

Concurrent Use of a “Manchester” and “National” Algorithms to Improve Detection of Acute Kidney Injury (AKI)

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Background

Acute kidney injury (AKI) occurs in 1 in 5 hospital admissions in the UK, associated with worse outcomes. A national drive to improve early detection of AKI cases has recommended a tried and tested creatinine-based detection algorithm to be implemented in all hospital biochemistry laboratories. Some concerns have been expressed about the risk of missing cases of AKI due to the reliance of such an algorithm for AKI detection.

Methods

We performed a simulated run comparing a locally derived Manchester Algorithm (MA) that used different baseline creatinine criteria to the “National Algorithm (NA)” to analyse its ability to pick up any missed cases of AKI. The MA uses the lowest creatinine in the preceding six months as baseline whilst the NA uses the lowest in the preceding 0-7 days, or if not available the median in the preceding 8-365days. Comparative AKI alerts were analysed over 3 months.

Results

3764 blood results were analysed. AKI (Stage 1-45 cases, Stage 2 –10 cases and stage 3 – 5 cases) were detected by the NA compared to 212 cases (Stage 1-93 cases, stage 2 -93 cases and stage 3 -26 cases) with the MA. The NA also generated 1434 results with “suggest AKI”. 588 of these had repeat blood tests with a further 21 AKI cases missed. The sensitivity of the MA was 100% with specificity of 97.3% meaning that no AKI cases are missed. This compares to 72.4% sensitivity and 98.3% specificity with NA. 32 cases were missed by NA due to the “lowest in 0-7 days” criterion. The integrated system combining both algorithms had 100% sensitivity with 98% specificity. MA had 96 false positive AKI alerts; this equates to 3 cases per day across the hospital.

Conclusion

The use of a lowest creatinine in the preceding 0-7 days as baseline presents a potential pitfall of missing cases of severe AKI (stage 3), although a “suggest repeat” will be appear with the first result. Due to its much higher sensitivity, the concomitant use of back-up system such as the MA corrects this deficiency and reduces the risk of missed cases or late detection, key in AKI care.

Key Words- Acute Kidney Injury, Manchester Algorithm, National Algorithm .