Surgical Expert Systems:

Acute Kidney Injury

Acute Kidney Injury (AKI) is a highly pervasive condition, particularly amongst hospitalized patients[1]. The complication involves a sudden and often reversible reduction in kidney function, as measured by increased creatinine or decreased urine volume[1]. Even a minor increase in serum creatinine from baseline is independently associated with increased mortality and contributes to long-term morbidity[2]. Risk factors for AKI include male sex, advanced age, increased BMI, and hypertension[3].

Each year, approximately 1.7 million people around the world die from AKI[4].

AKI risk scores provided by Stream Care™ are selected based on a thorough and extensive review of existing literature, incorporating:

- ✓*42 Peer Reviewed Papers*
- ✓*2 Systematic Reviews*
- ✓*1 Textbook*

Impact

AKI affects approximately 10–20% of hospitalized patients, but incidence is as high as 45–50% among critically ill patients[5]. In colorectal surgical populations, postoperative AKI (PO-AKI) incidence ranges from 3.8–19.5%[6]. Similarly, 3%-17.5% of bariatric patients and 2.4-14.7% of esophageal experience the complication postoperatively[7–10].

AKI is associated with significant morbidity, mortality, extra costs incurred in the hospitalization process, longer stay in the hospital, and long-term consequences, including chronic kidney disease (CKD) and end-stage kidney disease (ESKD)[5]. Overall mortality rate at 30 days following the complication is as high as 24%[11]. Furthermore, PO-AKI is associated with electrolyte imbalance, fluid accumulation, and metabolic dysfunctions, leading to a cascade of cardiovascular, respiratory, neurological, infectious, and coagulation disorders[12]. In the United States, AKI is associated with high hospitalization costs that range from $5.4 to $24.0 billion[13].

*Driving **timely intervention** with early automated prediction of AKI.*

Static Risk Scores

SPARK

The Simple Postoperative AKI Risk (SPARK) score **predicts postoperative AKI** in noncardiac surgery patients and is **calculated in preoperative periods[14].**

Source

SPARK was developed by Park et al. and validated by Li et al. and Nishimoto et al.

Patient Population

SPARK was developed using patients who underwent a noncardiac operation[14].

Data Set

Seoul National University Hospital[14]

Sample Size

51,041[14]

Inputs

- Age
- eGFR
- Urine Albumin
- Sex
- Hypoalbuminemia
- Emergency Operation
- Hypoatremia
- Surgical Duration
- Diabetes
- RAAS Blockade Use
- Anemia

Performance Metrics

Risk Score	Cited By	Reference	Validation Type	AUC	Specificity	Sensitivity	NPV	PPV
SPARK	99	Park et al.	Internal	0.81	0.75	0.82	–	–
		Li et al.	External	0.703	0.5749	0.6835	0.9536	0.1244
		Nishimoto et al.	External	0.67	–	–	–	–

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