NR	Prospective cohort	Hungary	1	2004-2008	PCICU (cardiac only)	Prospective data collection	1489	Consecutive	Neonates Infants Children Adolescents	Median 488 days [IQR 177, 2124]
Li (2016)	NGO	Prospective cohort	China	1	2011-2012	Other (PICU, but composition not specified)	Prospective data collection	370	Consecutive	Infants Children Adolescents	Median [IQR] 11 [3-33] mo and 14 [7-26] mo
Liu (2009)	NR	Prospective cohort	USA	1	2004-2004	PCICU (cardiac only)	Prospective data collection	71	Consecutive	Neonates Infants Children Adolescents	No AKI mean 2.1 yr (2), AKI 3 yr (5.2)
Lombel (2012)	Other (No funding)	Retrospective cohort	USA of America	1	2004-2009	PICU (non-cardiac only)	Chart review	21	Consecutive	Children Adolescents	Median 51 mo [IQR 42, 67]
MacDonald (2016)	Govt.	Prospective cohort, Observational/	Canada	1	2001-2012	PCICU (cardiac only)	Prospective data collection	66	Consecutive	Neonates Infants Children	NR

		descriptive study									
Martin (2013)	NR	Prospective cohort, Observational/ descriptive study	Argentina	1	2005-2009	PICU (non-cardiac only)	Prospective data collection	1496	Consecutive	Infants Children Adolescents	Median 2.4 [0.08-17.7] yr
Mathur (2006)	NR	Case/control study (case matched)	India	1	2003-2003	Other (Nursery)	Chart review	200	NR/Unable to determine	Neonates	Mean GA 36.5 wks
Matics (2017)	NR	Retrospective cohort	USA	1	2009-2016	Mixed PICU (cardiac and non-cardiac)	EMR query	8711	Consecutive	Neonates Infants Children Adolescents	Survivors, median: 69 mo [IQR 17-156]; non-survivors: 43 mo [IQR 8-144]
Mccaffrey (2015)	NR	Prospective cohort	United Kingdom	1	2011-2012	PICU (non-cardiac only)	Prospective data collection	49	Consecutive	Neonates Infants Children Adolescents	Mean 3 yr, [range 0.04-15 yr]
Meersch (2014)	Govt.	Prospective cohort	Germany	1	2013-2013	PCICU (cardiac only)	Prospective data collection	51	Consecutive	Neonates Infants Children Adolescents	Mean 3 (0.5) and 1.5 (1) yr
Menon (2016)	Govt.	Prospective cohort, Observational/ descriptive study	USA	1	2012-2014	PICU (non-cardiac only)	Prospective data collection	184	Consecutive	Infants Children Adolescents	Median 7.7 [2.7, 14.9]
Mishra (2008)	NGO	Prospective cohort	India	1	2006-2007	Other (Not entirely clear: stated that patients were recruited from the "pediatric ward of a tertiary hospital")	Prospective data collection	60	NR/Unable to determine	Neonates Infants Children	Children with ARF: 39.2 (39.2) mo; children without ARF: 41.6 (40.5) mo
Mishra (2005)	Govt. NGO	Prospective cohort	USA	1	2004-2004	PCICU (cardiac only)	Prospective data collection	71	Consecutive	Neonates Infants Children	Median 2.1 yr [1-2] for the AKI group
Neunhoeffer (2016)	Other (Unfunded)	Prospective cohort	Germany	1	2013-2014	PCICU (cardiac only)	Prospective data collection	50	NR/Unable to determine	Neonates Infants	Median [IQR] 4 [0.1-10.8] and 0.5 [0.25-2.3] mo
Nguyen (2005)	Govt. NGO	Prospective cohort	USA	1	2004-2004	PCICU (cardiac only)	Prospective data collection	15 cases and 15 matched control	Consecutive	Neonates Infants Children Adolescents	NR
Ormeci (2015)	NR	Prospective cohort	Turkey	1	2012-2014	PCICU (cardiac only)	Prospective data collection	37	NR/Unable to determine	Neonates Infants	NR

Palermo (2017)	Govt.	Prospective cohort, Observational/ descriptive study	Canada	4	2013-2014	PICU (non-cardiac only)	Prospective data collection	81	Consecutive	Neonates Infants Children Adolescents	No AKI 7.7 yr (6.2); AKI 10.7 yr (5.9)
Palmieri (2009)	NR	Retrospective cohort	USA	1	2006-2008	PICU (non-cardiac only)	Prospective data collection	123	Consecutive	Infants Children Adolescents	No acute kidney injury: Mean 7.4 (5.4) yr; Acute Kidney Injury: Mean 6.74 (5.4) yr
Parikh (2013)	Govt., Industry	Prospective cohort	Canada, USA	3	2007-2009	PCICU (cardiac only)	Prospective data collection	311	Consecutive	Infants Children Adolescents	Stage 2 AKI median 0.7 [0.4, 3.7]; no Stage 2 AKI 2.9 [0.5, 5.6]
Park (2016)	NR	Prospective cohort, Observational/descriptive study	South Korea	1	2012-2012	PCICU (cardiac only)	Chart review, EMR query	220	Consecutive	Neonates Infants Children	Most under 12 mo, split by AKI, 8 or 3 mo median age ranges
Peco-Antić (2013)	NR	Prospective cohort	Serbia	1	2011-2011	PCICU (cardiac only)	Prospective data collection	112	Consecutive	Neonates Infants Children	Median age 1.6 [IQR: 0.4-4.7]
Penk (2019)	NR	Retrospective cohort	USA	4	2015-2017	PCICU (cardiac only)	Chart review	166	Convenience	Neonates Infants Children Adolescents	6.4 [0.6-27.2]
Plotz (2008)	NR	Retrospective cohort	The Netherlands	1	2002-2006	PICU of unknown composition	EMR query	103	Consecutive	Infants Children Adolescents	4.5 yr [1 mo – 17 yr]
Polat (2013)	NR	Prospective cohort	NR/Unable to determine	1	NR	PICU of unknown composition	Prospective data collection	32	NR/Unable to determine	Neonates Infants Children Adolescents	Mean 105 (71.7) mo
Portilla (2008)	Govt. NGO	Prospective cohort	USA	1	NR	PCICU (cardiac only)	Prospective data collection	40	Consecutive	Neonates Infants Children Adolescents	No AKI (n=19) 4.3 yr (1.3); AKI (n=21) 2.7 yr (0.8)
Prasetyo (2016)	NR	Prospective cohort	Indonesia	1	2014-2014	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	56	Consecutive	Infants Children Adolescents	Mean 49.7 mo (46.2)
Raggal (2013)	Other (None)	Case/control study (case matched), Prospective cohort	Egypt	1	2008-2009	Other (NICU)	Prospective data collection	30 cases, 20 controls	Consecutive	Neonates	First 2 days of life
Ramesh (2010)	NR	Prospective cohort	USA	1	2006-2007	PCICU (cardiac only)	Prospective data collection	60	NR/Unable to determine	Neonates Infants Children Adolescents	Mean (SD) 4.3 (4.5) and 4.0 (4.6) yr
Raymakers-Janssen (2019)	NGO	Retrospective cohort	The Netherlands	8	2006-2017	PICU of unknown composition	Chart review, Registry	68	Consecutive	Neonates Infants Children Adolescents	Median 8.9 [3.3, 8.9] yr

Ricci (2012)	NR	Prospective cohort, Cross-sectional study	Italy	1	NR	PCICU (cardiac only)	Prospective data collection	160	Consecutive	Neonates Infants	Mean 134 days (117)
Ricci (2012)	NR	Prospective cohort	Italy	1	NR	PICU of unknown composition	Prospective data collection	10	Other (Convenience sample of patients with congenital heart disease on ECMO)	Neonates Infants Children Adolescents	CVVH pts median 31 days [7-5008], not CVVH its median 13 days [9-3056]
Ricci (2013)	NR	Prospective cohort	Italy	1	2010-2011	PCICU (cardiac only), Other (CPB)	Prospective data collection	160	Consecutive	Neonates Infants	Mean 134 (117) days
Riyuzo (2016)	NR	Retrospective cohort	Brazil	1	1990-1994	PICU (non-cardiac only)	Chart review	77	Other (Sepsis and AKI as filters (based on creatinine elevation method by Guignard and Santos))	Infants Children Adolescents	Mean 12.8 (23.5) mo
Roy (2019)	NR	Retrospective cohort	USA	1	NR	PICU (non-cardiac only)	Chart review	157	Consecutive	Infants Children Adolescents	NR
Rustagi (2017)	NR	Prospective cohort	India	1	2009-2009	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	380	Consecutive	Infants Children Adolescents	Median 4.86 yr (range 2 mo - 18 yr)
Sadeghi-Bojd (2015)	NGO	Prospective cohort	Iran	1	2012-2014	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	303	NR/Unable to determine	Neonates Infants Children Adolescents	Mean 2.96 (3.76)
Safdar (2016)	NGO	Prospective cohort	Saudi Arabia	1	2013-2013	PICU (non-cardiac only)	Prospective data collection	62	Consecutive	Neonates Infants Children Adolescents	AKI (n=32) Median 18 mo [8-42], no AKI (n=30) 20.5 mo [6-54]
Saleh (2017)	NR	Prospective cohort	Egypt	1	2015-2016	PICU (non-cardiac only)	Prospective data collection	120 patients, 40 controls	Consecutive	Infants Children Adolescents	Median 21 mo [IQR 1.5-180]
Sanchez-de-Toledo (2016)	NR	Retrospective cohort	Spain	1	2010-2012	PCICU (cardiac only)	Chart review	480	Consecutive	Neonates Infants Children Adolescents	Mean 3.3 (0.6) yr
Sanchez-Pinto (2016)	NR	Retrospective cohort	USA	1	2003-2015	PICU (non-cardiac only)	EMR query	9396	Consecutive	Neonates Infants Children Adolescents	Median 7.3 yr [1.7-13.6]

Sanchez-Pinto (2015)	NR	Retrospective cohort	USA	1	2003-2012	PICU (non-cardiac only)	EMR query	8260	Consecutive	Infants Children Adolescents	Non AKI: median 7.4 yr [IQR: 1.8,13.6], AKI: 6.7 yr [1.6, 13.9]
Santiago (2010)	Govt.	Observational/descriptive study	Spain	1	1996-2009	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	174	Consecutive	Neonates Infants Children Adolescents	Mean 52.3 mo (63.8)
Scheider (2010)	NR	Retrospective cohort	USA	1	2003-2007	PICU of unknown composition	EMR query	3396	Consecutive	Infants Children Adolescents	Survivors: Median 7.5 yr [IQR 1.9, 13.4]; Nonsurvivors: 4.3 yr [IQR 0.9, 12.2]
Schroeder (2019)	Govt.	Retrospective cohort	USA	1	2007-2009	PCICU (cardiac only)	Prospective data collection	63	Consecutive	Neonates	7 days [6.0, 8.5]
Seguin (2014)	NGO	Retrospective cohort	Canada	1	2005-2007	PCICU (cardiac only)	Chart review, Registry	193	NR/Unable to determine	Neonates Infants Children Adolescents	Mean 2.6 (4.2) yr
Seitz (2013)	Industry	Prospective cohort	Germany	1	2010-2011	PCICU (cardiac only)	Chart review, Prospective data collection	139	Consecutive	Neonates Infants Children Adolescents	Mean 4.8 yr, median 0.9 yr [range 1 day to 44 yr, IQR 0.3-7.7 yr]
Selewski (2012)	Other (No funding)	Retrospective cohort	USA of America	1	2006-2010	PICU (non-cardiac only), PCICU (cardiac only)	Chart review	53	Consecutive	Neonates Infants Children Adolescents	Median 0 mo [IQR 0,10 mo]
Selewski (2011)	Other (Not funded)	Retrospective cohort	USA of America	1	2006-2010	Mixed PICU (cardiac and non-cardiac)	Chart review	113	Consecutive	Neonates Infants Children Adolescents	Median 19 mo [IQR 0.2, 181 mo]
Selewski (2014)	NGO	Retrospective cohort	USA	1	2011-2013	Mixed PICU (cardiac and non-cardiac)	Other (Institutional database)	3009	Other (ICU discharges identified from institutional database)	Neonates Infants Children Adolescents	Median 4 yr [range 0,13]
Selistre (2012)	NR	Retrospective cohort, Other (This study does not really qualify per our inclusion criteria)	France	1	2003-2010	Other (Selected from patients with measured GFR (inulin))	Retrospective cohort from a prospectively consented cohort. The data collection method is unclear	751	Other (Patients selected from mGFR cohort. Exclusion criteria not clear)	Adolescents	Median 17.0 [13.0-21.0]
Sethi (2018)	NR	Prospective cohort, Observational/descriptive study	NR	1	2013-2014	NR/Unable to determine	Chart review, Prospective data collection	102	Consecutive	Neonates Infants Children Adolescents	Mean 6.5 (5.9) mo
Shalaby (2014)	Other (None)	Retrospective cohort	Saudi Arabia	1	2011-2011	PICU (non-cardiac only)	Chart review	281	Consecutive	Infants Children Adolescents	AKI (n=102) 43.1 mo (50.4); non-AKI (n=179) 50.7mo (53.4)

Shi (2018)	Govt.	Prospective cohort	China	1	2012-2013	PCICU (cardiac only)	Prospective data collection	67	Consecutive	Neonates Infants Children	Mean 8.4 (6.4) mo
Shime (2001)	NR	Retrospective cohort	Japan	1	1998-1999	PCICU (cardiac only)	Registry	142	Consecutive	Neonates Infants Children Adolescents	Median [range] 1 yr 1 mo [5 days-17 yr]
Sinitksy (2015)	NR	Retrospective cohort	USA	1	2009-2013	PICU (non-cardiac only)	Chart review	100	Other (Ventilated at 48 hours)	Infants Children Adolescents	Median 1.05 yr [0.3-4]
Soler (2013)	Govt.	Prospective cohort	USA	1	2009-2010	PICU (non-cardiac only)	Prospective data collection	266	Consecutive	Infants Children Adolescents	Mean 7 (6) yr
Soni (2015)	Other (Unfunded)	Retrospective cohort	USA	1	2010-2012	PCICU (cardiac only)	Chart review	410	Consecutive	Neonates Infants Children Adolescents	Mean 23-24 mo [40-45] *age only listed for AKI and no AKI subgroups rather than whole cohort
SooHoo (2018)	Other (None)	Retrospective cohort	USA	1	2009-2015	PCICU (cardiac only)	Chart review	95	Consecutive	Neonates	Median 5 days
Stanski (2019)	NR	Prospective cohort	NR	1	2014-2015	PICU (non-cardiac only)	Prospective data collection	178	Convenience	Infants Children Adolescents	Median 6.7 yr
Sugimoto (2016)	NGO	Prospective cohort	Japan	1	2010-2012	PCICU (cardiac only)	Prospective data collection	376	Consecutive	Infants Children Adolescents	NR if values were median or means: no AKI 32 mo, Risk 17 mo, Injury 11.5 mo, Failure 8 mo, p=0.0002 for differences across categories
Sutherland (2015)	Other (Unfunded)	Retrospective cohort	USA	1	2006-2010	Mixed PICU (cardiac and non-cardiac), Hospital floor outside the ICU	EMR query	14,795	Consecutive	Infants Children Adolescents	Median 6.7 yr [IQR 1.95 - 14.11]
Sutherland (2010)	Govt. NGO	Prospective cohort	USA	13	2001-2005	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	297	Consecutive	Neonates Infants Children Adolescents	Mean 8.5 yr (7.0)
Symons (2007)	NR	Prospective cohort	USA	13	2001-2005	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	344	Consecutive	Neonates Infants Children Adolescents	Not provided. Only that 80% >1 yr old; 10% less than 1 mo old and 10% 1 mo to 1 yr old
Tanyildiz (2017)	NR	Retrospective cohort	Turkey	1	2009-2011	PICU (non-cardiac only), PCICU (cardiac only)	Chart review	137	Consecutive	Infants Children Adolescents	Mean 36.6 (43.3) mo

