

Epidemiology of acute kidney injury among hospitalized children in China

Supplements

METHOD

AGE- AND SEX- SPECIFIC REFERENCE VALUE OF SERUM CREATININE IN CHILDREN

We selected from the total study population 718,158 children with at least one serum creatinine measurement, excluding those with any of the following conditions during the hospitalization: any kidney diseases, dehydration, diarrhea, sepsis, shock, respiratory failure, heart failure, malnutrition, need intensive care, or death during hospitalization. We log-transformed value of the first available creatinine test in each selected child and estimated the sex-specific smoothed curves of serum creatinine with respect to age, and used the estimated geometric mean of creatinine given age and sex as the age- and sex-standardized reference value. The age- and sex- specific reference value for serum creatinine can be approximated by the equation: $(5 \times \text{age} - 16) \mu\text{mol/L}$ for boys aged more than 13 years and $(2 \times \text{age} + 21) \mu\text{mol/L}$ for all others.

Table S1. Characteristics of the total pediatric population

	Included in the analysis set n=101,836 (11%)	Excluded from the analysis set n=846,018 (89%)
Age (years)	4.7 (5)	4.4 (4)
Infancy (1 month-1 year)	33,402 (33)	200,504 (24)
Childhood (2-10 year)	50,107 (49)	534,557 (64)
Adolescence (11-18 year)	18,327 (18)	102,862 (12)
Male		
Male	61,565 (61)	533,560 (64)
Female	40,271 (40)	304,363 (36)
Location		
Central	47,181 (46)	385,396 (46)
Northern	27,786 (27)	235,826 (28)
Southern	26,869 (26)	216,701 (26)
Hospital type		
Children hospital	63,124 (62)	644,375 (77)
General hospital	38,712 (38)	193,548 (23)
In-hospital death	1188 (1)	1411 (0.2)
Need intensive care	14,587 (14)	21,308 (3)
Length of stay (days)	14 (9, 21)	7 (4, 10)
Clinical settings		
Respiratory infection	33,445 (33)	269,105 (32)
Non-cardiac surgery	32,142 (32)	310,816 (37)
Congenital heart disease/ cardiac surgery	20,462 (20)	36,974 (4)
Anemia	7385 (7)	18,268 (2)
Sepsis	6544 (6)	14,768 (2)
Diarrhea/dehydration	6323 (6)	36,420 (4)
Glomerulonephritis	5550 (5)	12,937 (2)
CKD [#]	51 (0.01)	97 (0.05)
Heart failure	5200 (5)	7172 (0.9)
Respiratory failure	4154 (4)	4444 (0.5)
Trauma/burn	3882 (4)	15,002 (2)
Epilepsy	3581 (4)	47,368 (6)
Intestinal obstruction	2846 (3)	8127 (1)
Malnutrition	2028 (2)	5727 (0.7)
Shock	1743 (2)	1330 (0.2)
Urinary tract obstruction	1474 (1)	4845 (0.6)
Urinary tract infection	1263 (1)	5918 (0.7)
Hypoxic ischemic encephalopathy	669 (0.7)	1495 (0.2)

* Age (years) is expressed in mean (sd); length of stay is expressed in median (q25,q75); other data are expressed in N (%).

CKD: physician-diagnosed chronic kidney disease stage 3-4, given by ICD10 codes: N18.803, N18.804

Table S2. Cumulative incidence of AKI and diagnosis rate by diagnostic code

	N	CA-AKI N (%)	HA-AKI N (%)	Total AKI N (%)	AKI diagnosis rate*, N (%)
All patients	101,836	7,220 (7)	12,688 (13)	20,006 (20)	712 (4)
Age[#]					
Infant	32,804	2,974 (9)	6,082 (19)	9,056 (28)	118 (1)
Childhood	50,600	3,196 (6)	5,493 (11)	8,689 (17)	354 (4)
Adolescent	18,432	1,050 (6)	1,113 (6)	21,63 (12)	240 (11)
Hospital type					
Children	63,124	4,561 (7)	9,055 (14)	13,616 (22)	457 (3)
General	38,712	2,659 (7)	3,633 (9)	6,292 (16)	255 (4)
Location					
Central	47,181	3,751 (8)	6,752 (14)	10,503 (22)	486 (5)
North	27,786	1,900 (7)	2,425 (9)	4,325 (16)	139 (3)
South	26,869	1,569 (6)	3,511 (13)	5,080 (19)	87 (2)

