OPTIMIZATION OF KDIGO AKI STAGING FOR HOSPITAL-ACQUIRED AKI (HA_AKI)

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Objectives:

HA_AKI is associated with increased risk of in-patient mortality, in proportion to the severity of AKI. Misclassification due to inappropriate thresholds for Stage 1,[1,2] and time-dependence of Stage 2- 3 HA_AKI[3] was addressed by modifying the threshold criteria as follows:

- both the timing and magnitude of the baseline serum creatinine (sCr);
- narrowed criteria from 7 days to 168 hours following baseline sCr;
- and excluded deaths occurring within 48 hours of admission.

Our objectives were to evaluate and improve the performance of the staging criteria for HA_AKI

Methods:

We evaluated the time-course for 8,224 adults with HA_AKI and 79,859 adults with No-HA_AKI at 2 large academic medical centers (UAB and UCSD). The cohort was stratified into No-AKI and Stages 1-3 HA_AKI using the KDIGO[4] and revised KDIGO staging criteria.

HA_AKI was defined by specified timed threshold increase in sCr, with the maximum sCr occurring after the minimum sCr for each admission. Length of stay was right-censored at 30-days, without repeat admissions. Baseline sCr was defined as the lowest sCr at or following the minimum sCr before a significant increase in sCr for cases that developed HA_AKI. Patients with prior ESRD, dialysis or transplant were excluded. Patients with <2 inpatient sCr measurements for a given admission were excluded.

No-HA_AKI was defined as <0.3 mg/dL increase within 48 hrs or <50% increase in sCr within 7 days.

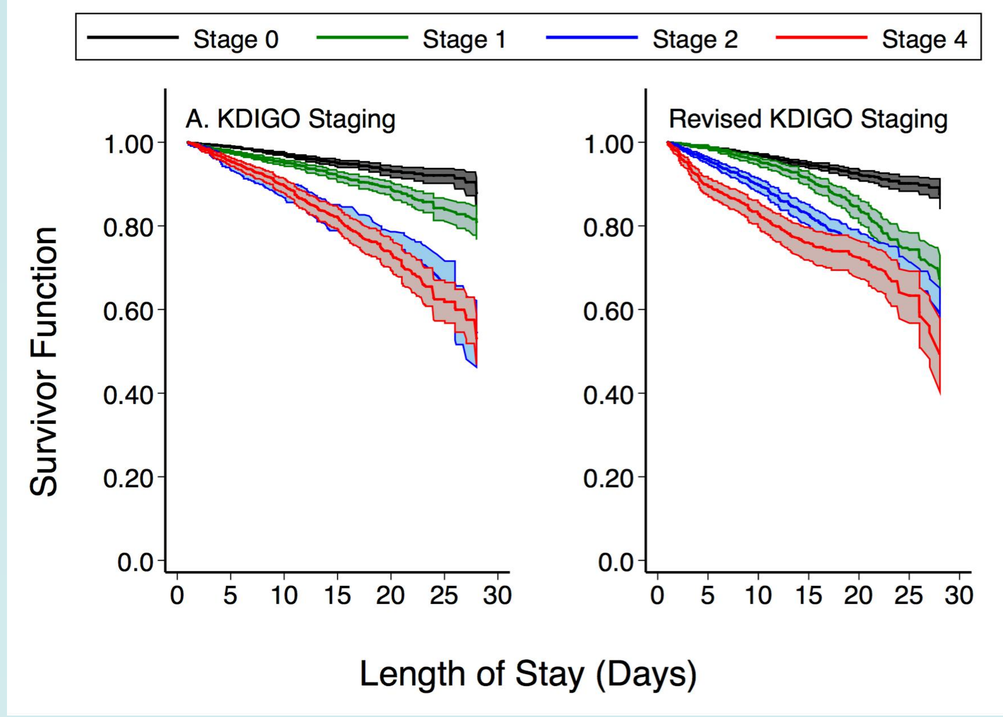
The revised definition of No-HA_AKI included <0.3 mg/dL increase is baseline sCr <1.5 mg/dL, or <0.5 mg/dL increase within 96 hours if baseline sCr >1.5 mg/dL. Criteria for Stages 1-3 were similarly adjusted for the revised staging criteria. Cox regression models were adjusted for demographics, baseline eGFR, Charlson comorbidity scores, and for survivor advantage associated with multiple admissions. Limitations: no urine output, medications or long-term follow up were available.

Results:

The distributions for KDIGO staging were: Stage 0 73,209 (83%); Stage 1 11,553 (13%); Stage , 1,418 (1.6%); Stage 3 1,903 (2.2%) and for revised KDIGO: Stage 0 79,859 (91%); Stage 1 4,127 (4.7%); Stage 2 3,719 (3.6%); Stage 3 918 (1.0%). The reduction in the incidence of Stage 1 HA_AKI (and concordant increase in No-HA_AKI) with the revised KDIGO staging reflects the misclassification problem with KDIGO staging that has previously been described.[1,2]

The hazard ratios (±95% CI) are shown for both staging criteria (Table), using fully adjusted Cox regression models. There was no significant discrimination between Stage 2 and Stage 3 HA_AKI with the KDIGO criteria; the survivor curves completely overlapped (Figure), and the Wald test *P* value was 0.7852 for the difference between Stage 2 and Stage 3 for KDIGO staging. The Wald test *P* value was <0.001 for the difference between Stage 2 and Stage 3 with the revised KDIGO criteria.

	KDIGO STAGING	REVISED STAGING
Stage	HR ± 95% CI	HR ± 95% CI
#1	1.81 (1.611–2.04)	1.91 (1.66–2.21)
#2	4.20 (3.59–4.92)	3.49 (3.09–3.93)
#3	4.33 (3.79–4.96)	5.20 (4.48–6.04)



Conclusions:

The KDIGO staging criteria for HA_AKI can be optimized to improve discrimination between the stages and to minimize misclassification Stage 1 HA_AKI. Further work is needed before a formal proposal is made to revise the KDIGO staging criteria, but this is a possible outcome of the current efforts.

References:

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