Thakkar (2018)	Other (None)	Prospective cohort	India	1	2013-2013	PICU of unknown composition	Prospective data collection	115	NR/Unable to determine	Infants Children	NR
Torres de Melo Bezerra Cavalcante (2016)	Govt.	Prospective cohort	Brazil	1	2013-2014	PCICU (cardiac only)	Prospective data collection	289	Consecutive	Neonates Infants Children Adolescents	Mean 3 yr (4.4)
Ueno (2019)	NR	Retrospective cohort	Japan	1	2010-2018	PCICU (cardiac only)	Chart review	81	Consecutive	Neonates	Median 15 days [0-26] AKI and 18 [7-26] no AKI
Vaewpanich (2019)	NR	Case/control study (case matched, Retrospective cohort	USA	1	2012-2014	PICU (non-cardiac only)	Chart review, EMR query	42	Random	Infants Children Adolescents	Median 1.22 [0.48, 10.4]
Valentine (2012)	Govt. NGO	Retrospective cohort	USA	5	2007-2010	PICU of unknown composition	EMR query, Registry	NR	Consecutive	Infants Children Adolescents	Median 3 [IQR 0.8-11] yr
Vassalos (2011)	NGO, Other ("The Association of Children with Heart Disorders", nature of funding body not disclosed)	Prospective cohort	UK	1	NR	PCICU (cardiac only), Other (CPB only)	Prospective data collection	20	NR/Unable to determine	Infants	Range 4-58 mo
Volovelsky (2018)	Govt.	Prospective cohort	USA	1	2016-2017	PCICU (cardiac only)	Prospective data collection	76	NR/Unable to determine	Neonates Infants Children Adolescents	Median 0.7 [0.3, 4.7]
Volpon (2015)	NR	Prospective cohort	Brazil	1	2011-2012	PICU of unknown composition	Prospective data collection	122	Consecutive	Neonates Infants Children Adolescents	Median age for those who got AKI: 5.8 [0-163] mo; Those that did not get AKI: 65 [5-215] mo
Volpon (2016)	NR	Prospective cohort	Brazil	1	2011-2012	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	160	Consecutive	NR/Unable to determine	Median 32 [range 0-241] mo
Wai (2013)	Govt.	Case/control study (case matched)	USA	1	NR	PCICU (cardiac only)	Prospective data collection	60 (39 cases, 21 controls)	Consecutive	Neonates Infants Children Adolescents	Cases (n=39) Mean 7.5 yr (6.97)
Wang (2017)	Govt.	Retrospective cohort	USA	1	2011-2012	Mixed PICU (cardiac and	EMR query	1332 for ICU	NR/Unable to determine	Infants Children	Median 4.4 [IQR 0.9-12] yr

						non-cardiac), Hospital floor outside the ICU		patients (the investigators did a separate analysis for non-ICU patients)		Adolescents	
Washburn (2008)	Govt.	Prospective cohort	USA	1	NR	PICU (non-cardiac only)	Prospective data collection	137	Consecutive	Infants Children Adolescents	Mean 6.5 (6.4)
Westhoff (2016)	Govt.	Cross-sectional study	Germany	1	2011-2015	NR/Unable to determine	Chart review	141	Consecutive	Neonates Infants Children Adolescents	Median [IQR] 2.6 [0.3-7.1], 0.6 [0-10], 2.4 [0.6-6.5], and 6 [0-9] yr
Westhoff (2015)	Industry	Prospective cohort	Germany	1	2011-2014	Other (Hospitalized children including NICU, patients referred to clinic, ICU controls without AKI)	Prospective data collection	193	Convenience	Neonates Infants Children Adolescents	Median 3.4 yr [IQR 0-9]
Westhoff (2017)	Govt.	Prospective cohort	Germany	1	2011-2015	PICU (non-cardiac only), Hospital floor outside the ICU, Other (Clinic)	Prospective data collection	55 pts w/ AKI, 27 pts w/ no AKI	Convenience	Neonates Infants Children Adolescents	AKI median 0.9 yr [0 to 7.3], No AKI 2.4 [0.6 to 6.5]
Wheeler (2008)	Govt., NGO, Other (This study primarily looks at predictive ability of serum NGAL on ICU admission for AKI, though mortality is	Prospective cohort	USA	15	NR	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	168	Consecutive	Neonates Infants Children	Controls 0.2 y [0, 5.9], SIRS 3.5 y [1.8, 7]; septic shock 2.2 y [0.8, 6.2]

	reported as well)										
Wilder (2016)	Govt. NGO	Retrospective cohort	USA	1	2006-2010	PCICU (cardiac only)	EMR query	435	NR/Unable to determine	Neonates	NR
Wong (2015)	Govt.	Retrospective cohort	USA	16	NR	PICU of unknown composition	Registry	Derivation – 241, validation – 200	Other (Derivation cohort – not reported, validation cohort – random selection from database)	Neonates Infants Children	Derivation cohort - median [IQR] 2.5 [0.8-5.9] yr
Xu (2018)	Govt. NGO	Retrospective cohort	China	25	2013-2015	Other (Hospitalized children (including children in PICUs), excluded children with any AKI risk factors)	Other (Secondary analysis of dataset from prior research study)	102,817	NR/Unable to determine	Infants Children Adolescents	Median 4.8 yr
Yavuz (2014)	NGO	Case/control study (case-matched)	Turkey	1	2009-2011	Other (Burn ICU)	Prospective data collection	43 (22 burn, 21 controls)	Consecutive	Neonates Infants Children Adolescents	Burned + No AKI (n=16) 2 yr [1-6]; Burned + AKI (n=6) 4 yr [2-6]; Controls (n=21) 3.5 yr [2-5.5]
Yoneyama (2019)	NGO, NR	Case/control study (case-matched), Prospective cohort	Japan	1	2017-2018	PCICU (cardiac only)	Prospective data collection	103	Consecutive	Neonates Infants Children Adolescents	Mean 54.3 (74.9) mo
Youssef (2013)	NR	Case/control study	Egypt	1	NR	PICU of unknown composition	Prospective data collection	60 PICU patients, 15 healthy volunteers	NR/Unable to determine	Infants Children	PICU patients median 9 mo [range 1-108] mo; healthy volunteers median 6 mo [range 1-29] mo
Zappitelli (2015)	Govt. NGO	Prospective cohort	Canada, USA	3	2007-2009	PCICU (cardiac only)	Prospective data collection	287	Consecutive	Infants Children Adolescents	By categories of no post-op AKI at all, AKI by SCr only, AKI by CysC only, AKI by both SCr and CysC: Mean 4.8 (4.7), 3.0 (4.1), 5.4 (5.1), 1.9 (3.8) yr
Zappitelli (2012)	Govt. Industry	Prospective cohort	Canada, USA	3	2007-2009	PCICU (cardiac only)	Prospective data collection	294	Consecutive	Infants Children Adolescents	In 1 mo to 2 yr olds, across three increasing urine ACr

											categories, mean age was 0.69 (0.45), 0.50 (0.35), 0.49 (0.38) yr; In > 2 yr olds, similar age groups were 7.4 (3.8), 6.8 (4.4), 6.9 (4.7) yr
Zappitelli (2011)	Govt. NGO	Prospective cohort	USA, Canada	3	NR	PCICU (cardiac only)	Prospective data collection	288	Consecutive	Infants Children Adolescents	Mean 3.8 (4.5)
Zappitelli (2009)	Govt. NGO	Retrospective cohort	Canada	1	2002-2007	PCICU (cardiac only)	Chart review	390	Consecutive	Neonates Infants Children Adolescents	Mean 2.8 (4.7)
Zappitelli (2007)	Govt.	Prospective cohort	USA	1	NR	PICU (non-cardiac only)	Prospective data collection	140	Consecutive	Infants Children Adolescents	Control, pRIFLE R, I and F: mean 8.5 (6.2), 5.9 (6.7), 4.4 (5.7), 6.6 (6.4)
Zheng (2013)	NR	Prospective cohort	China	1	2010-2011	PICU of unknown composition	Prospective data collection	58	Consecutive	Neonates Infants Children	NR
Zinter (2020)	Govt. NGO	Retrospective cohort	USA, Canada	>4	2009-2014	PICU of unknown composition	Registry	936	Consecutive	Infants Children Adolescents	Median 8 [IQR 2-14]
Zwiers (2015)	Industry	Prospective cohort, Observational/ descriptive study	The Netherlands	1	2010-2013	Mixed PICU (cardiac and non-cardiac)	Prospective data collection	31	Consecutive	Neonates Infants	Median 5.6 days [IQR 2.2 - 39.9]

Abbreviations: Govt., government; NGO, nongovernmental organization; NR, not reported; PICU, pediatric intensive care unit; PCICU, pediatric cardiac intensive care unit; IQR, interquartile range; SD, standard deviation

[a]Neonates (0 to 30 days), Infants (31 days to < 1 year), Children (1 year to < 12 years), Adolescents (12 years to < 18 years)

[b]Data are presented as mean (SD) or median [IQR, range]

Supplemental Table 2. Performance Characteristics for Assessment Tools and Scores for Renal Dysfunction in Critically Ill Children (n=192 studies)

Author (yr)	Score/Assessment Tool	Is this a study of score/tool derivation or validation?	Inclusion criteria	Time of score/tool assessment	Outcomes	Performance characteristics
Abulebda (2014)	Other (Percent fluid overload)	Validation	Other (Children with septic shock)	First 24hr in PICU and cumulative over first 7 days in PICU	Mortality, Other (Complicated course (death within 28d or >=2 organ failures at 7 days))	Other: Univariate OR only showed significant association between 7d %FO and mortality in low-risk patients
Afroz (2017)	pRIFLE	Validation	Other (Special Care Baby Unit patients)	Unable to assess	Mortality, Outcomes related to MODS, Other (LOS)	Other: Higher MOF in I and F and longer LOS in F group, 27% mortality with AKI
Akcan-Arikan (2007)	pRIFLE	Validation	General PICU population (mixed cardiac and non-cardiac), General PICU population (non-cardiac)	Peak pRIFLE in PICU stay	Mortality, Other (RRT, LOS hospital and ICU)	NPV: Patients who remained free of AKI in the first 7 days did not receive RRT, p= 0.03 aOR: AKI during the PICU stay for 28 day mortality Using SCr + urine criteria aOR: any AKI during admission 1.1 (0.3-4.3), if no PRISM 1.4 (0.4-5.1) ; pRIFLEmax I or worse 1.9 (.7-5.1) , if no PRISM 1.7 (0.6-4.8).aOR for mortality AKI on admission with persistent AKI excluding PRISM 3.9 (1.4-10.6), AKI pRIFLE I or worse on admission with persistent AKI excluding PRISM 3.4 (1.2-9.8). Other: pRIFLEmax I or F >2x mortality than pRIFLEmax R or controls (21 vs 8%, P<0.05); mortality 25.8% for pRIFLEmax F vs 10.9% for all others, P = 0.03 . aHR for LOS: AKI during the PICU stay (SCr+urine output): Any AKI during admission: hospital LOS 0.6 (0.4-0.9), PICU LOS 0.6 (0.4-0.9); pRIFLEmax I or F hospital LOS 0.6 (0.4-0.9), PICU LOS 0.7 (0.5-0.9)
Akcan-Arikan (2017)	pRIFLE, Other (FOKIS (Fluid overload kidney injury score)	Validation	General PICU population (mixed cardiac and non-cardiac)	At any point during PICU stay	Mortality, Organ-specific outcomes/residual morbidity, Other (Length of stay)	aOR: FOKIS score OR for mortality = 1.45 (95%CI 1.35-1.56); FOKIS>7 OR 13.6 (95%CI 8.2-22) for mortality
Alcaraz (2013)	pRIFLE	Other (Prediction of NGAL based on SCr change as standard)	PCICU population (only cardiac)	72 hours to 7 days	Mortality, Organ-specific outcomes/residual morbidity	PPV: NGAL for AKI: 0.59-0.66 NPV: NGAL for AKI: 0.84-0.93 AUROC: NGAL for AKI: 0.69-0.83
Ali (2013)	Plasma biomarkers	Validation	PCICU population (only cardiac)	Pre-operatively and post-op day 0 through 4	Other (Post-operative fluid balance, length of mechanical	AUROC: Pre-op FGF levels for AKI 0.843 (95%CI 0.665-1.020) aOR: FGF23>86RU/ml odds of AKI 2.0 (95%CI 1.076-3.717, p=0.033) Other: Preop FGF23 correlation with post-op fluid balance (r=0.607, p=0.006); pre-op FGF23 correlation with LMV (r=0.8052, p<0.001) and LOS ICU (r=0.735, p<0.001)

					ventilation, length of stay in the PICU)	
Alkandari (2011)	AKIN	Validation	General PICU population (only non-cardiac), AKI of any cause, Patients receiving nephrotoxic medications)	Throughout PICU	Mortality, Other (PICU LOS; duration of mechanical ventilation)	AUROC: Percent rise in SCr on PICU day 1 to predict AKI, AUROC=0.68 aOR: 3.7 (2.1-6.4) for AKI with PICU mortality; aOR 5.8 for Stage 2 AKI with PICU mortality; Other: AKI and AKI stage 2 associated with longer PICU stay and mechanical ventilation (p<0.05 in multiple linear regression)
Amini (2017)	pRIFLE	Other (Epidemiology study of prevalence of AKI post-CPB)	PCICU population only cardiac)	Not specified, looks like within the first 3-4 days post-op	Mortality, Organ-specific outcomes/residual morbidity, Outcomes related to MODS	aOR: Log regression for AKI: duration of surgery aOR 1.05/10mins (95% CI 1.01-1.08); cyanotic heart disease aOR 1.97 (95%CI 1.15-3.2); lactate after operation (timing not specified) 1.14 (95% CI 1.03-1.3). No specification on what was included in the model in which the OR were adjusted. Other: Proportion of subjects in each category of pRIFLE who died: None (2.7%), Risk (13%), Injury (28.6%), Failure (85.7%); p=0.01 in MWU comparison. Prevalence of AKI 28.9% of cohort.
Arikan (2012)	Other (Fluid overload)	Other (Adjusted analysis of fluid overload and oxygenation index)	General PICU population (only non-cardiac), Other (Mechanically ventilated >24h and with arterial line)	Daily	Other (oxygenation index)	Other: Determined the independent effect of fluid overload on oxygenation index after adjusting for PELOD score on the day of the measurement using regression analysis, only p values reported. Total fluid overload was associated with peak OI (p=0.03). Daily fluid overload associated with daily OI (p=0.009)
Asilioglu (2012)	pRIFLE, Plasma biomarkers	Derivation	General PICU population (only non-cardiac)	Before day 7	Organ-specific outcomes/residual morbidity	Se: For EGFR as primary: SCr 24%, CysC: 81% Sp: For EGFR as primary: SCr 98%, CysC: 96% PPV: For EGFR as primary: SCr 91%, CysC: 94% AUROC: For EGFR as primary: SCr 0.64, CysC: 0.93
Askenazi (2019)	KDIGO	Validation	NR	NICU	Mortality	Se: Absolute Cr rise: 0.42; % Cr rise: 0.42; Absolute Cr and/or % Cr rise: 0.58 Sp: Absolute Cr rise: 0.87; % Cr rise: 0.80; Absolute Cr and/or % Cr rise: 0.80 PPV: Absolute Cr rise: 0.1; % Cr rise: 0.07; Absolute Cr and/or % Cr rise: 0.09 NPV: Absolute Cr rise: 0.98; % Cr rise: 0.98; Absolute Cr and/or % Cr rise: 0.98 LR: Absolute Cr rise: +LR 4.7 -LR 0.67; % Cr rise: +LR 1.7 -LR 0.73; Absolute Cr and/or % Cr rise: +LR 2.9 -LR 0.53 AUROC: Absolute Cr rise: 0.64; % Cr rise: 0.61; Absolute Cr and/or % Cr rise: 0.69
Askenazi (2011)	Other (Category complicatio n code for for serum creatinine >1.5 mg/dL or Internationa	NR	General PICU population (only non-cardiac), AKI of any cause	NR	Mortality	aOR: For neonates: The adjusted odds of death given AKI in ECMO patients=3.2; 95% CI: 2.6-4.0, p=<.001. For neonates: The adjusted odds of death given RRT in ECMO patients=1.9; 95% CI: 1.6-2.2, p=<.001. For pediatric patients: The adjusted odds of death given AKI in ECMO patients=1.7; 95% CI: 5% CI: 1.3-2.3, p=<.001. For pediatric patients: The adjusted odds of death given RRT in ECMO patients=2.5; 95% CI: 1.9-3.2, p=<.001.