*AKI diagnosis rate was calculated the percentage of AKI by diagnostic code from the admission and discharge record among the AKI cases identified based on the serum creatinine change.

[#]Infant, childhood, and adolescent were defined as age of <1, 2-5, and 11-18 years, respectively.

Abbreviation: CA-AKI, community acquired AKI; HA-AKI, hospital acquired AKI

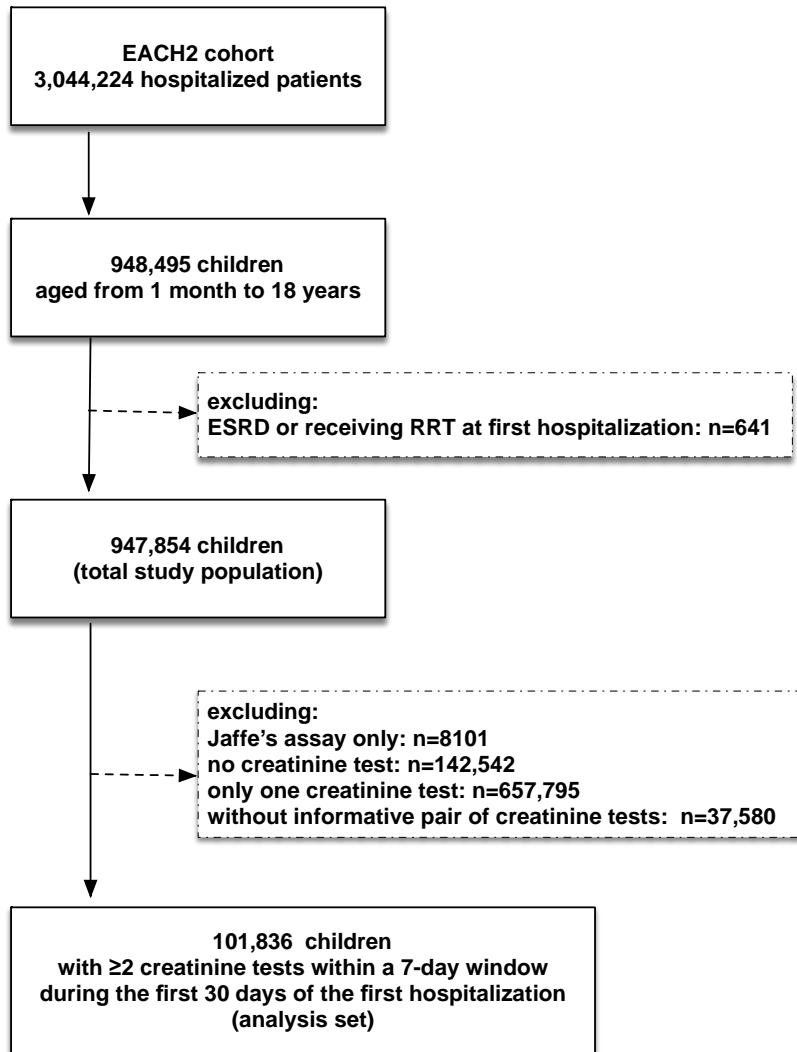


Figure S1. Study population and the analysis set

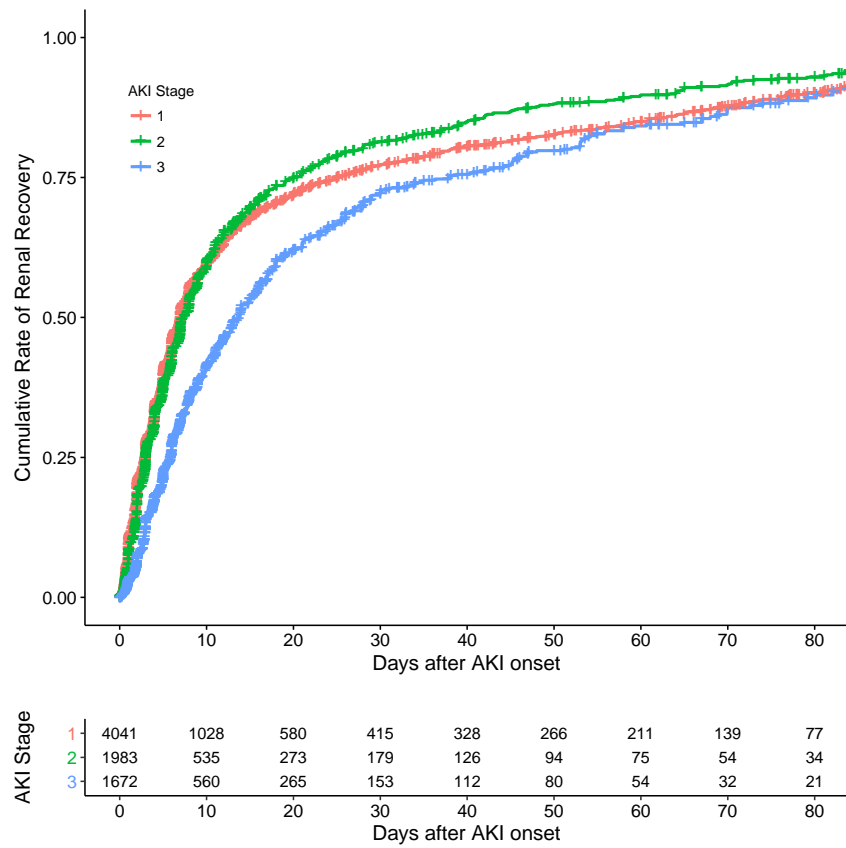


Figure S2. Kaplan Meier Curves of cumulative renal recovery of hospital acquired AKI by AKI stages

Appendix - List of Analyzed Drugs

Proton Pump Inhibitors

Omeprazole
Lansoprazole
Pantoprazole
Esomeprazole
Rabeprazole

Aminoglycoside Antibiotic

Gentamicin
Amikacin
Tobramycin
Streptomycin
Etimicin

Antiepileptic Drugs

Sodium Valproate
Phenobarbital
Carbamazepine
Oxcarbazepine
Levetiracetam
Lamotrigine
Topiramate
Clonazepam
Pregabalin
Zonisamide
