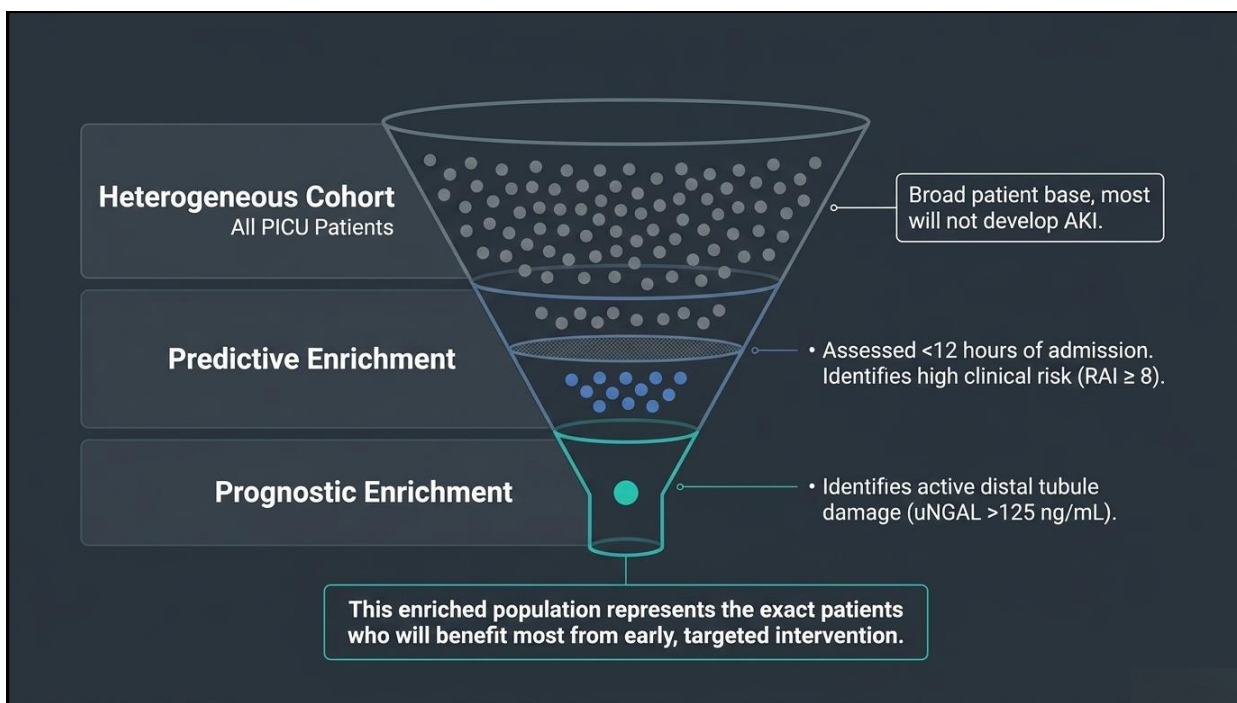
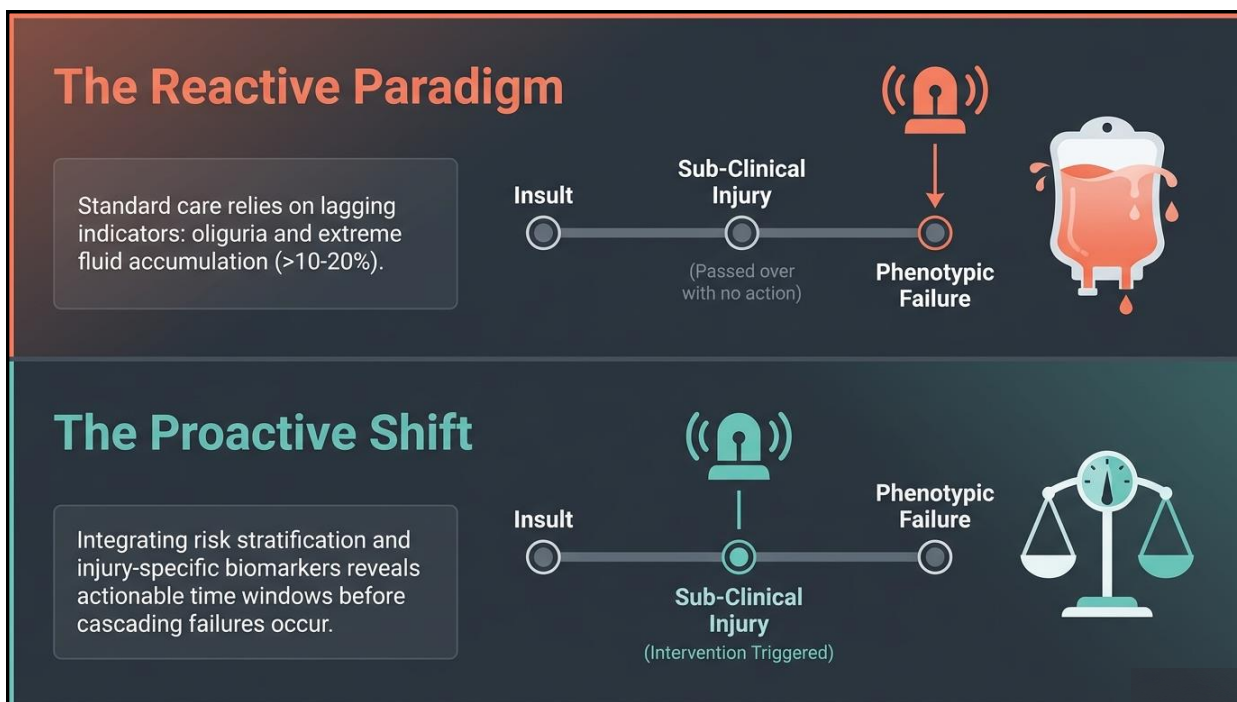