	l Statistical Classificatio n of Diseases and Health Problems, Revision 9 (ICD-9) code for acute renal failure and renal replacemen t therapy)					
Aygun (2018)	pRIFLE	Other (NR)	General PICU population (mixed cardiac and non-cardiac)	Anytime	Mortality, Other (Length of PICU stay)	aOR: Not aOR, OR for mortality 3.408 0.003 - 0.175 but reported as significant, so I am guessing there is some mistake Other: Mean duration of ICU stay was 10.66 ± 10.55 days with AKI vs 8.31 ± 6.46 days without AKI.
Bai (2018)	Urine biomarkers, Plasma biomarkers	Other (Biomarker prediction of AKI via AKIN at 120hr after PICU admission)	General PICU population (mixed cardiac and non-cardiac)	Serum and urinary levels of FGF23 and IGFBP-7 within 24 hrs of admission	Organ-specific outcomes/residual morbidity, Other (AKI via AKIN criteria without UOP)	AUROC: To predict severe AKI (AKIN stage 2 and 3): sCysC 0.89 (95%CI 0.84-0.99); uCysC 0.88 (95%CI 0.76-0.99); uIGFBP-7 0.79 (95%CI 0.66-0.92); uIGFBP-7 & sCysC 0.89 (95%CI 0.79-0.99); uIGFBP-7 & uCysC 0.88 (0.79-0.98); uIGFBP-7 & uCysC & sCysC 0.90 (95%CI 0.81-1.00) aOR: For severe AKI: sCysC 5.28 (1.64-16.99); uIGFBP-7 2.94 (1.08-8.01); uCysC 1.13 (1.02-1.25), adjusted for body weight, sepsis and PRISM III score
Baskin (2005)	Other (AKI defined by Serum Creatinine > 1.2 mg/dL, urine output < 0.5 mL/kg/hr for 4 hours)	Other (Descriptive)	PCICU population (only cardiac)	AKI anytime	Mortality	aOR: AKI was not associated with mortality in this manuscript
Basu (2017)	KDIGO, Other (Renal Angina Index)	Validation	General PICU population (mixed cardiac and non-cardiac)	Day 1 score of RAI	Organ-specific outcomes/residual morbidity	Other: Multiple outcomes related to RAI - versus nothing, increase from baseline creatinine, etc
Basu (2011)	RIFLE, Plasma biomarkers	Validation	General PICU population (only non-cardiac)	Within 7 days	Mortality, Outcomes related to MODS	Se: For SSAKI Prediction: MMP-8 89%, Ela-2 83% Sp: For SSAKI Prediction: MMP-8 29%, Ela-2 42% PPV: For SSAKI Prediction: MMP-8 15%, Ela-2 16% NPV: For SSAKI Prediction: MMP-8 95%, Ela-2 95% AUROC: For SSAKI Prediction: MMP-8 0.66, Ela-2 0.69
Basu (2014)	RIFLE, Plasma biomarkers, Other	Validation	General PICU population (only non-cardiac)	AKI on Day 3	Mortality, Organ-specific outcomes/residual morbidity	AUROC: Prediction of AKI on day 3: Renal angina: 0.8, MMP-8+renal angina 0.84, ELa-2+renal angina 0.86, NRI and IDI significant increase with biomarker incorporation into renal angina index model

	(Renal angina index)					
Basu (2014)	KDIGO, Other (Renal angina index)	Derivation	General PICU population (only non-cardiac)	Day 3 AKI prediction	Organ-specific outcomes/residual morbidity	Se: Renal angina+ for Day 3 AKI: 75% Sp: Renal angina+ for Day 3 AKI: 73% PPV: Renal angina+ for Day 3 AKI: 40% NPV: Renal angina+ for Day 3 AKI: 92% AUROC: Renal angina+ for Day 3 AKI: 0.72-0.80 Youden's index: Renal angina+ for Day 3 AKI: 48
Bennett (2018)	Urine biomarkers	Other (Testing predictive power of urinary biomarker)	PCICU population (only cardiac)	Urine samples immediately before CPB, AKI within 48 hours after surgery	Organ-specific outcomes/residual morbidity	AUROC: Preoperative urine uromodulin AUROC 0.90 to predict AKI after CPB aOR: uUMOD levels in the lowest quartile = 132.3 OR (95% CI 17.1-1020.5) for post-op AKI; adjusted for uCr levels
Bennett (2008)	Urine biomarkers	Validation	PCICU population (only cardiac)	Day 1, 2, 3 of CPB surgery	Mortality, Organ-specific outcomes/residual morbidity, Other (Development of AKI, duration of AKI, hospital length of stay)	Se: 2hr NGAL over 50ng/ml for AKI: 0.89 Sp: 2hr NGAL over 50ng/ml for AKI: 0.85 AUROC: 2hr NGAL over 50ng/ml for AKI: 0.93
Bestati (2010)	Other (Renal dysfunction by PELOD subscore (creatinine-based))	Validation	General PICU population (mixed cardiac and non-cardiac)	Worse in first 7 days	Mortality	aOR: OR adjusted for 5 other organ dysfunctions. Neonates aOR : 0.97 (0.87, 1.09); Older children aOR: 1.1 (1.03,1.17)
Bhaskar (2015)	Other (Fluid Overload)	Derivation	General PICU population (mixed cardiac and non-cardiac)	NR	Mortality	aOR: Fluid overload aOR 9.17 for death (95 % CI 2.22-55.57)
Bjork (2019)	Other (Validation of GFR equations)	Validation	Other (Multiple registries, setting not clear but not ICU)	NR	Other (Bias and precision of the equations)	Other: Composite creatinine and CysC equations were consistently more precise than single-marker equations at all mGFR levels, CysC had better accuracy below mGFR 75
Bojan (2014)	Urine biomarkers	Validation	PCICU population (only cardiac)	Pre-operative and serially within 48 hours after surgery (up to 6 samples)	Mortality, Organ-specific outcomes/residual morbidity	Se: For RRT/death: Before CPB 0.81 (0.58-1), within 1hr of CPB 0.55 (0.47-1) Sp: For RRT/death: Before CPB 0.68 (0.40-0.94), within 1 hr of CPB 0.85 (0.31-0.96) LR: For RRT/death: Before CPB 2.56 (1.45-8.52), within 1 hr of CPB 3.61 (1.39-14.17) AUROC: For RRT/death: before CPB 0.679 (0.512-0.847), within 1 hr of CPB 0.656 (0.458-0.853) aOR: For RRT/Death: Before CPB 9.57 (3.32-infinity), within 1 hour of CPB 6.87 (2.04-infinity)
Bojan (2013)	Other (The authors identified 3	NR	PCICU population (only cardiac)	Within 2 days of cardiac surgery	Mortality	AUROC: Discrimination between survivors and patients who died by early creatinine changes: AUROC of 0.687, 95% CI: 0.593-0.778 on the

	clusters of serum creatinine change to describe creatinine kinetics)					day of surgery, 0.704, 95% CI: 0.610-0.784 on post-operative day 1, and 0.746, 95% CI: 0.663-0.825 on post-operative day 2
Borasino (2018)	KDIGO	Other (None)	PCICU population (only cardiac)	NR	Other (AKI is the outcomes (furosemide stress test following cardiac surgery))	AUROC: Furosemide response predicted: predicted cs-aki AUROC 0.69peak FO AUROC 0.68, predicted prolong PD AUROC 0.79 and prolonged mechanical ventilation 0.79.
Bresolin (2013)	pRIFLE	Validation	General PICU population (mixed cardiac and non-cardiac)	PICU admission	Mortality, Other (AKI (for risk factors); Length of stay)	Other: No adjusted analyses were done. They found that AKI was associated in univariable analyses with length of stay (p=0.001); mortality (p = 0.0002). In univariable analyses, PRIMS 2, PIM2, younger age, septic shock, mechanical ventilation, nephrotoxic drugs, and vasoactive drugs were associated with AKI
Bucholz (2015)	AKIN, Plasma biomarkers	Validation	PCICU population (only cardiac)	Post-operative	Mortality, Other (Developed of AKI by AKIN; mortality; PICU and hospital LOS; time to extubation)	Se: Optimal cutoff values for sensitivity, specificity, PPV and NPV to predict postop AKI for pre-op CKMG, preop FABP and post-op hs-cTnT, respectively were (showing biomarker cutoff, sensitivity, specificity, PPV and NPV): 2.9, 64.2, 64.6, 66.7, 62.0 & 2.6, 68.0, 68.8, 69.4, 67.4 & 2668, 58.2, 58.8, 60.4, 56.6 Sp: See sensitivity PPV: See sensitivity NPV: See sensitivity AUROC: Preop NT pro-BNP, cTnI, and hs-cTnT all had AUROC <0.58 to predict postop AKI; preop CK-MB and h-FABP had AUROC 0.70 (0.60-0.81) for post-op AKI; Post-op all 5 biomarkers had AUROC <0.63 to predict AKI. aOR: Preoperative CK-MB and h-FABP: associated with post io AKI (aOR: 5.09 (1.64-15.82) and 3.02 (1.35-6.75)); post-op these bioamrkers were not associated with AKI. Pre-op or post-op NT pro-BNP, cTnI, and hs-cTnT were not associated with post-op AKI.
Burra (2018)	KDIGO	Validation	PCICU population (only cardiac)	48 hours	Other (POs at 24-48 hrs to predict subsequent AKI)	Se: PO4 at 24 hours 75%, PO4 at 48 hours 67% Sp: PO4 at 24 hours 94%, PO4 at 48 hours 98% PPV: PO4 > 6.4 at 24 hours 50%, PO4 at 48 hours 86% NPV: PO4 > 6.4 at 48 hours 97.8%, PO4 at 48 hours 93% AUROC: PO4 at 24 hours 0.711, PO4 at 48 hours 0.86
Cabral (2015)	pRIFLE	Validation	Other (General PICU population (unclear if mixed cardiac or not))	pRIFLE at PICU admission and maximum pRIFLE during PICU course	Mortality, Other (Duration of mechanical ventilation, duration of vasoactive drug therapy, length of PICU stay)	Other: Standardized mortality ratio (based on PIM2 expected mortality) of 2.19 for those with max pRIFLE of F, compared to 0.7-0.8 SMR for those with other max pRIFLE scores or no AKI
Cantinotti (2017)	Plasma biomarkers, Other (Cystatin-C)	Validation	PCICU population (only cardiac)	2h, 6h, 12h post-op	Organ-specific outcomes/residual morbidity, Other (Organ specific: AKI	AUROC: Cystatin-c at 12h: AUROC for any AKI= 0.746; AUROC for stage 3 AKI = 0.886 Other: Cystatin-c at 12h hazard ratio of "complicated course"=2.66 (1.75-4.059)

					per RIFLE. Composite of complications and prolonged mechanical ventilation)	
Cantinotti (2012)	Urine biomarkers, Plasma biomarkers	Derivation	PCICU population (only cardiac)	2, 6, 12 hours after bypass	Mortality, Organ-specific outcomes/residual morbidity	AUROC: 2 hour NGAL for AKI prediction AUROC 0.85
Cavallin (2019)	KDIGO	Other (Prognosis of aki to predict HIE)	Other (Neonates with Hypoxic ischemic encephalopathy related to perinatal asphyxia)	NR	Functional outcomes/residual morbidity, Other (AKI predicting long term death and disability at 24 months of age)	Se: Sensitivity of AKI 0.19 (95% CI 0.11-0.32) Sp: Specificity of AKI 1 (95% CI 0.88-1) PPV: PPV of AKI 1 (95% CI 0.71-1.00) NPV: NPV of AKI 0.41(95% CI 0.3-0.52)
Chiravuri (2011)	pRIFLE	Other (Case-control)	PCICU population (only cardiac)	3 days for CICU stay	Mortality, Other (Cardiac failure, open chest, ECMO, LCOS)	aOR: 12.8 for mortality for F; Complications Respiratory RI [2.4; 1.5, 3.9] F [2; 1.2, 3.5] Neurologic RI [3.8; 2, 7] F [5.6; 3, 10.5] Sepsis RI [3.2; 1.9, 5.3] F [6.9; 4, 11.9] Cardiovascular RI [4.8; 3.1, 7.2] F [21.7; 9.2, 50.9] Other: OR 6.7 for death for RI, 36.7 for death for F, 5.6 for LCOS for RI, 14.2 for F; ECMO RI 8.7; 4.8, 16 F 39.4; 19.9, 77.9; delayed sternal closure RI [2; 1.4, 3] F [3.8; 2.4, 6.3]; additional surgery RI [4.6; 2.8, 7.4] F [8.8; 5.2, 14.8]
Choi (2017)	Other (Specifically fluid overload, and several other variables at CRRT initiation)	Validation	General PICU population (mixed cardiac and non-cardiac)	CRRT initiation	Mortality	aOR: Fluid overload association with mortality adjusted for multiple factors: aOR 1.190 0.971-1.457; other risk factors evaluated too within the manuscript in the adjusted analyses.
Colasacco (2011)	Other (Defined renal insufficiency as a rise in serum creatinine greater than or equal to 40% from baseline or oliguria for more than 4 hours)	NR	PCICU population (only cardiac)	Postoperative days 0, 1, and 2	NR	Se: A postoperative day 1 NIRS mean cuttoff value of 80% can predict a 40% increase in serum creatinine with a sensitivity of 100%. Sp: A postoperative day 1 NIRS mean cuttoff value of 80% can predict a 40% increase in serum creatinine with a specificity of 97%.
D'Ariezo (2019)	KDIGO	Other (Evaluating diagnostic	General PICU population (mixed	NR	Mortality	aOR: Not adjusted OR to predict mortality Severe AKI 9.9 (6.1-16.1)

		coding compared to creatinine coding of AKI)	cardiac and non-cardiac)			
De Fontnouvelle (2017)	Plasma biomarkers	Derivation	PCICU population (only cardiac)	Pre-op and 6 hours post op	Organ-specific outcomes/residual morbidity, Other (AKI based on KDIGO)	aOR: In >2years, Pre-op Il-8 had aOR 5 (2-13) and post-op TNFa aOR 3 (1-9) for AKI. No association in <2years
de Galasso (2016)	Other (Fluid overload)	Validation	Other (CRRT)	Survival at PICU discharge	Mortality	aOR: In renal patients, fluid overload >10% at CRRT start = OR 10.9 (95% CI 0.8-152.6, p=0.07) for death
de Melo Bezerra (2013)	pRIFLE, Other (UOP (continuous and modified categorical))	Other (Modification of existing pRIFLE)	Other (NICU)	Rolling 7 days of NICU admission, worst eGFR	Mortality, Other (New UO cutoffs proposed for new pRIFLE R<1.5 mL/kg/h for 24 h Injury <1.0 mL/kg/h for 24, Failure <0.7 mL/kg/h for 24 h or anuric for 12 h)	AUROC: 0.88 for mortality for new pRIFLE, 0.78 for mortality for UOP aOR: 3.77 for oliguria (UOP <1.5 ml/kg/hr) for mortality
Deep (2018)	Other (Ultrasound-based and other hemodynamic measures)	Derivation	General PICU population (only non-cardiac)	First 24 hours of PICU	Organ-specific outcomes/residual morbidity, Other (AKI stage 2/3 based on KDIGO)	Other: Multivariate analysis: Higher CVP and lactate only hemodynamic variables associated with AKI at p=0.01
Dent (2007)	Plasma biomarkers	Validation	PCICU population (only cardiac)	Multiple times within 24hr of CPB surgery	Mortality, Organ-specific outcomes/residual morbidity, Other (Development of AKI, change in creatinine, length of hospital stay)	Se: 2hr plasma NGAL over 150ng/ml: 0.84 Sp: 2hr plasma NGAL over 150ng/ml: 0.94 AUROC: 2hr plasma NGAL over 150ng/ml: 0.96 Other: Adjusted beta coefficient B=0.004, p<0.0001
Devarajan (2010)	Urine biomarkers, Other (Urine α1-microglobulin, α1-acid glycoprotein, and albumin in urine)	Other (Derivation and validation)	PCICU population (only cardiac)	2 hours after CPB	Organ-specific outcomes/residual morbidity, Other (AKI as defined by an increase of creatinine from baseline by 50%)	AUROC: Urine α1-microglobulin at 2h AUROC for AKI=0.85 (0.8, 0.9) ; Urine α1-acid glycoprotein at 2h AUROC=0.85 (0.8,0.9) ; and Urine albumin at 2h AUROC= 0.69 (0.63, 0.75)
Diaz (2017)	Other (Peak percent fluid overload)	Validation	General PICU population (only non-cardiac)	Any day during PICU admission	Mortality, Other (LOS, duration mechanical ventilation)	aOR: For mortality by peak fluid overload 1.01 (CI 0.98,1.02). Authors conclude peak FO not associated with mortality but AKI (pRIFLE) was (aOR 4.6). Peak FO was associated with longer ventilation in survivors.