Gabapentin
Phenytoin Sodium

Antituberculosis Drugs

Isoniazid
Pyrazinamide
Rifampin
Isoniazid Aminosalicylate Tablets
Ethambutol

Antifungal Drugs

Fluconazole
Itraconazole
Voriconazole
Amphotericin B
Caspofungin
Amphotericin
Micafungin Net
Miconazole
Flucytosine
Ketoconazole
Caspofungin Acetate

Antiviral Drugs

Ganciclovir

Vidarabine
Ribavirin
Acyclovir
Oseltamivir
Lamivudine
Valacyclovir
Foscarnet Sodium
Penciclovir
Entecavir
Adefovir Dipivoxil
Telbivudine

Chemotherapeutic Drugs

Vindesine
Daunorubicin
Etoposide
Cisplatin
Cyclophosphamide
Topotecan
Ifosfamide
Vincristine
Carboplatin
Pegaspargase
Cytarabine
Mitoxantrone
Fluorouracil
Doxorubicin
Rituximab
Methotrexate
Sirolimus
Idarubicin
Mercaptopurine
Cladribine
Pirarubicin
Pingyangmycin
Doxorubicin
Methotrexate
Epirubicin
Bevacizumab
Paclitaxel
Bleomycin
Bleomycin
Dacarbazine
Arsenic Trioxide
Hydroxyurea
Actinomycin D
Nedaplatin
Gemcitabine
Retinoic Acid
Asparaginase
Temozolomide
Oxaliplatin