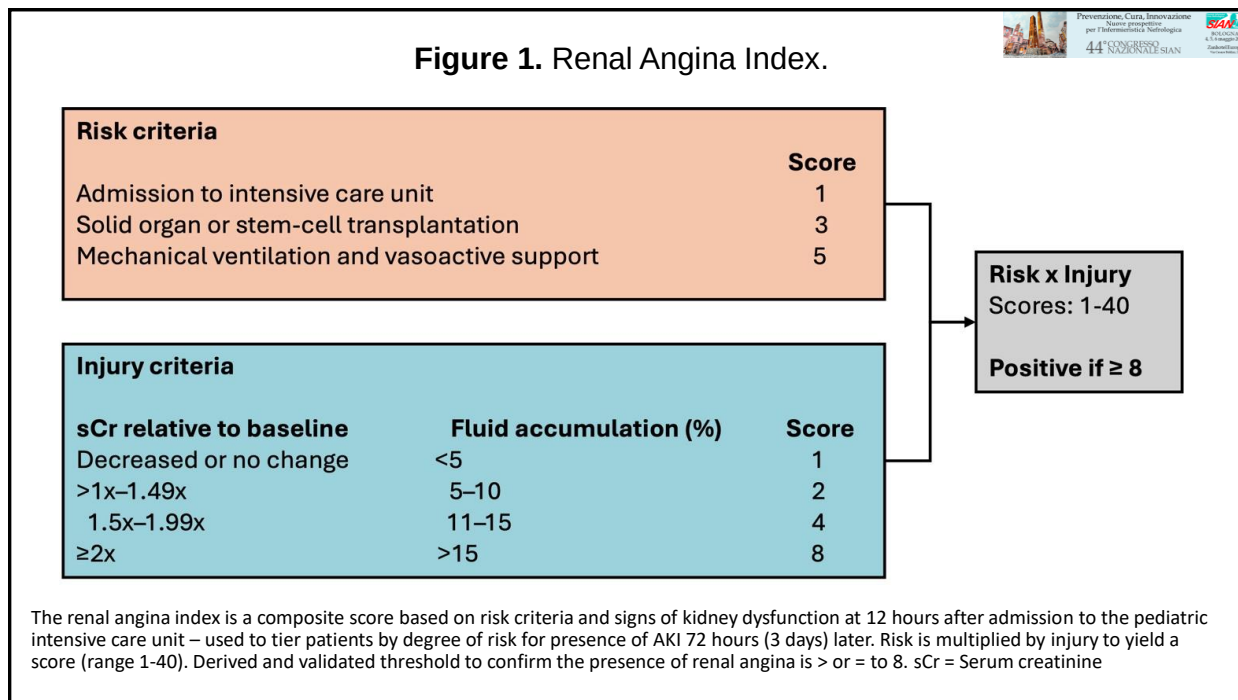
I paziente sottoposto a CRRT: indicazioni cliniche, casi e scenari

