Clinical Kidney Journal, 2019, vol. 12, no. 6, 859–860

doi: 10.1093/ckj/sfz075
Advance Access Publication Date: 7 June 2019
Letter to the Editor

LETTER TO THE EDITOR

Paediatric acute kidney injury hospital admissions in England 1997–2014: burden and risk factors

Alasdair Henderson [1], Masao Iwagami[2,3], Christian Bottomley[1], Laurie Tomlinson[2], Kathryn Mansfield[2] and Dorothea Nitsch[2]

[1]Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK, [2]Department of Non-Communicable Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK and [3]Department of Health Services Research, Faculty of Medicine, University of Tsukuba, Tsukuba, Japan

Correspondence and offprint requests to: Alasdair Henderson; E-mail: alasdair.henderson1@lshtm.ac.uk, Masao Iwagami; E-mail: masao.iwagami@lshtm.ac.uk

Acute kidney injury (AKI) is a sudden decline in renal function that occurs over hours or days. AKI is associated with increased mortality in both children and adults [1]. In adults, studies have shown that coding of AKI in electronic health records (EHRs) captures more severe cases when compared with the total number of AKI cases defined using biochemical criteria [2]. For children, there is limited information on the recording of AKI in EHR and the associated risk factors. Here, we used routine EHR to understand trends in recording of, and risk factors for, paediatric AKI in England.

We used routinely collected primary care EHR data from the Clinical Practice Research Datalink (CPRD) [3] linked to hospital admissions data from the Hospital Episode Statistics (HES) database [4]. Our study was restricted to children aged 1–18 years registered with CPRD practices consenting to HES linkage (covers ∼4% of the English paediatric population) [5]. In our case–control study of risk factors, cases were children with a record of AKI in a hospital admission during the study period. Controls [matched on age (±1 year), sex and general practice] were identified on the same day as their matched case entered the study. We used conditional logistic regression to account for matching to investigate the risk factors for AKI, adjusted for available confounders (Table 1).

Ethical approval was obtained from CPRD's Independent Scientific Advisory Committee (Protocol 16_098) and the institutional ethics committee (reference: 11175/RR/4219).

The annual prevalence of AKI diagnosis in paediatric hospitalizations increased from 0.02% in 1997 to 0.11% in 2012 (Figure 1). There was no evidence (*t*-test, $P = 0.37$) of a difference between the prevalence of AKI diagnosis for girls and boys across the 1997–2013 period (both 0.06%).

The case–control study included 247 cases of AKI and 2470 controls (Table 1). Previous surgery, congenital disorders, neoplasms and infectious diseases were all risk factors for AKI (Table 1). With the exception of congenital disorders (more strongly associated with AKI in young children), there was no evidence of modification of effect for any of the risk factors by age.

To date, most studies of AKI in children have been restricted to high-risk populations (such as children admitted to intensive care units) [6]. Our study used a nationally representative database and found a lower proportion of paediatric admissions with AKI in children compared with research from the USA [7] and India [8]. This suggests that the cases recorded in UK hospital data may represent only severe presentations of AKI.

Our study was limited since diagnosis of AKI is more complex in children than in adults. Serum creatinine tests are not routinely measured in all children, and since height can increase rapidly in children, a higher level of creatinine may be due to changing physical characteristics rather than AKI. A Welsh study [9] has attempted to capture creatinine-based AKI in children from the general population, using a variety of ways to define the unmeasured baseline creatinines in children.

Received: 9.4.2019; Editorial decision: 9.5.2019

Table 1. Risk factors for AKI in children aged 1–18 years in England

Risk factor	Variables adjusted for	OR (95% CI)[a]	Adjusted OR (95% CI)[b]
Hypertension	No adjustment	5.0 (0.5–55.1)	5.0 (0.5–55.1)
Diabetes	No adjustment	6.0 (1.4–25.1)	6.0 (1.4–25.1)
Surgery in previous hospitalization	Congenital disorders, infectious disease and neoplasms	16.1 (6.4–40.8)	5.8 (2.0–17.0)
Congenital disorder	Interaction with age: 0.9[c] (years)	4.0 (2.8–5.7)	
	At age 0		9.8 (4.8–19.9)
	At age 1		8.9 (4.6–17.1)
	At age 10		3.7 (2.6–5.4)
	At age 15		2.3 (1.3–4.0)
Infectious disease	Operations and neoplasms	7.5 (4.6–12.0)	5.8 (3.5–9.8)
Neoplasms	Congenital disorders	25.0 (12.5–50.3)	24.3 (11.9–49.3)

OR, odds ratio; CI, confidence interval.
[a]All ORs are adjusted for variables used in matching design (general practitioner practice, age, sex).
[b]Choice of variables for adjustment was based on *a priori* risk factors given research into AKI in adults.
[c]95% CI for interaction with age = 0.85–0.97.

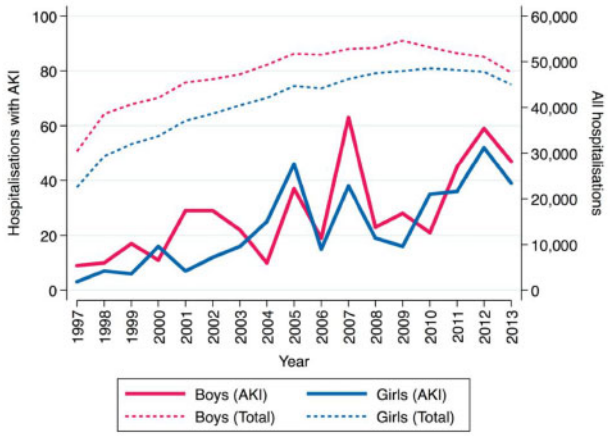

FIGURE 1: Number of hospitalizations and proportion diagnosed with AKI by sex.

Mortality post-AKI was high in the Welsh study at 35%, and 12% of children with creatinine-based AKI required intensive care. This underlines that AKI in children has poor outcomes, and that more needs to be done to ensure that it is diagnosed promptly to allow appropriate intervention.

Future research should investigate whether coding patterns identified here have continued since April 2013. Our findings suggest that there has been an underrecognition of diagnoses of AKI in paediatric hospital care and highlight a risk that opportunities to limit and treat AKI in children are being missed.

FUNDING

ADH was supported by an MRC LID studentship (grant Number MR/N013638/1).

CONFLICT OF INTEREST STATEMENT

None declared.

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