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DIFFERENT POTENTIAL INTERPRETATIONS OF CRITERIA FOR AKI WHEN USING AUTOMATED DECISION SUPPORT: IMPACT ON ASSOCIATED MORTALITYWim Van Biesen¹, Johan Steen¹, Johan Decruyenaere², Dominique Benoit², Eric Adriaan J. Hoste², Jill Vanmassenhove¹¹Ghent University Hospital, Renal Division, Gent, Belgium and ²Ghent University Hospital, Intensive Care Unit, Gent, Belgium

Background and Aims: The reported associated mortality risks of Acute Kidney Injury (AKI) in the intensive care unit (ICU) are variable. Although the Kidney Disease Improving Global Outcome (K-DIGO) improved harmonisation of the definition, there is remaining variability in the actual implementation of this AKI definition, with variable use of the urinary output (UO) criterion, and different interpretations of the baseline serum creatinine (Screa). This hampers progress of our understanding of the clinical concept AKI and leads to confusion and unclarity when interpreting models to predict AKI associated outcomes. With the advent of big data and artificial intelligence based decision algorithms, this problem will only become more of interest, as the user will not know what exactly the construct AKI in the application used means. Therefore, we intended to explore the impact of different interpretations of the Screa and the UO criterium as presented in the K-DIGO definition on the associated ICU mortality risk of AKI stage 2 in the ICU.

Method: We included all patients of an electronic health data system applied in a tertiary ICU between 2013 and 2017. Sequential Organ Failure Assessment (SOFA) score was calculated, and gender, age, weight and mortality at ICU and in hospital were extracted. All serum creatinine (sCrea) values during ICU stay and hospitalisation were extracted, as were UO data, with their time stamps. In addition, all Screa data up to 1 year before ICU admission were retrieved from a dataset external to ICU. AKI was defined according to KDIGO stage 2, using different possible interpretations of the Screa and/or the UO criterion. For the evolution of Screa as compared to a baseline value, we either used a value directly available to ICU staff (def 1), a presumed eGFR of 75ml/min (def 2), the first available value after admission to ICU (def 3), the lowest value during the current hospitalisation before ICU admission (def 4), the lowest value before the hospitalisation episode as found in an external dataset (def 5). For the UO criterion, we used either (in line with K-DIGO stage 2) a UO below 6ml/kg during a 12 hour block (def 6) or a UO below 0.5ml/kg/hour during each of 12 consecutive one

hour intervals (def 7). Definition 8 and 9 identified patients who complied with at least one out of the Screa criteria 1-5 (def 8) or out of the UO criteria (def 9). Definition 10 identified patients who complied both with at least one Screa and one UO criterium.

Results: Our dataset comprised 16433 admissions (34.7% female, age 60.7 ± 16.4 years). Overall, 8.1% of patients died in Intensive Care Unit (ICU). The SOFA score at admission was 6.9 ± 4.1. The mortality risk associated with AKI according to the stage 2 definition of K-DIGO varied according to the interpretation of the diagnostic criteria (table). Most important, associated mortality risk was comparable whether a UO (RR 2.31, 95% CI 1.90-2.81) or a Screa (RR 2.00, 95% CI 1.57-2.55) criterium was used, and was highest in patients who complied with both at least one UO and one Screa criterium (RR 7.28, 95% CI 6.12-8.65).

Conclusion: Uncertainty on the actual interpretation of the Screa and UO criteria used in the K-DIGO definition of AKI leads to substantial differences in AKI associated mortality risk. Omitting the UO criterium leads to substantial underestimation of associated risk.

Definition (see text)	Exp Beta adjusted for age, gender and SOFA score	95% CI	Unadjusted mortality positive patients	Unadjusted mortality negative patients
1	4.58	3.87-5.43	27.6%	5.0%
2	3.33	2.91-3.80	20.3%	5.0%
3	2.87	2.35-3.49	28.5%	6.8%
4	6.14	5.22-7.88	26.9%	4.2%
5	4.96	4.24-5.80	22.7%	4.0%
6	3.63	3.16-4.17	15.6%	4.0%
7	5.09	4.46-5.81	24.7%	5.0%
8	3.53	3.09-4.03	18.3%	4.4%
9	3.64	3.17-4.18	15.6%	4.0%
10: none of 1-9	1			
10: only UO	2.31	1.90-2.81	7.3%	
10: only Screa	2.00	1.57-2.55	7.1%	
10: both UO and Screa	7.28	6.12-8.65	26%	

Figure: mortality according to different interpretations of the Screa and UO criteria of K-DIGO AKI stage 2