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Early Diagnosis of Acute Kidney Injury in Hospitalized Patients with Comorbidities

Kokilaben Dhirubhai Ambani Hospital & Medical Research Institute | Mumbai, India

Acute Kidney Injury (AKI), or Acute Renal Failure, is a rapid and precipitous episode of kidney damage or kidney failure with the onset occurring within a several hours or a few days. Because the function of the kidneys includes the balance of body fluids and regulation of sodium, potassium, and acid, as well as the removal of waste products and drugs and regulation of blood pressure, AKI can have an immediate impact on patient health.

The asymptomatic presentation of AKI can make it difficult to diagnose, with about 1 in 2 cases being missed. Without timely diagnosis and intervention, the condition can progress to chronic kidney disease (CKD) or potentially end-stage renal disease (ESRD), which is fatal unless treated properly. To guide timely identification and appropriate intervention, whether conservative treatment or renal replacement therapy, the Kidney Disease Improving Global Outcomes (KDIGO) consortium established three stages of AKI-based serum creatinine levels.

To address this issue, the Biochemistry & Immunology department of Kokilaben Dhirubhai Ambani Hospital & Medical Research Institute incorporated KDIGO guidelines into an algorithm-based e-alert system for tracking rises in serum creatinine values. The algorithm accounts for clinical history, including 53 AKI-associated features, explained Dr. Barnali Das, Primary Investigator of the AKI alert pilot project and Lead Consultant of the Biochemistry & Immunology section of Laboratory Medicine. Even when creatinine levels are within normal range, the system better identifies significant changes in creatinine, thus enabling early AKI recognition, added Consultant Intensivist Dr. Kiran Shetty.

"The AKI alert system enables earlier recognition of acute kidney injury even when creatinine levels are normal. An early alert is especially useful in patients with nephropathy, diabetes and hypertension. Early awareness helps manage these patients and reduces clinical uncertainty," said Dr. Shetty. "The AKI alert system also contributes to the assessment of drug-dosage modifications, informing primary consultants on early identification of AKI and potential necessary action."

Involving IT data analytics support and reliable laboratory intelligence, the approach improved clinicians' visibility into AKI risks that may have gone unnoticed under the previous standard of care.

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True positive alerts were generated for 214 of 4,439 patients screened over a 45-day period, with exceptional sensitivity, specificity and diagnostic accuracy. The care team identified 59.8% more patients with otherwise unsuspected AKI after e-alert implementation, allowing rapid treatment and improved outcomes.

The system additionally alleviated strain for the busy clinical staff, shared Dr. Niranjan Kulkarni, Consultant Nephrologist.

Widespread education helped clinicians understand the rationale behind changes, increasing compliance to recommended protocols and translating to improved care outcomes. Helping patients take better control of their kidney health and long-term outcomes was a strong satisfier for clinicians, according to Dr. Sharad Sheth, Head of Nephrology.

Patient impact was the foremost success of this initiative, explained Urja Parekh, who was involved in research for the initiative. The positive outcomes associated with this initiative have also garnered international recognition for Kokilaben Dhirubhai Ambani Hospital and have had notable and positive financial implications, as screening for AKI is far less costly than treating it after disease progression, which may require dialysis and other costly treatments.

"With early detection of AKI via the e-alert system, we are certain that the cost burden associated with AKI decreased. Our game-changing alert system enables detection, monitoring and mitigating AKI's progression to life-threatening stages. In this way, Kokilaben Dhirubhai Ambani Hospital & Medical Research Institute no longer must rely on costly and debilitating interventions for AKI treatments," said Dr. Santosh S. Shetty, CEO and Executive Director.

Implementation of an e-alert system for AKI is a novel approach in India. Kokilaben Dhirubhai Ambani Hospital is now collaborating with the Koita Centre of Digital Health at IIT Bombay to execute this strategy in a bigger initiative and outreach. As serum creatinine is a widely available test, and the e-alert system does not require major infrastructure modifications, the best practice has enormous potential to be replicated at other organizations.

For their innovative transformation and improved outcomes, this integrated clinical care team was recognized for achievement by the UNIVANTS of Healthcare Excellence award program.

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