Tegafur, Gimeracil And Oteracil Potassium
Thioguanine
Ubenimex
Camptothecin
Aclarubicin
Harringtonine
Mannatide
Calcium Levofolinate
Fludarabine
Brucea Javanica Oil
Docetaxel
Arsenious Acid
Rukuaixiao

Contrast Media

Urografin
Iohexol
Iopamidol
Gadodiamide
Iopromide
Ioversol
Acetone
Iodized Oil
Gadopentetate Dimeglumine
Iodixanol

Nonsteroid Anti-Inflammatory Drug

Ibuprofen
Acetaminophen
Aspirin
Compound Paracetamol And Methylephedrine Oral Solution
Diclofenac
Indomethacin
Compound Pseudoephedrine Hydrochloride
Paracetamol Suppositories
Paracetamol, Pseudoephedrine Hydrochloride,
Dextromethorphan Hydrobromide And Chlorphenamine Maleate Tablets
Sodium Salicylate
Pediatric Paracetamol, Artificial Cow-Bezoar And Chlorphenamine Maleate
Paracetamol, Caffeine, Artificial Cow-Bezoar And Chlorphenamine Maleate
Compound Aminophenazone And Barbitol
Glucosamine
Pseudoephedrine Hydrochloride, Chlorpheniramine Maleate
And Dextromethorphan Hydrobromide
Acetaminophen Oral Solution
Dexibuprofen
Flurbiprofen
Etoricoxib
Parecoxib Sodium
Acetaminophen Oral Solution
Compound Indomethacin Tincture
Paracetamol Solution

Celecoxib
Propacetamol
Superoxide Dismutase
Meloxicam

Other Antibiotics

Vancomycin
Teicoplanin
Sulfonamide
Trimethoprim and Sulfamethoxazole
Compound Sulfamethoxazole

Appendix - List of Participating Hospitals

1. Nanfang Hospital, Southern Medical University, Guangzhou, China;
2. The First Affiliated Hospital of Zhengzhou University, Zhengzhou, China;
3. West China Second University Hospital, Sichuan University, Chengdu, China;
4. Sichuan Provincial People's Hospital, University of Electronic Science and Technology of China, Chengdu, China;
5. Guangdong General Hospital, Guangdong Academy of Medical Sciences, Guangzhou, China;
6. Children's Hospital of Chongqing Medical University, Chongqing, China;
7. Guizhou Provincial People's Hospital, Guizhou University, Guiyang, China;
8. The Second Affiliated Hospital, Zhejiang University, Hangzhou, China;
9. Guilin Medical University Affiliated Hospital, Guilin, China;
10. Tongji Hospital Affiliated to Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China;
11. The First Affiliated Hospital, Zhejiang University, Hangzhou, China;
12. The First Affiliated Hospital of Shenzhen University, Shenzhen University, Shenzhen, China;
13. The Second Affiliated Hospital of Dalian Medical University, Dalian, China;
14. Huashan Hospital, Fudan University, Shanghai, China;
15. Zhong Da Hospital, Nanjing, China;
16. Sun Yat-sen Memorial Hospital, Sun Yat-sen University, Guangzhou, China;
17. Children's Hospital of Nanjing Medical University, Nanjing, China;
18. The Children Hospital of Zhejiang University, Hangzhou, China;
19. Anhui Provincial Children's Hospital, Hefei, China;
20. Guangzhou Women and Children's Medical Center, Guangzhou Medical University, Guangzhou, China;
21. Children's Hospital of Fudan University, Shanghai, China;
22. Chengdu Women and Children's Central Hospital, Chengdu, China;
23. Shanghai Children's Medical Center, Shanghai Jiaotong University, Shanghai, China;
24. Jinan Children's Hospital, Jinan, China;
25. Lanzhou University Second Hospital, Lanzhou, China.