ZACCARIA RICCI



Early vs Late Initiation Of Kidney Replacement Therapy : A Comparison Of RCTs					
	ELAIN	AKIKI	IDEAL-ICU	STARTT-AKI	AKIKI-2
Study Design	RCT, Single Centre Germany	RCT, Multi-Centre France	RCT, Multi-Centre	RCT, Multinational	RCT, Multi-Centre France
Study participants (N)	231	620	488	2927	278
Eligibility criterion	KDIGO stage 2 AKI	KDIGO stage 3 AKI	RIFLE - FAILURE Septic shock	KDIGO Stage 2 or 3	KDIGO stage 3 with oliguria >72 hrs or BUN 40-50 mmol/l
Early KRT criterion	Within 8 hrs	Within 6 hrs	Within 12 hrs	Within 12 hrs	Within 12 hrs
Delayed KRT criterion	Within 12 hrs or no initiation	<ul style="list-style-type: none"> Life-threatening complications of AKI BUN > 40mmol/l Oliguria persisting >72 hrs 	48 hrs after randomisation in the absence of kidney recovery	<ul style="list-style-type: none"> Life-threatening complications of AKI Persistent AKI for ≥ 72 hrs 	<ul style="list-style-type: none"> BUN >50 mmol/l Life-threatening complication of AKI
Difference in mortality (Early Vs Late)	At 90 d 39.3% vs 54.7% (p=0.03)	At 60 d 48.5% vs 49.7% (p=0.79)	At 90 d 58% vs 54% (p= 0.38)	At 90 d 43.9% vs 43.7% (p=0.92)	At 60 d 44% vs 55% (p=0.07)
Other Key outcomes	Shorter KRT duration and hospital stay in early group	Diuresis occurred earlier in delayed arm	No difference in length of ICU and hospital stay	Higher KRT dependency at 90 d in accelerated arm	KRT free days between D0 and D28 10 vs 12 days (p=0.93)
Complications related to AKI OR KRT (Early Vs delayed)	No difference	CRBSI higher in early group	Hyperkalaemia more in delayed group	More in accelerated arm	No difference potential harm delay
Limitations	Small sample, single centre, mostly surgical patients	Included pts with advanced AKI, 50% pts received IHD	Non blinded, stopped early due to futility	Heterogeneity in groups, Decision of KRT at physician discretion	Small sample size, Debate over BUN levels for KRT initiation
	JAMA 2016	NEJM 2016	NEJM 2018	NEJM 2020	Lancet 2021





Patient Profile

- 6-year-old boy
- 21 kg (dry weight)

Context

Septic shock, 3 weeks post-bone marrow transplant for relapsed acute leukemia.

Admission Status (Day 0 - 03:00)

Intubated (FiO₂ 0.30, PEEP 5), starting norepinephrine, receiving fluid resuscitation.