Dobiliene (2019)	Urine biomarkers	Derivation	General PICU population (only non-cardiac)	Day 1 and 3	Organ-specific outcomes/residual morbidity, Other (AKI based on AKIN)	Other: Mann-Whitney: uNGAL day 1 p=0.04, uIL18 not significant
Dong (2017)	Urine biomarkers	Validation	PCICU population (only cardiac)	2, 6, 12, 24 hours after bypass	Other (Only AKI prediction)	AUROC: Variable based upon biomarker evaluated (page 2356)
Dubey (2000)	Other (Oliguria <400ml/m2/ day, rapidly rising BUN and Cr)	Other (Predictive ability of ROS for mortality)	Other (AKI cases (exact method to choose not reported) vs control)	NR	Mortality	Se: For mortality SOD 3 GPx 53.2 LPO 89.4 Sp: For mortality SOD 90 GPx 51 LPO 93.7 PPV: Superoxide dismutase (SOD), glutathione peroxidase (GPx) and lipid peroxide (LPO) SOD 74.5, LPO 95.2 for mortality NPV: SOD 71.8, LPO 91.7 for mortality
Elella (2017)	pRIFLE	Validation	PCICU population (only cardiac)	After ECMO cannulation	Mortality, Other (ECMO duration, ICU length of stay)	Other: Independent t test: AKI vs non-AKI patients: ECMO duration (9 [8] vs 6 [2] days, p=0.02)
El-Gamasy (2018)	Plasma biomarkers	Derivation	AKI of any cause, Other (Critically ill children with and without AKI and controls)	Within 24 hours of admission	Organ-specific outcomes/residual morbidity, Other (AKI was defined as a 50% increase in serum creatinine from reference range within 2 days)	Se: HSP60 cutoff >10: 97% Sp: HSP60 cutoff >10: 87% PPV: HSP60 cutoff >10: 88% NPV: HSP60 cutoff >10: 96% AUROC: HSP60: 0.99
Esch (2015)	AKIN	Other (Evaluates factors associated with the development of AKI)	PCICU population (only cardiac)	NR	Organ-specific outcomes/residual morbidity, Other (Length of stay)	Other: Proportional hazards model for length of stay moderate aki 0.56 (0.38, 0.83)
Fang (2018)	KDIGO	NR	General PICU population (only non-cardiac)	First 7 days after PICU Admission	Mortality	Se: At a cutoff of 1260, the peak urinary cystatin C had a sensitivity of 79.2% Sp: At a cutoff of 1260, the peak urinary cystatin C had a specificity of 72.3% aOR: For mortality for patients of patients that did not meet criteria for AKI, but had a positive urinary cystatin C: 9.34 (p<0.001)
Fargason (1993)	Other (Children receiving RRT (ARF< no structured definition for AKI))	Other (Investigates PRISM as a predictive score in pts with renal failure)	Other (RRT)	Anytime	Mortality	Other: Predicted mortality vs Observed mortality, respectively: admission PRISM 0% - 1% 25%; 1.1%- 5% 43% (sig by chi2); 5.1%-15% 100% (sig by chi2); 15.1%-30% 33% ; >30.1% 63% ; time to dialysis 1.7 days in survivors vs 11.1 days in nonsurvivors.
Ferah (2019)	pRIFLE, AKIN	Validation	General PICU population (only non-cardiac)	Not clear	Mortality, Outcomes related to MODS	Other: AKI Incidence using AKIN: 17.6%; AKI incidence using pRIFLE: 37.8%; AKI group had lower albumin levels using both definitions
Fernandez (2005)	Other (No specific tool, they	Other (Evaluation of association of	General PICU population (mixed cardiac and non-	Initiation of CRRT	Mortality	NR

	determined patient prognostic factors for death in this population receiving CRRT)	risk factors with death)	cardiac), Other (Receiving CRRT)			
Ferrer (2018)	KDIGO	Other (Biomarker enrichment of a clinical model for predicting AKI)	PCICU population (only cardiac)	Within 48 hours of ICU admission	Other (Risk of severe AKI using the KDIGO criteria)	AUROC: The ROC for postoperative urinary syndecan-1: 0.793
Fitzgerald (2016)	KDIGO	Other (Descriptive)	General PICU population (only non-cardiac)	NR	Mortality, Functional outcomes/residual morbidity, Other (Composite of 1) death or 2) worse disability by POPC)	aOR: Severe acute kidney injury predicted composite outcome aOR 2.5
Flores (2008)	Other (Multiple patient and crrt clinical variables were evaluated for associations with mortality)	Other (Not really applicable)	General PICU population (mixed cardiac and non-cardiac)	CRRT pre, initiation	Mortality	Other: Multivariable analysis done only controlling for prism score showed that Paw at CRRT termination was association with mortality
Flori (2011)	Other (Cumulative fluid balance over first 3 days of ALI)	Derivation	Other (ALI with PF<300)	Day 3 of ALI	Mortality, Other (Ventilator free days)	aOR: For mortality 1.08 with each increase in 10ml/kg/day
Foland (2004)	Other (Fluid overload % on CRRT initiation)	Validation	General PICU population (only non-cardiac)	% FO at CRRT initiation	Mortality, Outcomes related to MODS	aOR: Median FO% independently associated with mortality
Fuhrman (2019)	KDIGO	Validation	General PICU population (only non-cardiac)	24 hours post-operatively	Other (Biomarker prediction of AKI using KDIGO)	AUROC: When obtained 6 hours after liver transplant, the AUROC under the ROC curve was 0.900 for NGAL and 0.933 for the product of TIMP-2 and IGFB7
Gawadia (2019)	KDIGO, Other (Renal angina index to	Validation	General PICU population (mixed cardiac and non-cardiac)	Day 3 severe AKI (KDIGO stage 2 or above)	Mortality, Other (Renal recovery)	Other: Of the 69 children developing severe AKI (≥ Stage 2) during ICU, 49 (71%) had complete recovery of renal function and 4 had some improvement. 16 children had persistent severe dAKI and all died at a median (IQR) time of 3.5 (2,5) days after admission. RAI 0 to predict day

	predict day 3 AKI)					3 severe AKI is 55.5 (8.9, 333.3); <0.001, not sure what is in the multivariable model.
Gillespie (2004)	Initiation of RRT	Derivation	General PICU population (mixed cardiac and non-cardiac)	FO at CRRT initiation	Mortality	aOR: 10% FO at CRRT initiation = 3.02 OR for death (1.5-6.1)
Gil-RuizGil-Esparza (2014)	pRIFLE	Validation	PCICU population (only cardiac)	Early AKI within 72h of CPB, late AKI after 72h	Mortality, Other (Pediatric intensive care length of stay >12days, mechanical ventilation time >4days)	aOR: Adjustments based on age, CPB time, DHCA use, RACHS-1, and prior cardiac surgeries. Early AKI per pRIFLE aOR (95%CI) for mortality: Any =6.2 (1.9-19.5), R=3.9 (1, 16.1), I=8.6 (1.6, 45.3), F=12.5 (2.5, 63.4)
Giordano (2017)	Plasma biomarkers	Derivation	PCICU population (only cardiac)	6, 12, 24, 48 hours after bypass	NR	Other: Correlation
Gist (2016)	pRIFLE, Urine biomarkers, Plasma biomarkers, Other (NIRS; biomarker event (and urine IL-18, serum IL-6, and serum IL-8 higher than predefined thresholds (serum IL-6 > 125 pg/mL, serum IL-8 > 40 pg/mL, urine IL-18 > 58 pg/mL)))	Validation	PCICU population (only cardiac), Other (Cardiac OR and CICU)	First 24 hours after CBP	Mortality, Other (Hospital and ICU LOS, LOV)	Other: Summary stat comparison: NIRS event + biomarker event(and urine IL-18, serum IL-6, and serum IL-8 higher than predefined thresholds (serum IL-6 > 125 pg/mL, serum IL-8 > 40 pg/mL, urine IL-18 > 58 pg/mL)) Hospital LOS of NIRS event+ biomarker geometric mean and 95% CI, 23 d [13-39 d] vs 10 d [9-12 d]; 22 d [14-36 d] vs 10 d [8-12 d]; and 22 d [14-36 d] vs 10 d [8-12 d]). NIRS event + serum IL-6 and serum IL-8 ICU LOS, difference in LOS (geometric mean and 95% CI, 11 d [6-20 d] vs 5 d [4-6 d]). NIRS event LOV (58hr; 95% CI, 32-106) vs not (26hr; 95% CI, 21-32) (p = 0.05). ICU and hospital LOS in NIRS event (11 d; 95% CI, 6-20 and 22 d; 95% CI, 14-36) vs not (5 d; 95% CI, 4-6 and 9 d; 95% CI, 8-12).30-day mortality same (only 1 death in non event group)
Goldstein (2005)	Other (Risk factors at initiation of CRRT associated with mortality)	Other (Adjusted analysis)	General PICU population (mixed cardiac and non-cardiac)	CRRT initiation	Mortality	Other: Multivariate analysis controlling for severity of illness using PRISM 2 at CRRT initiation revealed that %FO was significantly lower for survivors versus nonsurvivors (P < 0.05)
Goldstein (2001)	Other (NR)	Other (Adjusted analysis)	General PICU population (only non-cardiac)	Initiation of CRRT	Mortality	Other: Multivariate analysis controlling for severity of illness using PRISM at CRRT initiation demonstrated that %FO was significantly lower for survivors versus non-survivors (P < 0.05)

Greenberg (2015)	AKIN, Plasma biomarkers	Validation	PCICU population (only cardiac)	Post-op AKI	Other (AKI, Stage 2 AKI; PICU and hospital LOS, time to extubation)	Se: Sens and spec for third tertile of preop IL-6 (2.2 pg/ mL) was 0.63 and 0.76; Sp: See Se above. AUROC: Pre-op IL6 to predict post- AKI stage 2 0.69
Haase (2011)	Urine biomarkers, plasma biomarkers, Other (AKI as well (biomarkers to predict AKI -- varying definitions across the different pooled studies, which I will not review individually))	Validation	General PICU population (mixed cardiac and non-cardiac)	From 36 to 48 hours before AKI attainment	Mortality, Other (AKI; need for RRT; need for RRT or mortality; ICU stay; hospital stay)	Other: No specific analyses can discern pediatric from adult data. Think we need to exclude
Hamed (2013)	RIFLE, Other (AKI was also defined by an estimated GFR <80 ml/min/1.73 m2 using the Schwartz equation and a cystatin C based equation)	NR	General PICU population (mixed cardiac and non-cardiac), AKI of any cause	NR	NR	Se: Serum cystatin C for detecting AKI: 78.9% Sp: Serum cystatin C for detecting AKI: 53.8% AUROC: Serum cystatin C for detecting AKI: 0.66
Han (2008)	Urine biomarkers	Validation	PCICU population (only cardiac)	2, 6, 12, 24, 36 and 48 hours after CPB	Other (Post-op AKI = 50% increase from baseline SCr)	AUROC: Combination of urine KIM-1, NAG and MMP-9 predicting AKI: 2h AUROC 0.66 (95%CI 0.52-0.83), 6h AUROC 0.61 (95%CI 0.50-0.80), 12h AUROC 0.83 (95%CI 0.69-0.96), 24h AUROC 0.79 (95%CI 0.62-0.93), 36h AUROC 0.85 (95%CI 0.69-0.96), 48h AUROC 0.81 (95%CI 0.68-0.94)
Hassinger (2014)	pRIFLE, Other (Fluid overload)	Other (Association between FO and pRIFLE)	PCICU population (only cardiac)	Early FO = 5% cumulative fluid balance up to midnight of POD#1 (50ml/kg)	NR	AUROC: Early FO AUROCROC for pRIFLE I or F 0.829 (95%CI 0.679-0.979, p=0.004); volume of fluid administered through POD#4 predicted pRIFLE F AUROCROC 0.963, 95%CI 0.916-1.000, p=0.002 aOR: FO on POD 0 = OR 5.92, 95%CI 1.31-26.7, p=0.021 for AKI on POD1; FO on POD 1 = OR 3.2, 95%CI 1.03-9.76, p=0.045 for AKI on

						POD2; FO on POD2 carried OR 4.26 (95%CI 1.4-12.98, p=0.011) for AKI on POD 3
Hassinger (2012)	Plasma biomarkers	Validation	PCICU population (only cardiac)	Pre-op, Post-op day 0 through 4	Other patient-centered outcomes, Other (LMV, MV longer than 48 hours, LOS-ICU, LOS-hosp, LCOS)	Other: Spearman correlation between serum ADMA levels and eGFR: rs ranged between -0.231 to -0.443 from pre-op to POD #2. Peak ADMA level and lowest eGFR: rs=-0.447, p<0.001
Hassinger (2012)	pRIFLE, Plasma biomarkers	Validation	PCICU population (only cardiac)	POD 0 through POD 4	Other (AKI = increase in SCr by 50%)	AUROC: Serum cystatin C values POD 1 for AKI 0.895 (95%CI 0.793-0.996)
Hayes (2009)	Initiation of RRT, Other (FO% at RRT initiation)	Validation	General PICU population (only non-cardiac)	FO% at CRRT initiation	Mortality, Outcomes related to MODS	aOR: >20% FO at initiation is independently associated with worse outcome
Hazle (2013)	AKIN, Urine biomarkers	NR	PCICU population (only cardiac)	NR	Other (Composite outcome: renal support therapy, death within 30 days, prolonged time to extubation, prolonged ICU length of stay)	Se: NGAL 0.64, IL-18 0.59, Cys C 0.51 Sp: NGAL 0.87, IL-18 0.86, Cys C 0.79 Other: AKI incidence 86%, did not distinguish outcomes
Herbert (2015)	Plasma biomarkers	Derivation	PCICU population (only cardiac)	Postop day 1, 2, 3	Other (Urine NGAL-defined AKI (defined at 6hr post CPB surgery))	Se: CysC 15% increase from baseline on POD 2: 0.80 Sp: CysC 15% increase from baseline on POD 2: 0.89 PPV: Max decrease in CysC-based GFR: 0.80; Max decrease in Cr-based GFR: 0.33 NPV: Max decrease in CysC-based GFR: 0.89; Max decrease in Cr-based GFR: 0.753 AUROC: POD 2 CysC 0.87, POD 2 Creatinine 0.58
Hessey (2017)	KDIGO	Other (Goal was to compare different methods to estimate baseline SCr)	General PICU population (mixed cardiac and non-cardiac)	AKI during PICU admission	Mortality, Other (PICU LOS, duration of mechanical ventilation)	aOR: Mortality: aOR of AKI and stage 2 AKI with mortality: 3.5 (1.2-9.8) and 4.2 (1.4-12.2) Other: Adjusted hazard ration for AKI and stage 2 AKI with PICU LOS (lower hazard ratio shows association): 0.6 (0.4-0.7) and 0.5 (0.3-0.7); Adjusted hazard ration for AKI and stage 2 AKI with ventilation duration (lower hazard ratio shows association): 0.6 (0.4-0.8) and 0.5 (0.4-0.8)
Hessey (2018)	KDIGO	Validation	General PICU population (only non-cardiac)	Unclear	Mortality, Other (5-7yr mortality)	Other: adjusted HR Stage 1 AKI 3.27 (1.5-7.13), Stage 2 AKI 4.29 (1.73-10.66), Stage 3 AKI 2.60 (0.84-7.99)
Hoffman (2013)	Urine biomarkers, Other (Urine NGAL, FGF-2, and EGF)	Validation	Other (Term newborns with HIE on hypothermia, and newborns requiring ECMO)	By 24h and 48h of therapy	Organ-specific outcomes/residual morbidity, Other (Development of AKI per pRIFLE)	AUROC: At therapy initiation: uNGAL AUROC for AKI in ECMO/HIE pts=0.54, uFGF-2 AUROC for AKI in ECMO/HIE=0.64, uEGF AUROC for AKI in ECMO/HIE: 0.51

Hollander (2016)	KDIGO	Other (This is an assessment of Renal Recovery after AKI. Long term morbidity assessment.)	PCICU population (only cardiac)	AKI assessed in first 7 post-operative days (Heart transplantation)	Organ-specific outcomes/residual morbidity, Other (Assessment of CKD risk following AKI depending on renal recovery. Could be important part of MODS discussion in terms of how to classify renal dysfunction during stay)	Other: Chi square analysis
Hornik (2014)	AKIN, Plasma biomarkers	Validation	PCICU population (only cardiac)	Post-op AKI	Other (AKI; picu and hospital LOS, duration of ventilation (above and below median values))	AUROC: Serum BNP preop was not predictive of AKI (AUROC's < 0.6 for mild and severe AKI); was only predictive of LOS, and vent duration with AUROC"s >0.67. aOR: Actually RR: Preop serum BNP was not predictive of post-op mild or severe AKI (aRR not significant). Third tertile was associated with LOS over 2 days (aRR 1.92 (1.42, 2.6)), hospital stay over 5 days (aRR 1.32 (0.95, 1.84)) but not vent time.
Hui (2013)	pRIFLE	Derivation	General PICU population (only non-cardiac)	NR	Mortality	aOR: Hazard for RIFLEcr --> mortality (R: 4.66, I: 12.28, F: 10.59)
Jayakumar (2013)	pRIFLE, Urine biomarkers, Other (50% increase in creatinine from baseline (preop))	Derivation	PCICU population (only cardiac)	3 days post cardiac surgery on CPB	Other (This is for semaphorin 3 A predicting AKI, but correlation with LOS and AKI days also reported)	Se: For semaphorin 3A cutoff @492, 81% Sp: For semaphorin 3A cutoff @492, 94% PPV: For semaphorin 3A cutoff @492, 91% NPV: For semaphorin 3A cutoff @492, 87% AUROC: 2 h urinary semaphorin to predict AKI 0.88; aOR: Every 100 pg/mg increase in semaphorin OR 2.19 for AKI Other: Spearman correlation of semaphorin 3A concentrations at different times with hospital LOS (2,6,12, 24hr -0.40-0.53) same time points except 24 hr with AKI days 0.59-0.39
Jhang (2014)	Other (extrarenal SOFA score)	Validation	General PICU population (mixed cardiac and non-cardiac)	NR	Mortality	AUROC: 0.744
Joffe (2018)	KDIGO, Other (Regional oxygen saturations)	Other (NR)	PCICU population (only cardiac), AKI of any cause	NR	Other (Baseline, intraop, postop RsO2 for AKI development)	aOR: Baseline rSo2 in the highest tertile 7.14 OR for CS-AKI compared with lowest tertile (p = 0.01). Higher average rSo2 during CPB predicted any CS-AKI (OR, 1.06; 95% CI, 1.01-1.12; p = 0.02) and moderate/severe CS-AKI (OR, 1.08; 95% CI, 1.01-1.15; p = 0.02). aOR after adjusting for both CPB time (p = 0.03) and aortic cross-clamp time (p = 0.02) but aOR values not reported
Kaddourah (2017)	KDIGO	Validation	General PICU population (only non-cardiac)	First seven days of PICU admission	Mortality	aOR: Severe AKI aOR 1.77
Kakajiwala (2017)	Other (Lack of furosemide response)	Derivation	PCICU population (only cardiac)	2 and 6 hr after CPB surgery	Other (KDIGO AKI)	Se: 2hr urine output: 0.68, 6hr urine output: 0.80 Sp: 2hr urine output: 0.77, 6hr urine output: 0.73 NPV: 2hr urine output: 0.96, 6hr urine output: 0.98 AUROC: 2hr (adjusted for cardiac surgery severity category: 0.74, 6hr: 0.81