Appendix - List of Diagnosis Codes

Congenital heart disease/ Cardiac surgery: Q24.9, O99.89, I97.110, I97.120, I97.130, I97.710, I97.790, I97.810, I97.820

Glomerulonephritis: N00.2, N00.3, N00.4, N00.5, N00.7, N01.2, N01.4, N01.5, N01.7, N02.2, N02.3, N02.4, N02.5, N02.7, N03.2, N03.3, N03.4, N03.5, N03.7, N04.2, N04.3, N04.4, N04.5, N04.7, N05.2, N05.3, N05.4, N05.5, N05.7, N06.2, N06.3, N06.4, N06.5, N06.7, N07.2, N07.3, N07.4, N07.5, N07.7

Respiratory failure: J95.821, J95.822, J96.00, J96.01, J96.02, J96.10, J96.11, J96.12, J96.20, J96.21, J96.22, J96.90, J96.91, J96.92, P28.5

Shock: A48.3, O03.31, O03.81, O04.81, O07.31, O08.3, O75.1, R45.7, R57.0, R57.1, R57.8, R57.9, R65.21, T75.01, T78.2, T79.4, T81.1, T81.11, T81.12, T81.19, T88.2, Y63.4, Y84.3

Heart failure: I09.81, I11.0, I13.0, I13.2, I50.2, I50.3, I50.4, I50.8, I50.9, I97.13

Urinary tract obstruction: N13.0, N13.2, N32.0, N13.5, N13.8, N13.9

Diabetes: E08.00, E08.01, E08.1, E08.2, E08.3, E08.4, E08.5, E08.6, E08.8, E08.9, E09.0, E09.1, E09.2, E09.3, E09.4, E09.5, E09.6, E09.8, E09.9, E10.1, E10.2, E10.3, E10.4, E10.5, E10.6, E10.8, E10.9, E11.0, E11.1, E11.2, E11.3

Diarrhea: K58.0, K59.1, P78.3, R19.7

Dehydration: P74.1, T67.3, E86.0

Sepsis: A02.1, A22.7, A26.7, A32.7, A40, A41.0, A41.1, A41.2, A41.3, A41.4, A41.5, A41.8, A41.9, A42.7, A54.86, B37.7, O03.37, O03.87, O04.87, O07.37, O08.82, O85, P36, R65.2

Respiratory infection: J06.9, J22, J44.0, J47.0

Intestinal obstruction: K50.012, K50.112, K50.812, K50.912, K51.012, K51.212, K51.312, K51.412, K51.512, K51.812, K56.5, K56.60, K56.69, K91.3, P76

Trauma: G89.11, G89.21, H05.33, H05.42, H40.3, H61.31, K08.11, K08.41, K08.81, K08.82, M18.3, M87.2, O71.8, O71.9, T79.8, T79.9, Z87.828, Z91.49

Burn: T20.00, T20.01, T20.02, T20.03, T20.04, T20.05, T20.06, T20.07, T20.09, T20.1, T20.2, T20.3, T21.0, T21.1, T21.2, T21.3, T22.0

Anemia: D46.0, D46.1, D46.2, D46.4, D50, D51, D52, D53, D55, D56, D57.4, D58, D59, D61, D62, D63, D64

Malnutrition: E43, E44, E45, E46, E64.0, O25.1, O25.2, O25.3

Epilepsy: G40.00, G40.01, G40.1, G40.2, G40.3, G40.4, G40.80, G40.90, G40.91, G40.B0, G40.B1, Z82.0

Hypoxic ischemic encephalopathy: P91.60, P91.61, P91.62

Urinary tract infection: N39.0, P39.3

Preterm: O42.01, O42.11, O42.91, O60.1, O60.2, P07.3, P59.0

Hematological malignancy: C90, C91, C92, C93, C94, C95, C81, C82, C83, C84, C85, C86