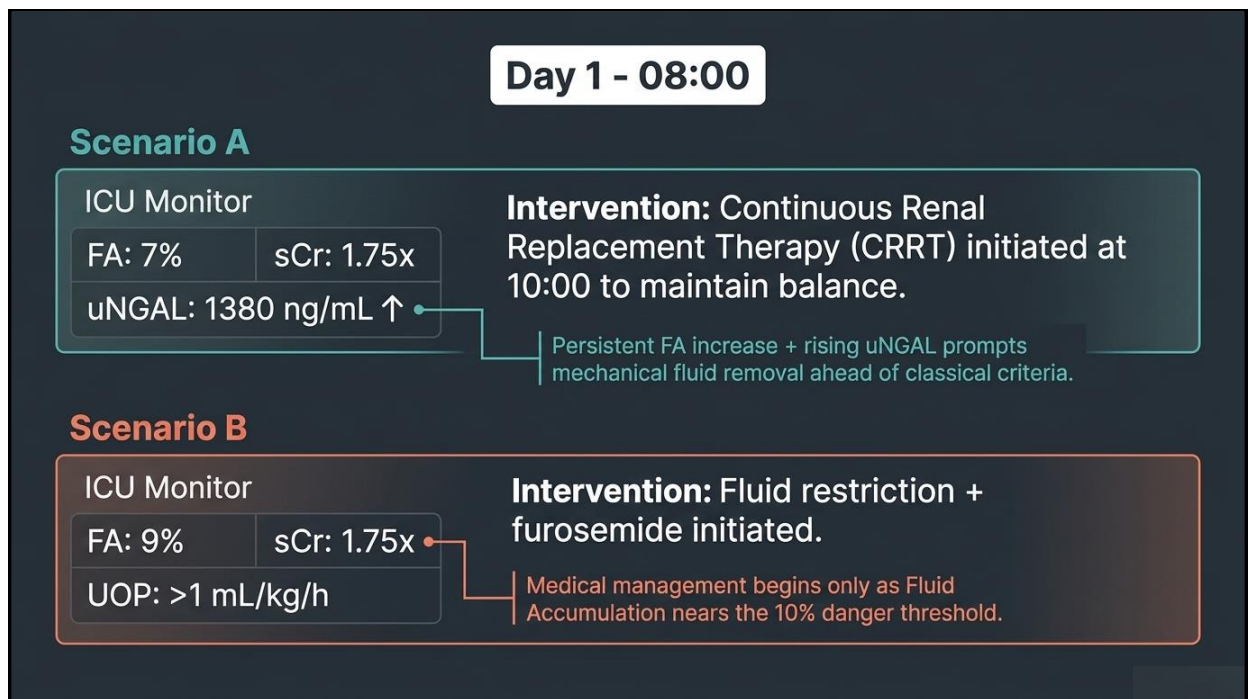
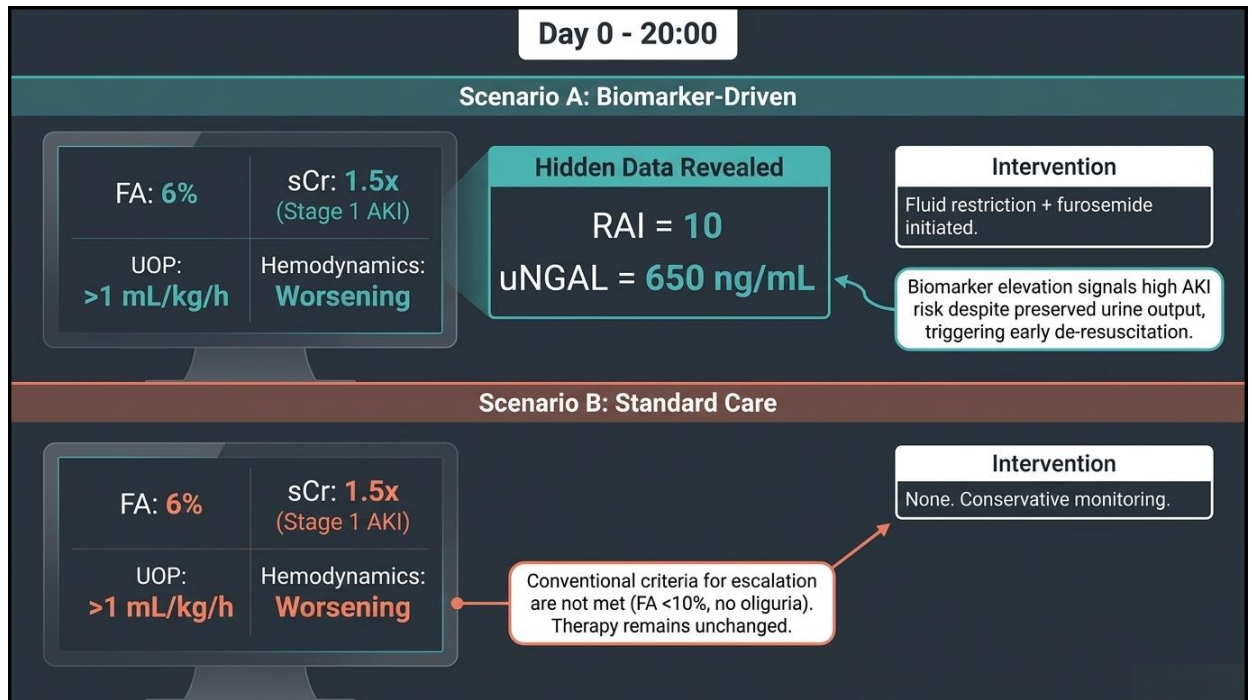
Scenario A: Biomarker-Driven

Clinical decisions guided by integration of RAI and uNGAL.