Kari (2018)	Other (sCysC and uNGAL)	Other (Biomarker predictive power)	General PICU population (mixed cardiac and non-cardiac)	sCysC and uNGAL levels at 0, 12, 24, 48 hr after admission	Organ-specific outcomes/residual morbidity, Other (AKI using pRIFLE within 48 hours of admission)	AUROC: uNGAL AUROC = 0.76 (95%CI 0.61-0.92), uNGAL 223ng/mL had 72.7% sensitivity and 89.9% specificity. sCysC AUROC 0.86 (95%CI 0.75-0.97), sCysC level of 1009mcg/L had 63.6% sensitivity and 88.9% specificity; Combined net sensitivity is 90.1% and net specificity 79%
Kaur (2018)	KDIGO, Other (RAI)	Validation	General PICU population (mixed cardiac and non-cardiac), AKI of any cause	Day 3 AKI	Other (Length of stay, RRT)	Se: Renal angina positivity sensitivity 75 % Sp: Renal angina positivity specificity 88% PPV: Renal angina positivity PPV 35% (95% CI = 28-43%) NPV: Renal angina positivity NPV 98% (95% CI = 96-99%) AUROC: RAI positivity (RAI > 8) predicted Day3-AKI AUROC 0.821 (95% CI 0.733-0.908); Youden's index: RAI also outperformed PRISM-II for the prediction of RAI for Day3-AKI Youden's index = 0.36, AUROC = 0.681
Kavaz (2012)	pRIFLE, AKIN	NR	General PICU population (mixed cardiac and non-cardiac)	AKI during PICU admission	Mortality	Other: Reported unadjusted mortality rates by AKI mortality 32.3% pRIFLE AKI, 34.9% AKIN AKI, vs 9% without AKI
Krawczeski (2010)	pRIFLE, Plasma biomarkers	Derivation	PCICU population (only cardiac)	1, 12, 24 hours after bypass	Other (Ability of cystatin C to predict AKI)	Se: Various depending on cutoff (page 1555) Sp: Various depending on cutoff (page 1555) AUROC: 0.81
Krawczeski (2011)	Urine biomarkers, Other (Urine neutrophil gelatinase-associated lipocalin (NGAL), interleukin 18 (IL-18), liver fatty-acid binding protein (L-FABP), and kidney injury molecule-1 (KIM-1))	Validation	PCICU population (only cardiac)	2h, 6h, 12h, 24h after CPB	Organ-specific outcomes/residual morbidity, Other (AKI as defined by increase in SCr by 50% within 48h from CPB)	AUROC: At 2h: uNGAL AUROC=0.9, uIL18=0.59, uFABP =0.5, uKIM-1=0.49; At 6h uNGAL AUROC=0.91, uIL18=0.78, uFABP =0.73, uKIM-1=0.52; At 12h: uNGAL AUROC=0.9, uIL18=0.82, uFABP =0.78, uKIM-1=0.7; At 24h uNGAL AUROC=0.87, uIL18=0.82, uFABP =0.77, uKIM-1=0.80;
Krawczeski (2011)	pRIFLE, Urine biomarkers, Plasma biomarkers	Derivation	PCICU population (only cardiac)	NR	Mortality, Organ-specific outcomes/residual morbidity	AUROC: Plasma NGAL for AKI: 0.94-0.95, Urine NGAL for AKI: 0.92-0.95, PPV 0.78 and 0.73-0.8 respectively, NPV > 0.93 for all
Krishnamurthy (2013)	AKIN	Other (Descriptive cohort of AKI pts admitted to PICU)	General PICU population (mixed cardiac and non-cardiac)	Worst AKI during hospital stay	Mortality, Other (Renal recovery - 79% of survivors had complete renal recovery. 6 (20.7%	aOR: AKI stages were not significant in univariate or multivariate Other: For mortality Mechanical ventilation odds ratio 9.7; 95% [CI]: 1.1 - 85.5

					of survivors) had partial renal recovery at discharge)	
Lagos-Arevalo (2015)	KDIGO, Urine biomarkers, Plasma biomarkers, Other (KDIGO modified definition for CysC from baseline)	Validation	General PICU population (only non-cardiac)	Throughout PICU admission	Other (PICU LOS; duration of mechanical ventilation; SCR-AKI was an outcome to validate CysC as an early biomarker; CysC AKI and SCr AKI were used as outcomes to validate biomarkers)	Se: Only reporting the Se and Sp for cutoffs of the significant AUROC's (those reported below in AUROC): Biomarkers within day 1-2 of PICU admission: Urine NGAL (ng/mg) 227 ng/mg (50 % Se) to predict Stage 2 AKI; Urine NGAL (ng/mL): 52 ng/ml (43 % Se) to predict Stage 2 CysC AKI: Urine NGAL (ng/mg) 490 ng/mg (43 % Se) to predict Stage 2 CysC AKI; PICU day 1 serum CysC 0.9 mg/L (Se 45%), 1 mg/L (Se 45%), 1.1 mg/L (Se 27%) to predict AKI; PICU day 1 cysc 0.9 mg/L (Se 50%), 1 mg/L (See 50%), 1.1 mg/L (Se 50%) to predict Stage 2 SCr-AKI. Sp: Only reporting the Se and Sp for cutoffs of the significant AUROC's (those reported below in AUROC): Biomarkers within day 1-2 of PICU admission: Urine NGAL (ng/mg) 227 ng/mg (50 % Se) to predict Stage 2 AKI; Urine NGAL (ng/mL): 52 ng/ml (43 % Se) to predict Stage 2 CysC AKI: Urine NGAL (ng/mg) 490 ng/mg (43 % Se) to predict Stage 2 CysC AKI; PICU day 1 serum CysC 0.9 mg/L (Sp 84%), 1 mg/L (Sp 89%), 1.1 mg/L (Sp 96%) to predict AKI; PICU day 1 cysc 0.9 mg/L (Sp 77%), 1 mg/L (Sp 83%), 1.1 mg/L (Sp 91%) to predict Stage 2 SCr-AKI. AUROC: Biomarkers within day 1-2 of PICU admission to predict AKI: urine NGAL, il-18, kim-1 and urine CysC -- all AUROC<=0.69 to predict AKI; Urine NGAL (ng/mg) AUROC 0.76 (0.59-0.94) to predict Stage 2 AKI; all other urine biomarkers AUROC<=0.69 to predict Stage 2 AKI; All urine biomarkers AUROC <=0.69 to predict CysC AKI; Urine NGAL (ng/mL): AUROC 0.71 (0.51-0.92) to predict Stage 2 CysC AKI: Urine NGAL (ng/mg) AUROC 0.78 (0.65-0.92) to predict Stage 2 CysC AKI; all other biomarkers AUROC <=0.58 to predict stage 2 CysC AKI; PICU day 1 serum CysC AUROC 0.71 to predict AKI; PICU day 1 cysc AUROC 0.8 to predict Stage 2 SCr-AKI. Other: Adjusted HR (lower means associated): SCr-AKI predicted PICU LOS (aHR 0.56[0.39-0.79]) and longer ventilation (aHR 0.49[0.33=0.72]); CysC AKI was not associated with these outcomes
Lee (2017)	pRIFLE	Validation	PCICU population (only cardiac)	7 days following cardiac surgery	NR	aOR: AKI as an outcome-Body weight: 0.841, height: 0.841, body surface area: 0.01, preoperative mechanical ventilation: 4.892
Lex (2014)	pRIFLE, AKIN, KDIGO	Validation	PCICU population (only cardiac)	NR	Mortality, Organ-specific outcomes/residual morbidity	AUROC: Mortality prediction adjusted: AUROC for AKIN AKI 0.81 (0.74-0.88, AUROC for pRIFLE AKI 0.78 (0.71-0.85), AUROC KDIGO 0.81 (0.75-0.87). AUROC for CRRT adjusted : AKI by pRIFLE 0.87 (0.83-0.91), AKIN without RRT 0.75 (0.69-0.81)
Li (2016)	Other (Fluid overload >=5%	Derivation	Other (PICU population, unclear makeup)	Day 1 of PICU admission	Mortality, Other (AKIN AKI, length of mechanical ventilation, length of PICU stay)	Se: For mortality: 0.78 Sp: For mortality: 0.74 AUROC: For mortality: 0.78
Liu (2009)	Plasma biomarkers, Other (Serum interleukin (IL)-1b, IL-5, IL-6, IL-8,	Validation	PCICU population (only cardiac)	2h, 12h, and 24h after CPB	Other (AKI was defined as a 50% increase in serum creatinine from baseline within 3 days)	AUROC: Il-6 at 2h AUROC for AKI = 0.76; Il-6 at 12h AUROC for AKI = 0.71; Il-8 at 2h AUROC for AKI = 0.74; Il-6 at 12h AUROC for AKI = 0.82; others NS

	IL-10, IL-17, interferon (IFN)-g, tumor necrosis factor-a (TNF-a), granulocyte colony-stimulating factor (G-CSF), and granulocyte-macrophage colony-stimulating factor (GM-CSF))					
Lombel (2012)	Other (Fluid overload)	NR	General PICU population (only non-cardiac)	Fluid overload at CRRT initiation	Other (Comparison of fluid overload definitions. Other outcome PELOD score)	Other: Mixed model showed 6/8 definitions of Ifuid overload predicted PELOD scores
MacDonald (2016)	pRIFLE	Validation	General PICU population (only non-cardiac)	First 7 post-operative days	Organ-specific outcomes/residual morbidity, Other (LOS)	aOR: Inverse PICU days -0.039 (-0.077 to 0.002, p=0.042). Inverse ventilation days -0.041 (-0.102 to 0.019, p=0.179)
Martin (2013)	pRIFLE	Validation	General PICU population (only non-cardiac)	Presence of AKI in 48 hours	Mortality	aOR: Odds for death in AKI patients (66): RRT (5.94), nothing else significant (demographic predictors)
Mathur (2006)	Other (BUN >20mg/dl on 2 separate occasions at least 24 hours apart)	Other (Comparison of pts with AKI vs not in septic newborns)	Other (Outborn septic neonates)	Anytime during nursery stay	Mortality, Organ-specific outcomes/residual morbidity, Other (AKI; non recovery in 56% of AKI cases; duration of AKI 5.5 days)	Se: Shock for AKI 71; wt < 2500 for AKI 87 Sp: Shock for AKI 73; wt < 2500 for AKI 32 PPV: Shock for AKI 48; wt < 2500 for AKI 31 NPV: Shock for AKI 88; wt < 2500 for AKI 87 Other: Mortality in AKI 70% vs 25% in no-AKI
Matics (2017)	Plasma biomarkers	Validation	General PICU population (mixed cardiac and non-cardiac)	Maximum level between admission and 28 days, death or discharge, whichever came first	Mortality	AUROC: Renal pSOFA score (range 0-4 based on SCr): AUROC 0.76
Mccaffrey (2015)	pRIFLE	NR	General PICU population (only non-cardiac)	First 7 days of PICU admission	Other (Acute Kidney Injury)	AUROC: Cys C AUROC to predict pRIFLE I or worse (95% CI): 0.85 (0.67-1.03); NGAL AUROC to predict pRIFLE I or worse (95% CI): 0.72 (0.54-0.89)
Meersch (2014)	Urine biomarkers	Validation	PCICU population (only cardiac)	4hr and 24hr after CPB surgery	Other (pRIFLE AKI)	Se: Nephrocheck 4hr, cutoff 0.7: 0.83 Sp: 4hr, cutoff 0.7: 0.77 PPV: 4hr, cutoff 0.7: 0.52 NPV: 4hr, cutoff 0.7: 0.94

						AUROC: 4hr: 0.85
Menon (2016)	KDIGO, Urine biomarkers	Validation	General PICU population (only non-cardiac)	NR	Mortality, Organ-specific outcomes/residual morbidity	AUROC: Of NGAL in RA+ patients for D3AKI (0.97) aOR: For RA and Day3 AKI: 10.1
Mishra (2008)	Other (Indirect plasma markers of active oxygen species)	Derivation	Other (Included all patients with "ARF" which they defined as oliguria,/anuria or a normal urine output with raised serum creatinine, and BUN over 12 in newborns and over 18 in infants/ children)	At the time of hospital admission	Other (Levels of free radicals in patients with ARF when compared to controls; Comparison of levels in survivors vs non survivors)	Se: The cutoff levels of plasma nitrite and ceruloplasmin in predicting mortality in ARF patients: 100% Sp: The cutoff levels of plasma nitrite and ceruloplasmin in predicting mortality in ARF patients: 60.7%
Mishra (2005)	Urine biomarkers, Plasma biomarkers, Other (Acute renal injury=50% increase in creatinine from baseline)	Derivation	PCICU population (only cardiac)	96 hr post CPB	Other (This study is prediction of AKI by NGAL, but is landmark for NGAL)	Se: 2 h post CPB uNGAL @ 50: 1·00 ; 2 h post CPB serum NGAL @ 25 0·70 Sp: 2 h post CPB uNGAL @ 50: 0·98; 2 h post CPB serum NGAL @ 25 0·94 PPV: 2 h post CPB uNGAL @ 50: 0·95; 2 h post CPB serum NGAL @ 25 0·82 NPV: 2 h post CPB uNGAL @ 50: 1·00; 2 h post CPB serum NGAL @ 25 0·89 AUROC: 0·998 for AKI for 2 hr post CPB urine NGAL; 0.906 for 2 h post CPB serum NGAL
Neunhoeffer (2016)	Other (O2C device measuring renal tissue oxygenation, renal microcirculation blood flow, approximate renal metabolic rate of O2; US-measured renal resistive index)	Validation	PCICU population (only cardiac)	24hr after CPB surgery	Other (pRIFLE AKI)	Se: Repair: rSO2 0.80, rFlow 0.64, aRMRO2 0.73, RRI 0.74; Palliation rSO2 0.78, rFlow 0.83, aRMRO2 0.78, RRI 0.71 Sp: Repair: rSO2 0.65, rFlow 0.44, aRMRO2 0.54, RRI 0.68; Palliation rSO2 0.63, rFlow 0.78, aRMRO2 0.75, RRI 0.46 PPV: Repair: rSO2 0.59, rFlow 0.42, aRMRO2 0.50, RRI 0.57; Palliation rSO2 0.40, rFlow 0.54, aRMRO2 0.50, RRI 0.26 NPV: Repair: rSO2 0.84, rFlow 0.67, aRMRO2 0.76, RRI 0.82; Palliation rSO2 0.90, rFlow 0.94, aRMRO2 0.91, RRI 0.86 AUROC: Repair: rSO2 0.75, rFlow 0.52, aRMRO2 0.68, RRI 0.75; Palliation rSO2 0.73, rFlow 0.86, aRMRO2 0.83, RRI 0.60
Nguyen (2005)	Urine biomarkers, Other (Protein	Derivation	PCICU population (only cardiac)	2h and 6h post CPB	Organ-specific outcomes/residual morbidity, Other (AKI as defined by 50%	AUROC: Urine protein biomarkers of 28.5, 43 and 66 kDa AUROC for AKI =0.98 each

