Cleveland Clinic Innovations

-PRODUCT
Algorithm to predict post-surgical renal and respiratory complications

INDICATIONS
Acute kidney injury

VALUE PROPOSITION
- Acute Kidney injury: Accurate risk model to predict AKI 72 h and/or 14 days post-cardiac and non-cardiac surgery.
- Respiratory failure: Predicts failure to wean and re-intubaion within 72 hours.
- Easy to deploy, maintain and update across units and health systems.

DEVELOPMENT STAGE
Proprietary algorithm has been tested, validated and published.

INTELLECTUAL PROPERTY
Patent # US 10,281,455 B2

RELATED PUBLICATIONS
- Predictive Accuracy of a Perioperative Laboratory Test–Based Prediction Model for Moderate to Severe Acute Kidney Injury After Cardiac Surgery. JAMA. 2022
- Healio/Cardiology Today
- Urology Times

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Algorithm to Predict Post-Surgical Complications

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UNMET NEED

Acute kidney injury (AKI) is a serious complication that affects between 5% and 42% of patients after cardiac surgery. AKI may increase mortality, morbidity, length of stay, and healthcare cost. Traditionally, AKI is diagnosed using serum creatinine, blood urea nitrogen, and urine output. However, due to the lag in the increase in serum creatinine levels after kidney injury this method has proven to be inadequate and significantly delays therapy initiation. Identifying patients at high risk for developing AKI early in the postoperative stage could allow for more targeted management, hemodynamic and volume optimization, and avoidance of nephrotoxins that could be detrimental to kidney function.

SOLUTION

To improve early diagnosis, Cleveland Clinic inventors developed an AKI algorithm that can predict renal and respiratory failure using a combination of metabolic data collected from routine blood tests (no extra tests needed). The model was developed using data from more than 63,000 patients. The model shows excellent discrimination and calibration among moderate to severe AKI and for AKI requiring dialysis within 72 hours and 14 days after surgery (AUC, 0.876 and 0.854) and (AUC, 0.916 and 0.900), respectively. The models have been externally validated in a community-based hospital setting. The base algorithm was further refined to improve performance, accuracy and reduce bias in non-cardiac surgery setting and respiratory failure endpoint.