From this exact moment, one protocol choice creates two vastly different patient trajectories.

Scenario B: Standard Care

AKI and fluid management follow standard heuristic practice.



Day 2 - 08:00

Scenario A

ICU Monitor

FA: 5% ↓ uNGAL: 1820 ng/mL

UOP: Oligo-anuric (expected on CRRT)

Intervention: CRRT ongoing with slow net negative balance.

Outcome: Oxygenation improved. Optimal nutrition provided.

Scenario B

ICU Monitor

FA: 10% ↑ sCr: 2.8x

UOP: Preserved

Intervention: Maximal diuretics. Wait-and-see approach adopted.

FA hits 10% danger zone. Nutrition is restricted to concentrated IV glucose fluids to limit volume intake, compromising patient strength.

Day 3 - 08:00

Scenario A

ICU Monitor

FA: 3%

uNGAL: 1040 ng/mL ↓

Status: Patient Extubated overnight.

Proactive volume control protects pulmonary function.

Scenario B

ICU Monitor

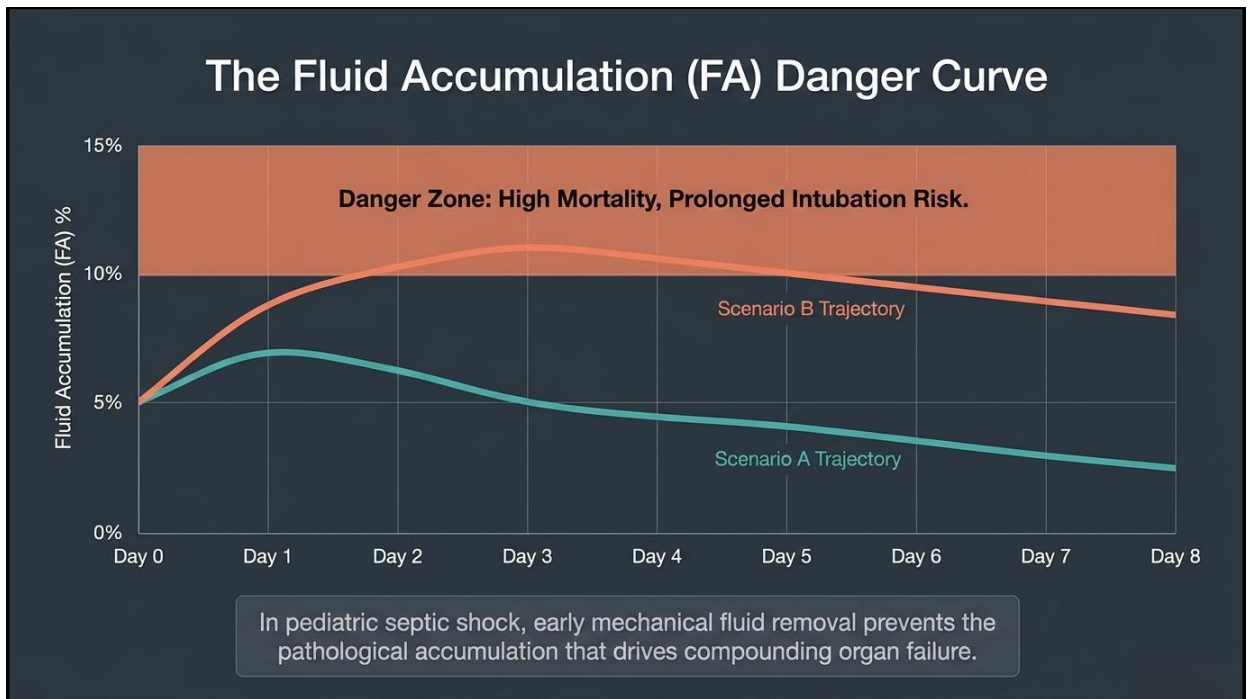
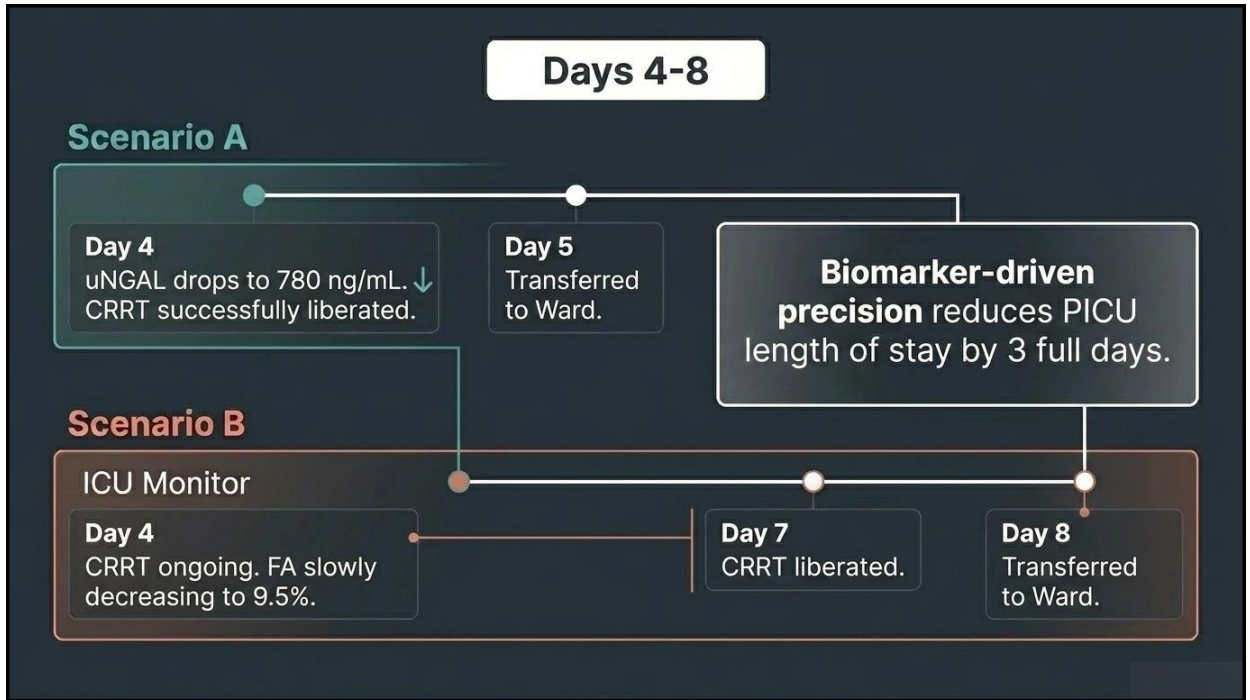
FA: 11% sCr: 5x

