Predicting the future: identifying AKI before they occur

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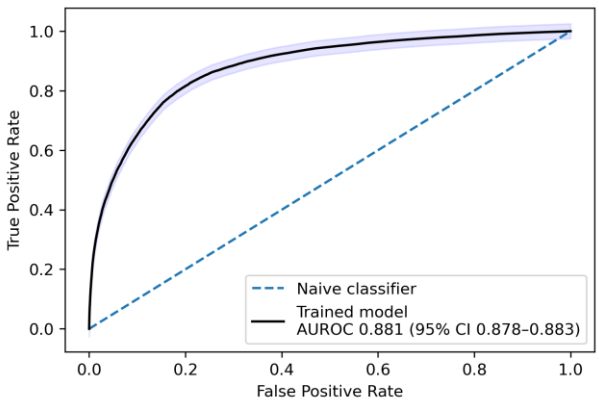
Problem

Acute kidney injury (AKI) is a condition where the kidneys suddenly stop working properly, causing distress to the patient, damage to their body and disrupting their treatment.

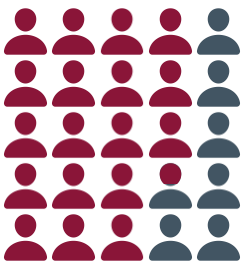
Aim: Predict AKI up to 30 days before they occur

Solution

We trained a random forest model on 597,403 routinely collected blood test results from 48,865 between January 2017 and May 2020. Blood result data is fed into the machine learning algorithm and trained to detect upcoming AKI from these results.



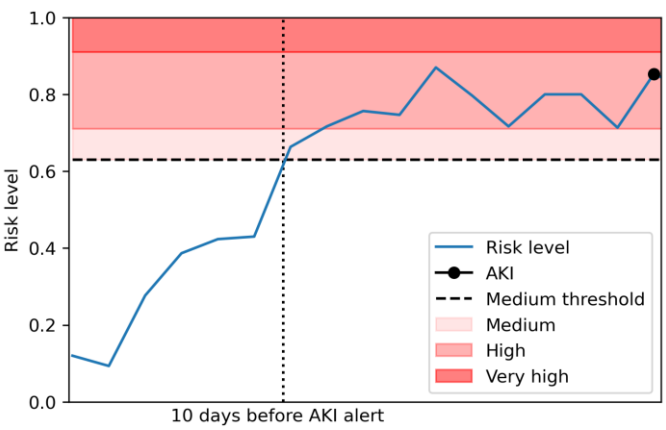
Achieved an AUROC of 0.881 (95% CI 0.878 – 0.883)



73.8% of patients with an AKI event identified before occurrence

61.2% of AKI events identified before occurrence

Impact



These predictions are intended to be utilised on an ongoing basis, with a prediction generated every time a patient has a blood test as part of their care. This allows the risk of AKI to be monitored over time and action to be taken if the risk increases.

These results suggest that around 60% of AKI occurrences experienced by patients undergoing cancer treatment could be identified using routinely collected blood results, allowing action to be taken and disruption to treatment by AKI to be minimised. This would reduce the cost of AKI related inpatient stays (which have an estimated cost of over £1billion in the NHS in England [1]) and particularly improve outcomes for patients with cancer who are at a high risk of AKI [2].

References

1. Kerr, M.; Bedford, M.; Matthews, B.; O'Donoghue, D. The economic impact of acute kidney injury in England. *Nephrol. Dial. Transplant.* **2014**, *29*, 1362–1368.
2. Cheng, Y.; Nie, S.; Li, L.; Li, Y.; Liu, D.; Xiong, M.; Wang, L.; Ge, S.; Xu, G. Epidemiology and outcomes of acute kidney injury in hospitalized cancer patients in China. *Int. J. Cancer* **2019**, *144*, 2644–2650.

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