	biomarkers with m/z of 6.4, 28.5, 43 and 66 kDa)				or greater increase in serum creatinine)	
Ormeci (2015)	Other (Renal NIRS and renal Doppler US measurement of restrictive indices)	Other (Correlation)	PCICU population (only cardiac)	4hr postop after CPB	Other (Mean urine output)	Other: Restrictive index>0.8 group had lower mean urine output than RI<0.8 group: 9.77 vs 11.25 ml/kg/24hr
Palermo (2017)	Urine biomarkers	Validation	General PICU population (only non-cardiac	PICU days 1 to 3	Other (AKI and prolonged AKI)	AUROC: PICU Day 1 uIL-18 predicted AKI AUROCROC 0.82, uNGAL and LFABP had AUROCROC less than 0.7
Palmieri (2009)	pRIFLE	Validation	General PICU population (only non-cardiac), AKI of any cause	Throughout PICU admission	Other (NR)	Other: A logistic regression analysis showed that PRISM score (OR 1.3, 95% CI: 1.1-1.4) and total body surface of the burns (OR: 1.04, 95% CI: 1.002-1.1) were independent risk factors for AKI; Since mortality in this study was so low, the mortality analysis was not adjusted.
Parikh (2013)	AKIN, Urine biomarkers, Plasma biomarkers	Validation	PCICU population (only cardiac)	Pre and early post-op biomarkers; post-op AKI	Mortality, Other (ICU LOS, Hospital LOS, progression of AKI)	AUROC: For Post-op biomarkers at 0-6 hrs, 6-12 hr and day 2 postop, respectively to predict AKI: uKIM-1: 0.64 (0.04), 0.64 (0.04), 0.63 (0.05); urine LFABP: 0.70 (0.04), 0.71 (0.04), 0.66 (0.05); uIL18: 0.72 (0.04), 0.76 (0.04), 0.60 (0.05); uNGAL:0.71 (0.04), 0.69 (0.04), 0.59 (0.05); plasma NGAL: 0.56 (0.05), NA ,0.57 (0.05). Urine IL-18 day 1 (0-6 h) and urine L-FABP day 2 to predict AKI: AUROC 0.78 (0.04); Urine IL-18 day 1 (0-6 h), urine NGAL day 1 (0-6 h) and urine L-FABP day 2 AUROC 0.78 (0.04) aOR: First Post-op KIM1 and LFABP were not associated with post op mortality; first postop KIM (highest quintile: aOR 4 (1.2 to 13.3)) and first postop LFABP (5.1 (1.8 to 14.5)) associated with postop Stage 2 AKI Other: Pre-op biomarker urine KIM1 and LFABP not associated with post-op AKI; first post-op KIM1 and LFABP associated with longer PICU and Hospital LOS ("adjusted p"<0.001); Adding first op KIM-1 to the clinical prediction model for AKI did not add to the model (NRI 0.06 [SEM 0.08], P=0.45; however ID was 0.03 (0.01) p=0.03); adding first postop LFABP to the clinical marginally improved AKI prediction (NRI 0.19 (SEM 0.08; P=0.02); IDI was 0.06 (0.02) p=0.002). Similar NRI and IDI, respectively, for urine IL-18: 0.22 (0.09) p=0.02 & 0.05 (0.02) p=0.01; for urine NGAL: 0.18 (0.08) p=0.02 & 0.03 (0.01) p=0.04; for plasma NGAL: 0.14 (0.06) p=0.02 & 0.05 (0.02) p=0.002.
Park (2016)	KDIGO	Derivation	PCICU population (only cardiac)	Within 7 days, KDIGO AKI	Organ-specific outcomes/residual morbidity	aOR: For AKI: Age<12 mo: 4.24, Pre-op Hgb < 11 (2.43), Hemoglobin variation by age
Peco-Antić (2013)	pRIFLE, Urine biomarkers, Plasma biomarkers,	Validation	PCICU population (only cardiac)	48 h after cardiac surgery	Mortality, Other (biomarkers pre and at 2, 6, 24, 48 h post cardiac surgery to predict 25%	AUROC: To predict AKI, uL-FABP AUROC 0.84 (pre) and 0.89 (2 h post), CysC (2 h post) 0.73; uNGAL 0.70 (6 h) and 0.93 (24 h);uL-FABP 0.75 (6h) and 0.87 (24 h)

	Other (Primary outcome: 25% decrease in eCCL by Schwartz)				decrease in eCCL; length of stay)	
Penk (2019)	Other (Furosemide stress test)	Derivation	PCICU population (only cardiac)	Day 1-7	Outcomes related to MODS	Other: Odds ratios for severe AKI based on urine flow rate after stress dose of furosemide
Plotz (2008)	pRIFLE	Validation	General PICU population (mixed cardiac and non-cardiac), AKI of any cause	All of PICU admission	Mortality	Other: Chi Square test comparing mortality in patients with vs. without AKI (25 vs. 5%, p<0.05)
Polat (2013)	Other (Urine and serum NGAL. Defined AKI as 50% or greater increase in serum creatinine from baseline)	Derivation	General PICU population (only non-cardiac), AKI of any cause	At time of AKI diagnosis	Other (Patients that got AKI were classified as pre-renal or intrinsic based on timing of a return to baseline creatinine)	AUROC: AUROC for urine and serum NGAL to distinguish pre-renal from intrinsic AKI was 0.94 (95% CI: 0.8969-1.02, p=<0.001) and 0.86 (95% CI: 0.71-1.02, p=0.002)
Portilla (2008)	Urine biomarkers, Plasma biomarkers	Validation	PCICU population (only cardiac)	Within first 12 hours after CPB	Other (AKI, defined as 50% increase in SCr from baseline before CPB)	Se: Urinary L-FABP of 486ng/mg at 4hr after CPB for AKI 71.4%; uNGAL at 4hr after CPB = 100% Se for AKI Sp: Urinary L-FABP of 486ng/mg at 4hr after CPB for AKI 68.4%; uNGAL of 100ng/mg at 4 hr = 100% spec for AKI AUROC: Urinary L-FABP at 4 hrs after CPB for AKI AUROCROC 0.810; uNGAL at 4 hr after CPB for AKI had AUROCROC of 1.0
Prasetyo (2016)	pRIFLE, Other (PELOD score utilized to predict AKI by pRIFLE)	Validation	General PICU population (mixed cardiac non-cardiac)	NR	Mortality, Other (PELOD to predict AKI)	AUROC: AUROC for the development of AKI for PELOD score of 6 was 0.75
Raggal (2013)	Plasma biomarkers	Validation	Other (Cases= perinatal asphyxia based on AAP criteria; controls healthy neonates matched to BW, gestational age and postnatal age)	Serum NGAL within first 6 hours of life	Other (AKI = elevation of SCr >1.5mg/dL for more than 48 hours)	Se: Serum NGAL 157ng/mL 83.3% sensitive for AKI Sp: Serum NGAL 157ng/mg was 94.4% specific for AKI PPV: sNGAL 157ng/mg 85.7% PPV for AKI NPV: sNGAL 157ng/mg 92.3% NPV for AKI AUROC: sNGAL at 6 hrs AUROC 0.968 (95%CI 1-1, p<0.001)

Ramesh (2010)	Urine biomarkers, Other (Urine Netrin-1)	Derivation	PCICU population (only cardiac)	0, 2, 6, 12, 24, 48hr after initiation of CPB	Other (AKI (50% increase in serum creatinine) and pRIFLE AKI)	Se: Netrin-1 cutoff 1100pg/mg urine creatinine: 0.84 Sp: Netrin-1 cutoff 1100pg/mg urine creatinine: 0.80 PPV: Netrin-1 cutoff 1100pg/mg urine creatinine: 0.81 NPV: Netrin-1 cutoff 1100pg/mg urine creatinine: 0.83 AUROC: Netrin-1 at 6hr: 0.86 aOR: 1.20 for every 100 pg/mg increase in netrin-1 at 6hr after CPB, p=0.006
Raymakers-Janssen (2019)	KDIGO, Initiation of RRT	Other (Epidemiology and outcomes)	Other (Hematopoietic Stem Cell Transplant Requiring CRRT)	NR	Mortality, Organ-specific outcomes/residual morbidity	aOR: Mortality
Ricci (2012)	pRIFLE, Plasma biomarkers	Validation	PCICU population (only cardiac)	Arrival in PCICU after cardiac surgery	Organ-specific outcomes/residual morbidity	Se: NGAL > 150 for AKI = 0.13 Sp: NGAL > 150 for AKI = 0.91 PPV: NGAL > 150 for AKI = 0.66 NPV: NGAL > 150 for AKI = 0.45 LR: NGAL > 150 for AKI = 1.6
Ricci (2012)	Plasma biomarkers, Other (Serum NGAL)	Validation	PCICU population (only cardiac), Other (on ECMO)	NR	Organ-specific outcomes/residual morbidity, Other (CRRT)	Other: Serum NGAL was higher in 3 patients who required CVVH
Ricci (2013)	pRIFLE	NR	PCICU population (only cardiac), Other (CPB only)	7 days of CICU stay	Mortality, Other (LOV, LOS)	Other: Any AKI longer LOV 2 days; range, 1-4 days vs 1 day; range, 1-4 days; longer ICU LOS 4 days, range, 2.75-7 days vs 3 days; range, 2-6 days; all mortality in I and F 4.4% vs 0
Riyuzo (2016)	pRIFLE, Other (Creatinine elevation by Guignard and Santos)	Derivation	General PICU population (only non-cardiac)	NR	Mortality, Organ-specific outcomes/residual morbidity	Other: Kaplan meier survivor curve based on albumin level and dialysis provision
Roy (2019)	KDIGO	Derivation	General PICU population (only non-cardiac)	Day 1	Organ-specific outcomes/residual morbidity	Other: Absolute number change in recognizing RAI + patients based on height imputation
Rustagi (2017)	RIFLE	Validation	General PICU population (mixed cardiac and non-cardiac)	During PICU stay	Mortality, Other (Risk factors for AKI development)	aOR: RR for AKI development: age > 1-5 on admission (2.9), admission PRISM score of > 10 (3.2), shock (3.5), infection (2.6), thrombocytopenia (3.2), hypo-albuminaemia (2.7) and MODS (3.6) Other: mortality: AKI (36%) vs no AKI (8.3%). AKI stratified by RIFLE, I had the highest risk of mortality (50%), followed by F (45.5%) and R (15%).
Sadeghi-Bojd (2015)	AKIN	Validation	General PICU population (mixed cardiac and non-cardiac), AKI of any cause	NR	Mortality	aOR: 3.04
Safdar (2016)	Plasma biomarkers	Validation	General PICU population (only non-cardiac)	Serum cystatin C at PICU admission and 6, 12, 24hr later	Other (pRIFLE AKI during PICU admission)	Se: For AKI: cys C of 0.645mg/L at 0hr 78% Se, at 6hr 94% Se, at 12hr 94% Se Sp: For AKI: cysC of 0.645mg/L at 0hr had 57% spec, at 6hr 57% spec, at 12hr 60% spec

						AUROC: cysC at 0 hr AUROCROC 0.825 (95%CI 0.694-0.956); 6hr cysC AUROCROC 0.825 (95%CI0.694-0.956); 12hr cysC AUROCROC 0.843 (95%CI0.732-0.953)
Saleh (2017)	Plasma biomarkers	Derivation	General PICU population (only non-cardiac)	Serum NGAL within 24 hours of admission	Mortality, Outcomes related to MODS	AUROC: AUROC of NGAI to predict sepsis 0.84 (0.77-0.92) with cut point 125, AUROC of NGAI to predict mortality 0.74 (0.64-0.83) with cut point 112.5
Sanchez-de-Toledo (2016)	AKIN, Initiation of RRT	Other (Study of associations with mortality)	PCICU population (only cardiac)	AKIN - at 24, 48, and 72hr after CPB surgery, RRT initiation within or after first 24hr after surgery	Mortality, Other (ICU and hospital LOS)	NR
Sanchez-Pinto (2016)	Other (Pediatric Early Acute Kidney Injury Risk Score: a combination of clinical variables (post-op status, cardiac arrest status, BUN, pH, platelets, total bilirubin, age))	Other (Derivation and Validation)	General PICU population (only non-cardiac)	First 12h of PICU admission	Organ-specific outcomes/residual morbidity, Other (Early AKI defined by KDIGO SCr criteria after 12h and by 72h)	AUROC: Pediatric Early Acute Kidney Injury Risk Score AUROC for early AKI: Derivation= 0.84 (0.83, 0.86), Validation 1= 0.81 (0.8, 0.83), Validation 2 = 0.86 (0.85-0.88)
Sanchez-Pinto (2015)	KDIGO	Validation	General PICU population (only non-cardiac)	Admission, Peak and trough AKI by KDIGO in first 7 days	Mortality	aOR: OR adjusted for PIM-2 and year of admission. Reference is no AKI group. New AKI that resolves: aOR 2.7 (95%CI 1.6, 4.7); new AKI that persists: aOR 19.4 (13.6, 27.9); AKI on admission that resolves: aOR 2.4 (1.5, 4); AKI on admission that persists: aOR 10.5 (7.6, 14)
Santiago (2010)	Initiation of RRT	Other (General assessment of mortality risk if you get CRRT)	NR	CRRT initiation	Mortality	Other: Hazard Risk. I think there is a chance this should not be included. It only talks about patients on CRRT not about the diagnosis of renal dysfunction.
Scheider (2010)	RIFLE	Validation	AKI of any cause	At admission	Mortality	aOR: Any AKI on Admission 5.4 (95% CI: 3.5-8.4); AKI during ICU stay: 8.7 (6.0-12.6)
Schroeder (2019)	KDIGO, Plasma biomarkers	Derivation	PCICU population (only cardiac)	Post CPB	Organ-specific outcomes/residual morbidity, Cost of medical care	Other: Pearson's
Seguin (2014)	Other (Peak cumulative fluid overload in	Validation	PCICU population (only cardiac)	Any time during PICU stay and PICU day 2 (POD 1)	Other (Primary: LOS and length of ventilation,	Other: aHR for prolonged PICU LOS by day 2 cFO % 0.95 p=0.009, duration ventilation aHR 0.97 p=0.03. Peak OI correlated with peak cFO% in non-cyanotic patients.

	PICU and PICU day 2 % cumulative fluid overload)				Secondary: oxygenation index)	
Seitz (2013)	pRIFLE, Urine biomarkers, Plasma biomarkers	Validation	PCICU population (only cardiac)	Blood biomarkers measured at 2-3hr after end of CPB and 4hr later, urine biomarkers measured 2 and 6 hours after CPB	Other (Development of AKI by pRIFLE category assessed daily in ICU)	AUROC: 2hr serum Cystatin C AUROC 0.741 (0.606-0.875), 6hr 0.707 (0.543-0.871) with cutoff of 0.995mg/L. Urine NGAL correlated with duration of CPB, lactate, length of stay, and duration of mechanical ventilation but not with pRIFLE score Other: Spearman's correlation coefficient
Selewski (2012)	Initiation of RRT, Other (Fluid overload at CRRT initiation)	Validation	General PICU population (mixed cardiac and non-cardiac)	NR	Mortality	aOR: 1.08 (1.01, 1.16) for FO at CRRT initiation, aOR FO < 10% at CRRT initiation is 0.02 (0.00,0.77)
Selewski (2011)	Initiation of RRT, Other (Fluid overload at CRRT initiation)	Validation	General PICU population (mixed cardiac and non-cardiac)	NR	Mortality	aOR: 1.04 (1, 1.07) for fluid overload at CRRT initiation
Selewski (2014)	KDIGO	Validation	General PICU population (mixed cardiac and non-cardiac)	ICU stay	Mortality, Other (LOS, LOV)	aOR: Any AKI during ICU for mortality aOR 3.4, 95 % CI 2.0-6.0; stage 3 AKI for ICU mortality aOR 5.7, 95 % CI 3.1-10.4 (ref no AKI), Other: AKI LOV 2.3 days longer than no AKI; stage 3 AKI LOV 4.2 days longer than no AKI; ICU LOS any AKI 125.0 h longer than no AKI; AKI longer hospital LOS 299.1 h than no AKI;<30 days with AKI LOV 3.6 days longer and stage 3 AKI LOV 5.1 days longer than no AKI; longer LOS
Selistre (2012)	Other (Comparison of eGFR formulas to measured GFR)	Validation	Other (Patients who were referred for inulin GFR measurement. Pts needing Foley excluded, only spontaneously voiding patients included)	N/A	Other (Comparison of eGFR to mGFR. This study does not really fulfill PODIUM screening criteria but it is informative as it is a large study comparing currently used eGFR formula to measured GFR. Schwartz performed the best)	Other: Correlation coefficient (r) for modified Schwartz= 0.85; 10% accuracy 36, 30% accuracy 87; mean ratio (eGFR/mGFR)= 1.00+/-0.22
Sethi (2018)	KDIGO	Derivation	Other (Mechanical ventilation >24 hours and arterial line)	Admission, day 3 AKI	Mortality, Organ-specific outcomes/residual morbidity	Se: 81.8 (Day 3 AKI) Sp: 69.6 (Day 3 AKI) PPV: 56.3 (Day 3 AKI) NPV: 88.9 (Day 3 AKI) AUROC: 0.73 (Any RAI), 0.62 (RAI as change CrCl), 0.78 (RAI as FO), 0.66 (PRISM)