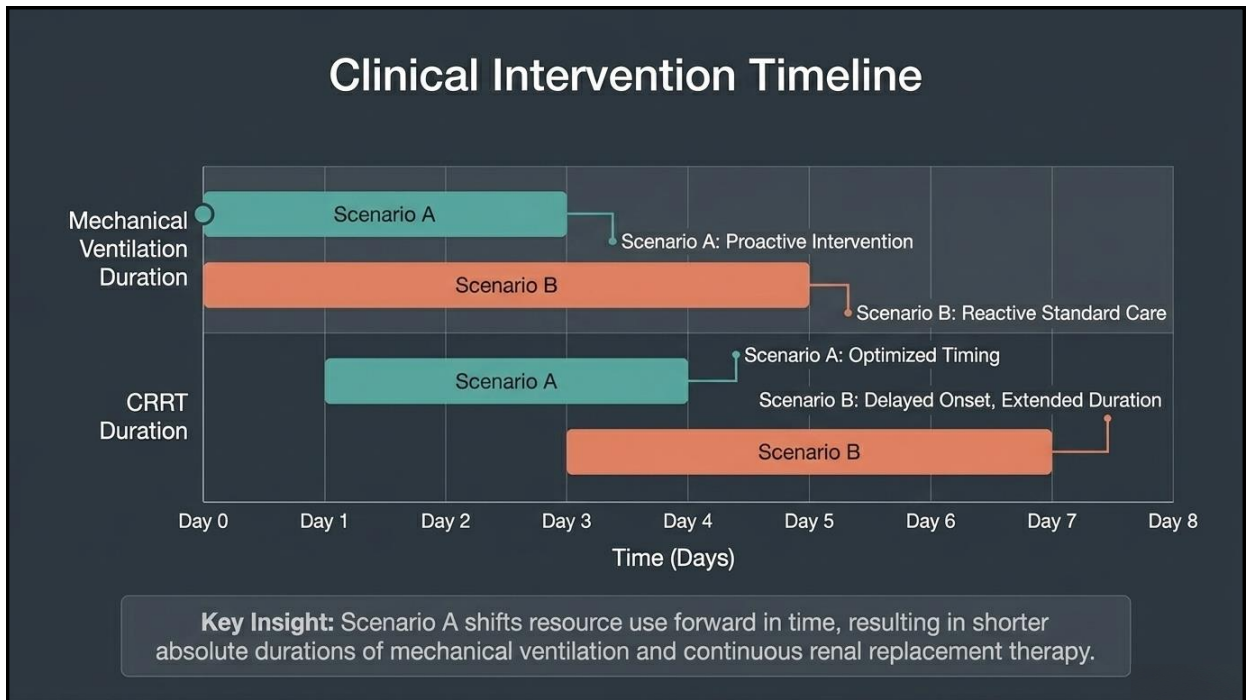
UOP: Oligo-anuric

Status: Worsening respiratory failure (FIO₂ 0.7, PEEP 8).

Intervention: Emergent CRRT started at 11:00.

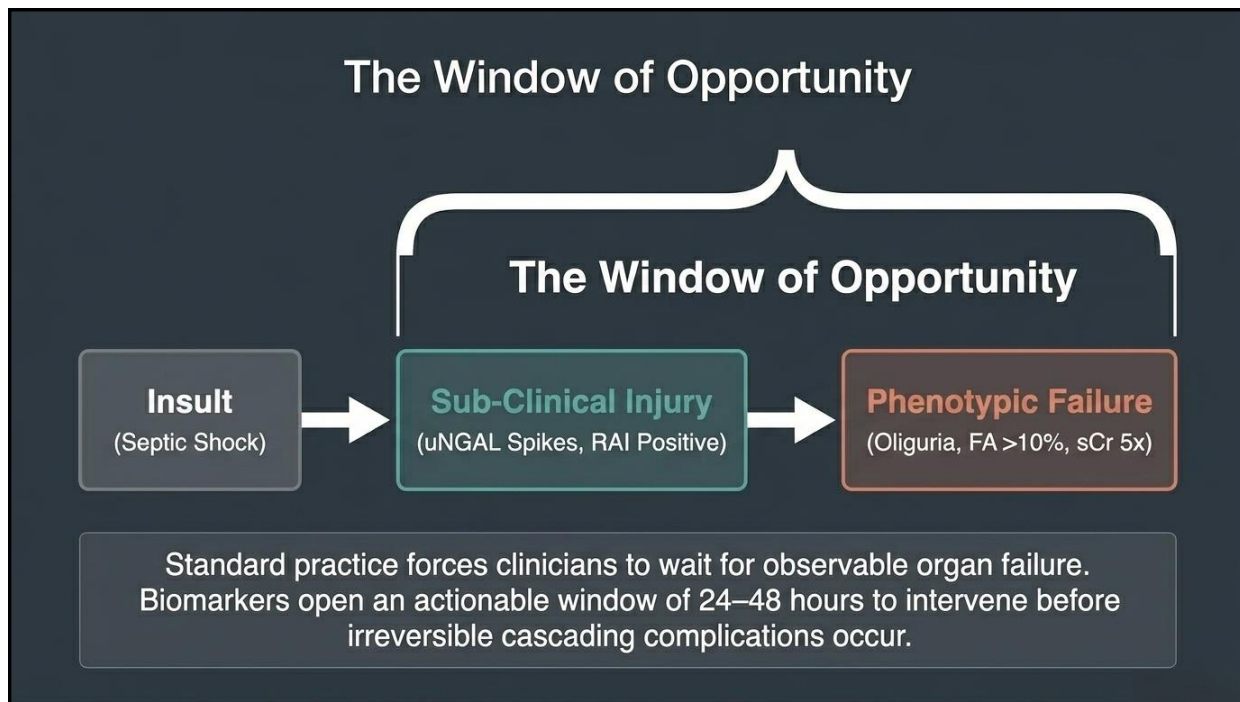
Phenotypic failure forces aggressive, reactive mechanical intervention under deteriorating conditions.





Tale of Two Pathways

Dimension	Scenario A (Biomarker-Driven)	Scenario B (Standard Care)
Trigger for CRRT	Elevated uNGAL (1380 ng/mL) & rising FA	Oligo-anuria, sCr 5x, respiratory failure
Peak Fluid Accumulation	7% (Avoids danger zone)	11% (Breaches danger zone)
Serum Creatinine Trend	[Line graph showing a single peak followed by a steady decline]	[Line graph showing multiple peaks and a slower decline]
Nutrition Status	Optimal nutrition maintained	Restricted to IV glucose due to FA
PICU Discharge	Day 5	Day 8



KL REPORTS 2023
CLINICAL RESEARCH

Real-Time Acute Kidney Injury Risk Stratification—Biomarker Directed Fluid Management Improves Outcomes in Critically Ill Children and Young Adults

Stuart L. Goldstein¹, Kelli A. Krallman¹, Jean-Philippe Roy¹, Michaela Collins¹, Ranjit S. Chima¹, Rajit K. Basu², Lakhmir Chawla³ and Lin Fei¹

¹Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA; ²Lurie Children's Hospital, Chicago Illinois, USA; and ³Department of Veteran's Affairs, Washington, DC, USA

Pre TF2 era 2014-2017 (71 CRRT)
Vs.
TF2 era 2017-2021 (107 CRRT):

- (i) an automated RAI result at 12 hours of admission,
- (ii) a conditional uNGAL order for RAI >8,
- (iii) a CRRT initiation goal at 10% to 15% weight-based fluid accumulation.

Trial in AKI using NGAL and Fluid Overload to optimize CRRT Use (TAKING FOCUS2)

KI REPORTS 2023 CLINICAL RESEARCH Prevenzione, Cura, Innovazione
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Real-Time Acute Kidney Injury Risk Stratification–Biomarker Directed Fluid Management Improves Outcomes in Critically Ill Children and Young Adults


Check for updates

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¹Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA; ²Lurie Children's Hospital, Chicago Illinois, USA; and ³Department of Veteran's Affairs, Washington, DC, USA


- A total of 286 patients comprised 304 intensive care unit (ICU) RAI+ admissions; 178 patients received CRRT over the observation period (2014–2021).
- **5% of RAI- pts received CRRT vs 35% of RAI+**
- **Among RAI+ 33% NGAL+ received CRRT whereas 2.8% of NGAL-**
- Median time from ICU admission to CRRT initiation was 2 days shorter ($p < 0.002$), and 15% pre-CRRT fluid accumulation rate was lower in the TF2 era ($p < 0.02$).
- TF2 ICU length of stay (LOS) after CRRT discontinuation and total ICU LOS were 6 and 11 days shorter for CRRT survivors (both $p < 0.02$).
- Survival rates to ICU discharge after CRRT discontinuation were higher (46% vs 65%) in the TF2 era ($p < 0.001$). These associations persisted in each TF2 year;
- we estimate a conservative \$12,500 health care cost savings per CRRT patient treated after TF2 implementation.

Systemic ROI



Reduced Healthcare Costs

The TAKING FOCUS 2 (TF2) study demonstrated a conservative cost savings of \$12,500 per ICU admission when using this enriched algorithm.



Improved ICU Capacity

Expedited liberation from CRRT and earlier extubation shortens PICU Length of Stay, increasing overall bed availability and throughput.



Optimized Resource Allocation

Eliminates wait-and-see hesitancy regarding mechanical fluid removal, aligning the right clinical action to the right patient.

CONCLUSIONS

- CRRT timing should move from reactive to proactive
- Fluid balance should be anticipated in order to minimize time on CRRT
- Watch and wait strategy should be balanced by enrichment strategies
- CRRT should be started at the right time in the right moment