						aOR: [Mortality and FO] 5-9.99% 2.520 (1.80-7.92) 0.011 10-14.99% 2.751 (1.32-15.66) 0.041 >15% 3.675 (1.28-23.18) 0.039 (Vs <5% as standard) [Mortality and age] 1-3 years 0.173 (0.02-1.19) 0.075 3-12 years 0.301 (0.06-1.50) 0.144 12-18 years 1.471 (0.41-5.22) 0.551 (<1 year as baseline)
Shalaby (2014)	pRIFLE	Other (Outcomes of PICU patients with AKI)	General PICU population (only non-cardiac), AKI of any cause	pRIFLE at PICU admission or during PICU treatment	Mortality, Organ-specific outcomes/residual morbidity	aOR: pRIFLE I for mortality ARR=2.76, 95%CI 0.90-4.07; pRIFLE F had ARR 2.88, 95%CI 1.38-6.04 for mortality
Shi (2018)	KDIGO	Derivation	PCICU population (only cardiac)	Perioperative pGSN levels	Organ-specific outcomes/residual morbidity	AUROC: Prediction of AKI post CPB: AUROC 6 hour pGSN - 0.79 (95% CI = 0.61-0.96); CPB Time 0.79 (95% CI = 0.51-1.00); Combined: 0.90 (95% CI = 0.75-1.02, P = 0.01) aOR: Post CPB AKI: CPB Time: 1.06 (1.01-1.19) p = 0.01, cross-clamp time: 0.88 (0.74-1.06) p = 0.18; pGSN 6 hours post: 0.05 (0.01-0.78) p = 0.03
Shime (2001)	Other modified SOFA (mSOFA)	Validation	PCICU population (only cardiac)	Admission, 12hr, 36hr postoperatively after cardiac surgery	Mortality, Other (Length of PICU stay, length of ventilation, catecholamine support)	Other: Renal subscores were low and little analysis done on these
Sinitksy (2015)	Other (Fluid overload %)	Validation	General PICU population (only non-cardiac)	FO% at 48 hours	Mortality, Organ-specific outcomes/residual morbidity	aOR: FO% independent association with poor outcome
Soler (2013)	pRIFLE, Other (Fluid overload >=10%)	Validation	General PICU population (only non-cardiac)	Up to 14 days after PICU admission	Mortality, Other (Length of hospital and ICU stay)	aOR: Length of ICU stay >=15d association with pRIFLE I or F category: 4.16 (1.72-10.06)
Soni (2015)	pRIFLE, AKIN	Validation	General PICU population (only non-cardiac)	NR	Mortality, Other patient-centered outcomes	Other: t-test and chi-square comparisons
SooHoo (2018)	KDIGO	Validation	PCICU population (only cardiac)	POD 0-4	Mortality, Other (Duration ventilation, LOS)	Other: Descriptive statistics: ICU LOS (p=0.002 fluid corrected Cr) and ventilation (p=0.0006 for fluid corrected Cr) longer in those with AKI, no mortality difference
Stanski (2019)	Urine biomarkers	Validation	General PICU population (only non-cardiac)	NR	Organ-specific outcomes/residual morbidity	aOR: 2.2-3.0 for poor outcome for NGAL+/Cr- vs. NGAL-/Cr- and similar to NGAL-/Cr+
Sugimoto (2016)	pRIFLE, Urine biomarkers	Validation	PCICU population (only cardiac)	Urine sample collected at ICU admission after CPB, daily creatinine measurements for assignment fop RIFLE category	NR	Se: 81.90% Sp: 46.70% PPV: 74.10% NPV: 58.20% AUROC: Urine albumin for AKI 0.71, p<0.0001, cutoff 5.1mcg/mL Other: Patients with AKI had longer ICU stays (median 5 vs 3 days, p<0.001) and longer duration mechanical ventilation (median 29 vs 6hr, p<0.001) compared to those without AKI. Correlation coefficient for urine albumin with AKI adjusted for age, CPB time, and RACHS-1 category was 0.007888 with p=0.0365

Sutherland (2015)	pRIFLE, AKIN, KDIGO	Validation	AKI of any cause	Anytime during hospitalization	Mortality, Other patient-centered outcomes	LR: Various mortality LRs depending on definition and AKI stage (table on page 558). Same is true for LOS.
Sutherland (2010)	Other (Fluid overload is being assessed at CRRT initiation as a predictor of mortality among children with AKI severe enough to warrant CRRT)	Derivation	General PICU population (mixed cardiac and non-cardiac)	At CRRT initiation	Mortality, Other patient-centered outcomes	aOR: For % FO = 1.03 (3% increase in mortality for each 1% increase in FO%)
Symons (2007)	Other (Was a paper to describe demographics of patients on CRRT. They looked at various factors associated with mortality)	Other (Was a paper to describe demographics of patients on CRRT. They looked at various factors associated with mortality)	General PICU population (mixed cardiac and non-cardiac)	Around CRRT treatment	Mortality	Other: Only univariable analyses were done
Tanyildiz (2017)	pRIFLE, AKIN	Validation	PCICU population (only cardiac)	pRIFLE and AKIN scores determined postop after cardiac surgery within 48 hours	Mortality	Other: Unadjusted OR for mortality: pRIFLE 15.1 (7.2-30.4) p<0.001, AKIN 11.2 (6.1-24.7) p<0.001
Thakkar (2018)	pRIFLE, AKIN	Validation	General PICU population (mixed cardiac and non-cardiac)	At admission, 6, 12, 24, 48hr after admission, then daily	Mortality	Other: Descriptive statistics only, demonstrated higher mortality with both pRIFLE and AKIN vs no AKI by Chi2 test (p=0.001-0.005)
Torres de Melo Bezerra Cavalcante (2016)	KDIGO, Urine biomarkers, Other (Renal Angina Index)	Derivation	PCICU population (only cardiac)	NR	Mortality, Organ-specific outcomes/residual morbidity, Other (Length of stay, severe AKI)	Other: Biomarker (syndecan-1 improved AUROC to predict severe AKI from clinical model of 0.81 to 0.87
Ueno (2019)	Other (Neonatal KDIGO)	Validation	PCICU population (only cardiac)	7 days	Mortality, Organ-specific	aOR: Stage 3 neonatal AKI OR for death 16 (1.6-162.1, p=0.02)

					outcomes/residual morbidity	
Vaewpanich (2019)	pRIFLE, Other (Fluid overload and FOKIS)	Validation	General PICU population (only non-cardiac)	NR	Organ-specific outcomes/residual morbidity	aOR: AKI OR for VAC = 2.15 (95th 1.39-3.31), peak % FO OR for VAC = 1.22 (9rth 1.08-1.37), peak FOKIS OR for VAC 1.29 (1.13-1.47)
Valentine (2012)	Other (Cumulative fluid balance at study day 3)	Validation	Other (Acute lung injury (PF<300, bilateral CXR infiltrates))	Day 3 of study	Other (Ventilator-free days)	Other: Adjusted linear regression coefficient -0.02, p=0.01
Vassalos (2011)	Plasma biomarkers, Other (Cystatin C compared to measured CrCl, renal dysfunction defined as GFR <55 ml/min/1.73 m2)	Other (This study looks at CBP and perfusion to predict AKI, it is not a prognostic tool)	Other (CPB)	24 hrs within CPB	Other (CCl; LOS in ICU and hospital, length of ventilation)	Se: Day-1 cystatin C > 1.044 mg/l 100% sensitivity for detecting renal dysfunction, defined as GFR <55 ml/min/1.73 m2 , day-1 creatinine >34 sensitivity 85% for the same outcome Sp: Day-1 cystatin C > 1.044 mg/l 67% specificity for detecting renal dysfunction (GFR <55 ml/min/1.73 m2 ,day 1 Cr > 34 specificity 88% for the same outcome Other: Correlation of cystatin C with 0-12h CCl and 12-24h CCL, correlation of cystatin C with hospital LOS r = 0.73, P < 0.001;
Volovelsky (2018)	KDIGO, Plasma biomarkers	Derivation	PCICU population (only cardiac)	Pre-surgery, once more 12-24 hours after surgery	Organ-specific outcomes/residual morbidity	AUROC: FGF23 (preop) had AUROC of 0.73. FGF23 (postop) had AUROC of 0.79. This is to predict severe (KDIGO stage 2/3) AKI
Volpon (2015)	Plasma biomarkers	Validation	General PICU population (only non-cardiac), AKI of any cause	Days 1-2 of PICU admission	Other (AKI defined by pRIFLE, ICU length of stay, duration of mechanical ventilation)	AUROC: Of cystitis C for AKI detection: 0.89; A serum cystatin C >0.70 was a associated with a longer length of PICU stay (adjusted hazard ratio of 1.64) and duration of mechanical ventilation (adjusted hazard ration, 1.82).
Volpon (2016)	pRIFLE, KDIGO	NR	General PICU population (mixed cardiac and non-cardiac)	28 days of PICU stay	Mortality, Organ-specific outcomes/residual morbidity, Other (LOS, LOV)	aOR: Cox so aHR:PICU LOS: pRIFLE Risk 0.63 (0.40-0.99), Injury 0.39 (0.23-0.66) , Failure 0.21 (0.12-0.35) , KDIGO Stage 1 0.58 (0.35-0.96), Stage 2 0.47 (0.27-0.81), Stage 3 0.22 (0.13-0.36). LOV Risk 0.74 (0.47-1.18), Injury 0.47 (0.28-0.80), Failure 0.25 (0.15-0.43), KDIGO Stage 1 0.72 (0.43-1.21) Stage 2 0.58 (0.34-1.00)) Stage 3 0.27 (0.16-0.44) ref no AKI for all Other: aRR for pRIFLE F for eCCL<75 at ICU d/c 1.86 (0.98-3.51) (ref R/I); KDIGO for same outcome aRR Stage 3 1.71 (0.85-3.42) (ref Stg 1 and 2); aRR for mortality R/I 0.55 (0.06-5.18), F0.86 (0.09-7.92), KDIGO Stage 1 and 20.48 (0.04-5.17), stage 3 0.98 (0.11-8.92) ref no AKI
Wai (2013)	Urine biomarkers	Validation	Other (PICU patient with septic shock or requiring ECMO)	Urine biomarker panel at PICU admission, peak of illness and resolution of illness	Mortality, Other (AKI defined as eCCl 50% below normal and/or UOP less than 0.5ml/kg/hr for 16 hours in the	Se: Admission uNGAL 1,544ng/mg 84% sens for AKI; admit uFGF-2 21.65pg/mg had 79% sens for AKI; uEGF of 31,598pg/mg had 47% Se for AKI Sp: Admission uNGAL 1,544ng/mg had 80% spec for AKI; admit uFGF-2 of 21.65pg/mg had 63% spec for AKI; admission uEGF of 31,598 had 94% spec for AKI

					absence of existing renal disease)	PPV: All three biomarkers admission PPV 0.85 for AKI NPV: 0.93 AUROC: Admission uNGAL for AKI AUROC 0.82 (95%CI 0.704 to 0.964); uFGF-2 at admission AUROC 0.74 (95%CI 0.58-0.90) for AKI; Admission uEGF AUROC for AKI 0.73 (95%CI 0.58-0.90); all three at admission for AKI AUROC 0.94 (95%CI 0.81-0.99)
Wang (2017)	Other (A EMR-based AKI screening tool that includes age, medication exposures, platelet count, red blood cell distribution width, serum phosphorus, serum transaminases, hypotension, and pH)	Other (Derivation and validation)	General PICU population (mixed cardiac and non-cardiac)	It is not clear from reading the study.	Other (AKI prediction. AKI was defined as 1.5 fold or a 0.3 mg/dL increase in serum creatinine)	Other: Their ICU prediction model had a C-statistic of 0.74 (95% confidence interval of 0.71-0.77)
Washburn (2008)	pRIFLE, Urine biomarkers	Validation	General PICU population (only non-cardiac)	PICU admission	Mortality, Other (AKI, prolonged AKI)	Se: For urine IL-18 to predict AKI within 24 hours for cutoffs ranging from >50 to >200 pg/ml, 38 to 13%; for urine il-18 to predict AKI duration > 48 hours, for cutoffs ranging from >50 to >200 pg/L, ranged from 68 to 21%. Sp: For urine IL-18 to predict AKI within 24 hours for cutoffs ranging from >50 to >200 pg/ml, 78 to 89%; for urine il-18 to predict AKI duration > 48 hours, for cutoffs ranging from >50 to >200 pg/L, ranged from 50 to 93%. PPV: For urine IL-18 to predict AKI within 24 hours for cutoffs ranging from >50 to >200 pg/ml, 27 to 20%; for urine il-18 to predict AKI duration > 48 hours, for cutoffs ranging from >50 to >200 pg/L, ranged from 77 to 88%. NPV: For urine IL-18 to predict AKI within 24 hours for cutoffs ranging from >50 to >200 pg/ml, 85 to 82%; for urine il-18 to predict AKI duration > 48 hours, for cutoffs ranging from >50 to >200 pg/L, ranged from 39 to 33%. AUROC: Urine IL-18 to predict AKI within 24 hours of collection: AUROC = 0.54 (0.31 to 0.77); to predict prolonged AKI when measured on AKI day: 0.61 (0.43 to 0.78) aOR: UIL-18 For association with mortality: aOR 1.29, 95% CI = 1.01-1.64; urine IL-18 for predicting AKI within 28 hours: aOR 3.7, 95% CI = 1.4 to 9.5; when EXCLUDING sepsis patients urine IL-18 predicted AKI within 48 hours with adjusted OR 5.23, 95% CI = 1.61 to 16.84;
Westhoff (2016)	Urine biomarkers,	Validation	Other (PICU/NICU/inpatien	Urine collected immediately after AKI	Other (Intrinsic AKI determined by	Se: Calprotectin 0.46, NGAL 0.84, KIM-1 0.55 Sp: Calprotectin 0.86, NGAL 0.89, KIM-1 0.97

	Other (Calprotectin, NGAL, KIM-1)		t with AKI and healthy controls)	diagnosis or on admission for those with established AKI, or as soon as possible in patients with anuria	physician consensus)	PPV: Calprotectin 0.68, NGAL 0.82, KIM-1 0.91 NPV: Calprotectin 0.71, NGAL 0.90, KIM-1 0.77 AUROC: Calprotectin 0.78, NGAL 0.93, KIM-1 0.76
Westhoff (2015)	Urine biomarkers	Validation	General PICU population (mixed cardiac and non-cardiac), AKI of any cause, Other (NICU and PICU controls without AKI, controls from outpatient clinics without AKI)	Urine sample collected immediately after hospital admission	Mortality, Organ-specific outcomes/residual morbidity	Se: 30d mortality (threshold 0.56): 100%, 3mo mortality (threshold 3.78): 71.4%, RRT: 43.8% Sp: 30d mortality: 50%, 3mo mortality: 84.6%, RRT: 93.6% PPV: 30d mortality: 23.1%, 3mo mortality: 45.5%, RRT: 70.0% NPV: 30d mortality: 23.1%, 3mo mortality: 94.3%, RRT: 83.0% AUROC: 30d mortality: 0.84 (0.70-0.98), 3mo mortality: 0.88 (0.75-1.00), RRT: 0.75 (0.60-0.89)
Westhoff (2017)	Urine biomarkers, Other (Urine calprotectin, kidney injury molecule-1 (KIM-1), and neutrophil gelatinase-associated lipocalin (NGAL))	Derivation	General PICU population (mixed cardiac and non-cardiac), AKI of any cause, Other (Inpatient and clinic)	At AKI diagnosis or on admission with AKI	Mortality, Organ-specific outcomes/residual morbidity, Other (RRT need)	AUROC: In AKI patients mortality at 30days : uNGAL AUROC=0.79; uCalprotectin AUROC =0.55, KIM-1 AUROC=0.55; In AKI patients need for RRT : uNGAL AUROC=0.79; uCalprotectin AUROC=0.55, KIM-1 AUROC=0.55. In No AKI patients mortality at 30days : uNGAL AUROC=0.84; uCalprotectin AUROC =0.60, KIM-1 AUROC=0.63; In No AKI patients need for RRT : uNGAL AUROC=0.73; uCalprotectin AUROC=0.75, KIM-1 AUROC=0.76
Wheeler (2008)	Plasma biomarkers, Other (A blood urea nitrogen (BUN) concentration > 100 mg/ dL, serum creatinine > 2 mg/dL in the absence of pre-existing renal disease, or the need for dialysis)	Other (NR)	Other (SIRS and septic shock with controls)	First 24h of PICU	Mortality	AUROC: Serum NGAL on admission for AKI 0.677 (95% C.I. 0.557, 0.786) aOR: Serum creatinine for AKI, aOR 66.8, 95% C.I. 6.9 - 640.4 Other: Crude mortality in AKI 18.2% vs 6.6% in nonAKI, p=0.2; NGAL in survivors (median, 188 ng/ mL, IQR 107-395 ng/mL) vs non-survivors (median, 295 ng/mL, IQR 131-933 ng/mL; p=0.2)

Wilder (2016)	Other (Weight based fluid overload)	Validation	PCICU population (only cardiac)	First 7 post-operative days after cardiac surgery	Other (A composite poor clinical outcome which was defined as death, need for renal replacement therapy, or extracorporeal life support within 30 post-operative days)	aOR: Fluid overload greater than or equal to 16% (adjusted odds ratio of 3.7) and a serum creatinine greater than or equal to 0.9 (adjusted odds ratio of 6.6) on post-operative day 3 remained an independent risk factor for mortality.
Wong (2015)	Plasma biomarkers, Other (Decision tree using the following biomarkers: ELA2, FGF13, MMP8, OLFM4, PRTN3)	Other (Derivation and Validation)	Other (PICU population with septic shock (unclear if cardiac included))	Day 1 of PICU admission	Other (Stage 2 or greater AKI (modification of KDIGO - 2x baseline creatinine) at day 3 of PICU admission)	Se: Derivation 0.93, validation 0.85 Sp: Derivation 0.88, validation 0.77 PPV: Derivation 0.51, validation 0.29 NPV: Derivation 0.99, validation 0.98 AUROC: Derivation 0.95, validation 0.83
Xu (2018)	pRIFLE, KDIGO, Other (pROCK (reference change value of SCr optimized for AKI))	Derivation	Other (General hospital population without AKI on admission and without AKI risk factors)	Two SCr measurements within 7 days at any point during hospitalization	Mortality	Se: 29% for 15d mortality in ICU patients (CI 24-35%) AUROC: 0.708 for 15d mortality in ICU patients
Yavuz (2014)	Urine biomarkers, Plasma biomarkers	Validation	Other (Burns involving >10% BSA; controls were healthy (source not specified))	Blood and urine NGAL levels at PICU admission and fifth hospital day	Other (pRIFLE R, I or F)	Se: Admission sNGAL 315ng/mL had 71.4% sensitivity for AKI; uNGAL of 100ng/mL had 83.3% sensitivity for AKI Sp: Admission sNGAL of 315ng/mL had 93.3% specificity for AKI; uNGAL of 100ng/mL had 93.7% specificity for AKI PPV: Admission sNGAL 315ng/mL had 83.3% PPV for AKI; uNGAL 100ng/mL had 83.3% PPV for AKI NPV: Admission sNGAL of 315ng/mL had 87.5% NPV for AKI; uNGAL of 100ng/mL had 93.7% NPV for AKI AUROC: Admission sNGAL for AKI AUROC 0.94 (95%CI 0-1); uNGAL for AKI AUROC 0.96 (95%CI 0-1)
Yoneyama (2019)	KDIGO, Urine biomarkers	Derivation	PCICU population (only cardiac), AKI of any cause	Biomarkers at PCICU admission, 4, 12, 24 hours later.	Organ specific outcomes/residual morbidity, Other (Length of stay and Length of intubation)	Se: L-FABP sensitivity for AKI prediction was 0.64 at ICU admission. NGAL sensitivity for AKI prediction was 0.73 at ICU admission. Sp: L-FABP specificity for AKI prediction was 0.93 at ICU admission. NGAL specificity for AKI prediction was 0.73 at ICU admission. AUROC: L-FABP best AUROC for AKI prediction was 0.82 at ICU admission. NGAL best AUROC was 0.9 at ICU admission.

						Other: P values used to assess ability of LFABP and NGAL to predict intubation period, ICU LOS, hospital LOS.
Youssef (2013)	Plasma biomarkers	Validation	General PICU population (mixed cardiac and non-cardiac)	1st and 3rd day of ICU admission	Organ-specific outcomes/residual morbidity	Se: For day 0 serum NGAL detection of AKI (by RIFLE criteria), cutoff 89.5ng/mL: 84.6% Sp: 59.06% PPV: 36.70% NPV: 68.40% AUROC: 0.63 (0.50-0.77)
Zappitelli (2015)	AKIN, Plasma biomarkers	Validation	PCICU population (only cardiac)	Post-op AKI	Other (AKI by SCr; AKI by CysC definition; ICU and hospital LOS; duration of ventilation)	AUROC: For first post-op biomarkers to predict Scr-AKI and CysC AKI: uIL-18 0.66 (0.59-0.72) & 0.74 (0.67-0.81); urine NGAL 0.69 (0.63-0.75) & 0.66 (0.59-0.74); uKIM1 0.58 (0.51-0.65) & 0.65 (0.57-0.72); uLFABP 0.66 (0.59-0.72) & 0.68 (0.60-0.76). These are in "per ml", corrected for urine creatinine available in manuscript. Other: Associations of SCr-AKI and CysC-AKI in multivariable analyses associated with length ICU stay, hospital stay and ventilation duration with p value<=0.008.
Zappitelli (2012)	AKIN, Urine biomarkers	Validation	PCICU population (only cardiac)	Pre io, post-op AKI	Other (Hospital and ICU length of; post-op AKI)	Se: < 2 year olds, optimal cutoff first post-op uACR, Se, Sp, LR+, LR-, PPV and NPV to predict AKI: >618, 0.71, 0.60, 1.80, 0.49 , 0.34, 0.87, respectively. >2 year olds, optimal cutoff first post-op uACR, Se, Sp, LR+, LR-, PPV and NPV to predict AKI: >289, 0.60, 0.79, 2.90, 0.51, 0.22, 0.95, respectively. Sp: See Se PPV: See Se NPV: See Se LR: See Se AUROC: For first post-op urine ACr <=0.63 to predict aki in < and >- 2 years. aOR: Actually was the RR: highest preop urine ACR tertile group, ONLY in >2 year olds, associated with post-op Stage 2 AKI: aRR 2.82 (0.82 ,9.71)
Zappitelli (2011)	AKIN, Plasma biomarkers, Other (First post-operative serum cystatin C; first postop % Cysc change from baseline; first post-op %SCr change from baseline)	Validation	PCICU population (only cardiac)	First post-operative value; AKI evaluated throughout all of postop PICU admission	Other (PICU LOS; Hospital LOS; duration of mechanical ventilation; AKI itself was also an outcome)	AUROC: First postop CysC associated with AKI (aAUROC 0.81) and Stage 2 AKI (aAUROC 0.89); %Cysc Change from baseline predicted AKI (aAUROC 0.8) and Stage 2 AKI (aAUROC 0.88); % Scr change from baseline first postop predicted AKI (aAUROC 0.83) and Stage 2 AKI (aAUROC 0.84). aOR: 5th quintile of first post-op CysC predicted AKI (aOR 6, 95% CI 1.5-23.3) and stage 2 AKI (aOR 17.2, 95% CI 1.6,34.6); first postop third tertile cysc change from baseline predicted AKI (aOR 4.4 95% CI 1.8-10.8) and Stage 2 AKI (aOR 5.7 95% CI 1.4-24); first postop % SCr change from baseline 3rd tertile predicted AKI (aOR 9.6 95% CI 2.4-39) but not stage 2 AKI Other: Multiple linear regression: first postop CysC change from baseline (p=0.04) and first post-op CysC (p<0.001) (not percent SCr change from baseline) associated with longer ventilation. First post-op cystatin C associated with longer hospital stay (p<0.04); first postop cystatin C association with hospital LOS (p=0.04); first post op SCr change from baseline (p=0.02) and first post-op cysc (p=0.002) associated with PICU LOS.
Zappitelli (2009)	pRIFLE, Other (25%	Validation	PCICU population (only cardiac)	Throughout postop PICU admission	Other (PICU LOS; Hospital LOS;	Other: Adjusted HR's (LOWER HR means association with outcome): AKI associated with PICU LOS (aHR 0.7[0.5-0.9]), and days of

	postop rise in SCr from baseline)				duration of ventilation)	ventilation (aHR 0.7 [0.6-0.9]). 25% post-op SCr rise from baseline - similar results
Zappitelli (2007)	pRIFLE, Urine biomarkers	Validation	General PICU population (mixed cardiac and non-cardiac)	Throughout PICU admission	Mortality, Other (AKI, AKI>48 hours; mortality; presence of sepsis)	Se: Urine NGAL lowest cutoff (0.05 ng/mg) Se/Sp for AKI: 85%/89% and for AKI 48 hours 44%/ 42%; at highest cutoff (1.5 ng/mg) Se/Sp for AKI: 54%/56% and 97%/92% Sp: See sensitivity section AUROC: NGAL to predict AKI within 48 hours of collection: AUROC 0.78 (95% confidence interval [CI] 0.62 to 0.95); to predict AKI over 48 hrs: 0.79 (95% CI 0.61 to 0.98) AUROC from day of AKI to predict prolonged AKI: 0.63 (95% CI 0.44 to 0.82), and to predict worsening of AKI: 0.61 (95% CI 0.32 to 0.89) Other: Multivariate analyses not done for mortality and other clinical outcomes
Zheng (2013)	Urine biomarkers, Other (Urine neutrophil gelatinase-associated lipocalin (NGAL), inter-leukin-18 (IL-18), microalbumin (MA), N-acetyl-ß-D-glu-cosaminidase (NAG), a1-microglobulin (a1-MG), and creatinine (UCr))	Validation	PCICU population (only cardiac)	Baseline, 4h, 6h, 12h, 24h after CPB	Organ specific outcomes/residual morbidity, Other (AKI per AKIN criteria)	AUROC: Urine NGAL at 4h AUROC for AKI=0.857 (0.753-0.961); Urine IL-18 at 4h AUROC for AKI=0.835 (0.729-0.940); Urine NGAL at 6h AUROC for AKI=0.859 (0.756-0.961); Urine IL-18 at 6h AUROC for AKI=0.766 (0.644-0.888). Other markers and time points with lower performance.
Zinter (2020)	Other (Pre-stem cell transplant renal injury (Cr>2 or use of dialysis or prior renal transplant))	Other (Predictive modeling of mortality/risk factor identification)	Other (Allogeneic stem cell transplant with PICU admission)	Prior to transplant	Mortality	aOR: 3.39 (95% CI 1.88-6.13)
Zwiers (2015)	Urine biomarkers	Validation	General PICU population (mixed cardiac and non-	At intervals between ECMO initiation and 6 days	Mortality, Organ-specific	Other: Standard t-testing

			cardiac), Other (Children < 1 year of age who needed ECMO)		outcomes/residual morbidity	

Abbreviations: Se, sensitivity; Sp, specificity; PPV, positive predictive value; NPV, negative predictive value; LR, likelihood ratio; AUROC, area under the receiver operating characteristics curve; aOR, adjusted odds ratio; PICU, pediatric intensive care unit; PCICU, pediatric cardiac intensive care unit

Supplemental Table 3. Literature Supporting Association of Existing Acute Kidney Injury Scores and Outcome

Proposed Criteria	Number of Studies	Types of Studies	Setting (type of ICU[a])	Patient Population	Outcomes Studied
Urine output <0.5mL/kg/hr for ≥6 hours AND serum creatinine increase 1.5-1.9 times baseline OR ≥0.3mg/dL (≥26.5 µmol/L) Urine output <0.5mL/kg/hr for ≥12 hours Serum creatinine increase ≥2 times baseline Decrease in eGFR[b] to <35mL/min/1.73m^2	AKIN[c] = 8 (References 7, 52, 97, 100, 135, 161, 163, 189)	Retrospective cohort = 4 Prospective cohort = 4	Mixed = 3 Non-cardiac = 1 Cardiac = 4	n = 2106, 14795, 54, 303, 211, 1489, 287, 137 Total = 19,382	Mortality, length of stay, duration of mechanical ventilation
	RIFLE[d] or pRIFLE[e] = 20 (References 3, 8, 12, 13, 32, 36, 55, 65, 85, 100, 104, 131, 142, 151, 155, 161, 163, 164, 171, 186)	Retrospective cohort = 11 Prospective cohort = 8 Case-control = 1	Mixed = 5 Non-cardiac = 4 Cardiac = 7 ECMO[f] = 1 Unknown = 3	n = 375, 447, 115, 3396, 14795, 409, 160, 150, 140, 266, 281, 51, 494, 66, 390,160, 519, 1489, 7914, 137 Total = 31,754	Mortality, duration of mechanical ventilation, length of stay
	KDIGO[g] = 15 (References 11, 13, 35, 39, 58, 81,89, 98, 100, 139, 148, 157, 161, 165, 171)	Retrospective cohort = 9 Prospective cohort = 5 Cross-sectional = 1	Mixed = 6 Non-cardiac = 4 Cardiac = 3 NICU[h] = 2	n = 538, 14795, 160, 3009, 493, 8260, 160, 4984, 1489, 95, 101, 1696, 353, 1622, 81 Total = 37,837	Mortality, length of stay, duration of mechanical ventilation, composite (death or new disability)
RRT[i] (not for hyperammonemia or toxin removal)	1	Retrospective cohort	ECMO[f]	n = 7,914	Mortality
TOTAL	37 studies	Retrospective = 20, prospective = 14, cross-sectional = 1, case-control = 1	Mixed = 11 Non-cardiac = 9 Cardiac = 10 Unknown = 3 ECMO[f] = 1 NICU[h] = 2	n = 56,118	Mortality, length of stay, mechanical ventilation, new disability

[a]ICU: intensive care unit
[b]eGFR: estimated glomerular filtration rate
[c]AKIN: Acute Kidney Injury Network
[d]RIFLE: Risk Injury Failure Loss of kidney function End-stage kidney disease
[e]pRIFLE: pediatric-modified Risk Injury Failure Loss of kidney function End-stage kidney disease
[f]ECMO: extracorporeal membrane oxygenation
[g]KDIGO: Kidney Diseases: Improving Global Outcomes
[h]NICU: neonatal intensive care unit
[i]RRT: renal replacement therapy

Table 3. Literature Supporting Association of Fluid Overload and Outcome

Proposed Definition	Number of Studies	Types of Studies	Setting	Patient Population	Outcomes Studied
Fluid overload or positive fluid balance over 20% (equal to 200ml/kg)[a]	24 (References 1, 9, 17, 24, 37, 41, 46, 60, 61, 64, 68, 69, 76, 77, 101, 103, 128, 144, 146, 147, 154, 160, 167, 179)	Retrospective cohort = 18 Prospective cohort 5	Mixed = 6 Non-cardac = 7 Cardiac = 3 HCT[b] = 1 Unknown = 6	n = 21, 53, 113, 88, 76, 131, 297, 123, 113, 116, 21, 98, 114, 224, 317, 193, 435, 80, 100, 370, 168, 313, 68 Total = 3,632	Mortality, ventilator-free days, oxygenation index, composite (death, RRT[c] need, ECMO[d] need), length of stay, duration of mechanical ventilation, acute kidney injury, PELOD[e] score

[a]Fluid overload (FO) can be calculated using intake and output or weight. Use of weight-based formula for fluid overload is preferential if weight data are available.

For weight-based determination, FO = $\frac{\text{Current weight (kg)} - \text{ICU admission weight (kg)}}{ICU\ Admission\ weight\ (kg)} \times 100\%$.

For ins/outs based determination, FO = $\frac{\text{Cumulative fluid balance NET (fluid IN – fluid OUT)}}{ICU\ Admission\ weight\ (kg)} \times 100\%$.

[b]HCT: hematopoietic cell transplant
[c]RRT: renal replacement therapy
[d]ECMO: extracorporeal membrane oxygenation
[e]PELOD: pediatric logistic organ dysfunction

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Research Priorities

Renal dysfunction is complex; understanding of the biologic drivers, clinical manifestations of pathophysiology, and reliable real-time adjudication of incipient or ongoing injury remains incomplete. Areas of future research with the potential to change the current treatment paradigms include:

1) the impact of bundled management, including use of balanced crystalloids, strict nephrotoxin avoidance, fluid balance and diuretic management,

2) elucidation of sub-phenotypes of AKI using existing and new biomarkers, including assessment of appropriate biomarker thresholds in children and development of a clinical renal function panel,

3) quality improvement methodologies for renal dysfunction and RRT,

4) novel technology for extracorporeal renal support dedicated specifically to children and neonates, and

5) leveraging the electronic medical record for machine-learning algorithms for early detection and clinical decision support for real-time management.

One of highest orders of priority is evaluation of renal dysfunction in the setting of other organ dysfunction. It is prudent to evaluate specific organ-crosstalk scenarios to ascertain the differential impact of varying degrees of renal dysfunction on management and outcomes such as cardiorenal syndrome and pulmonary-renal interactions.