



AKI CRRT 2025

6TH ASIA PACIFIC AKI CRRT

OPTIMIZING AKI CARE:
BRIDGING GAPS ACROSS DIVERSE SETTINGS

 October 2 - 4, 2025

 Eastin Grand Hotel Phayathai
Bangkok, Thailand

Program & Abstract Book

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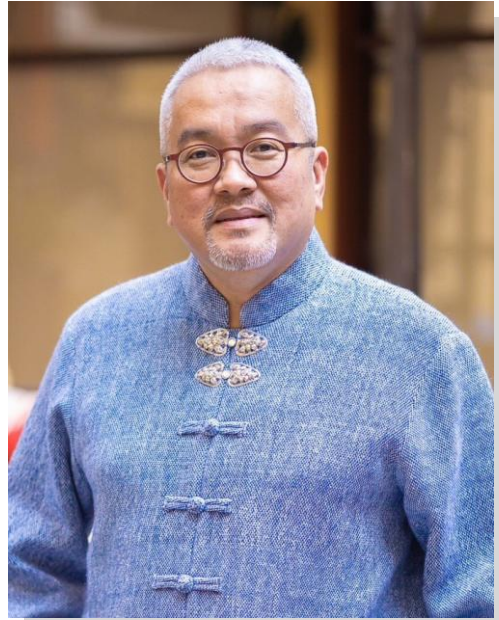
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Welcome Message from President, The Nephrology Society of Thailand

On behalf of the Nephrology Society of Thailand, it is my great honor and privilege to welcome you to the **6th Asia Pacific AKI CRRT 2025 Conference** in Bangkok, Thailand.

This year's event marks a significant milestone in advancing our collective knowledge and understanding of **acute kidney injury (AKI)** and **continuous renal replacement therapy (CRRT)**, which are crucial topics in the field of critical care medicine and nephrology. As healthcare professionals, we face continuous challenges in managing patients with AKI and multiple organ failure in diverse settings, and it is through collaboration, innovation, and the sharing of expertise that we can make strides toward improving patient care across the Asia Pacific region and beyond.



The conference promises to bring together the brightest minds in critical care nephrology to explore the latest research, clinical practices, and technological advancements in AKI, CRRT and blood purification. It will be an exceptional opportunity for networking, exchanging ideas, and strengthening the bonds between healthcare providers dedicated to improving the lives of those affected by kidney diseases.

We are excited to share the latest developments and engage in meaningful discussions with distinguished speakers, renowned experts, and passionate professionals from various parts of the world. Together, we will work towards enhancing patient outcomes, developing best practices, and building a stronger, more unified approach to tackling AKI and CRRT.

Thank you for your participation, and we look forward to a productive, inspiring, and successful event.

Sincerely,

Vuddhidej Ophascharoensuk, M.D.
President, The Nephrology Society of Thailand



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Bancha Satirapoj

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Sadudee Peerapornratana

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Warangkana Pichaiwong

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Peerapat Thanapongsatorn	<i>COMMITTEE</i>



SPEAKER

International Speakers

Australia

Ian Baldwin

Belgium

Eric Hoste

Canada

Neesh Pannu

China

Li Yang

France

Stephane Gaudry

Thomas Rimmele

India

Raj Chakaravathi

Italy

Claudio Ronco

Japan

Kent Doi

Malaysia

Sunita Bavanandan

Singapore

Manish Kaushik

South Africa

Brett Cullis

South Korea

Harin Rhee

Sejoong Kim

Taiwan

Vincent Wu

UK

Marlies Ostermann

USA

Ashita Tolwani

Jay Koyner

John Kellum

Kathleen Liu

Keith Wille

Kianoush Kashani

Ravindra Mehta

Sandra Kane-Gill

Shina Menon

Thai Speakers

Adisorn Lumpaopong

Adisorn Pathumarak

Anan Chuasuwan

Anirut Pattaragarn

Anutra Chittinandana

Arin Pisanuwongse

Atthaphong Phongphithakchai

Chaisith Sivakorn

Dusit Lumlertgul

Kamol Khositrangsikun

Khanitha Yimsangyad

Kittrawee Kritmetapak

Konggrapun Srisuwan

Kornchanok Vareesangthip

Korntip Phonphok

Kriang Tungsanga

Kriengsak Vareesangthip

Kritsada Pongsakornkullachart

Kunchit Piyavechviratana

Naowanit Nata

Napak Samritpab

Nattachai Srisawat

Natthamat Supakulthadasiri

Nuttapol Pattamin

Nuttha Lumlertgul

Opas Tritanon

Paphataya Noosalung

Pattarin Pirompanich

Pattharawin Pattaranithima

Paweena Susantitaphong

Peerapat Thanapongsatorn

Piyawan Kittiskulnam

Pongsathorn Gojaseni

Prapaipim Thirakhupt

Prit Kusirisin

Ranistha Ratanarat

Sadudee Peerapornratana

Sajja Tatiyanupanwong

Sarinya Boongird

Satit Rojwatcharapibarn

Sinee Disthabanchong

Sirirat Anutrakulchai

Suchai Sritippayawan

Sukit Raksasuk

Surachet Vongsanim

Surat Tongyoo

Suri Tangchitthavorngul

Suwimon Siripunyathikarn

Talerngsak Kanjanabuch

Thananda Trakarnvanich

Thanom Supaporn

Thipdhorn Aritajati



Thai Speakers (Cont.)

Thummaporn Naorungroj

Vuddhidej Ophascharoensuk

Wanjak Pongsittisak

Warangkana Pichaiwong

Wasineenart Mongkolpun

Wasineenart Mongkolpun

Watanyu Parapiboon

Weerachai Chaijamorn

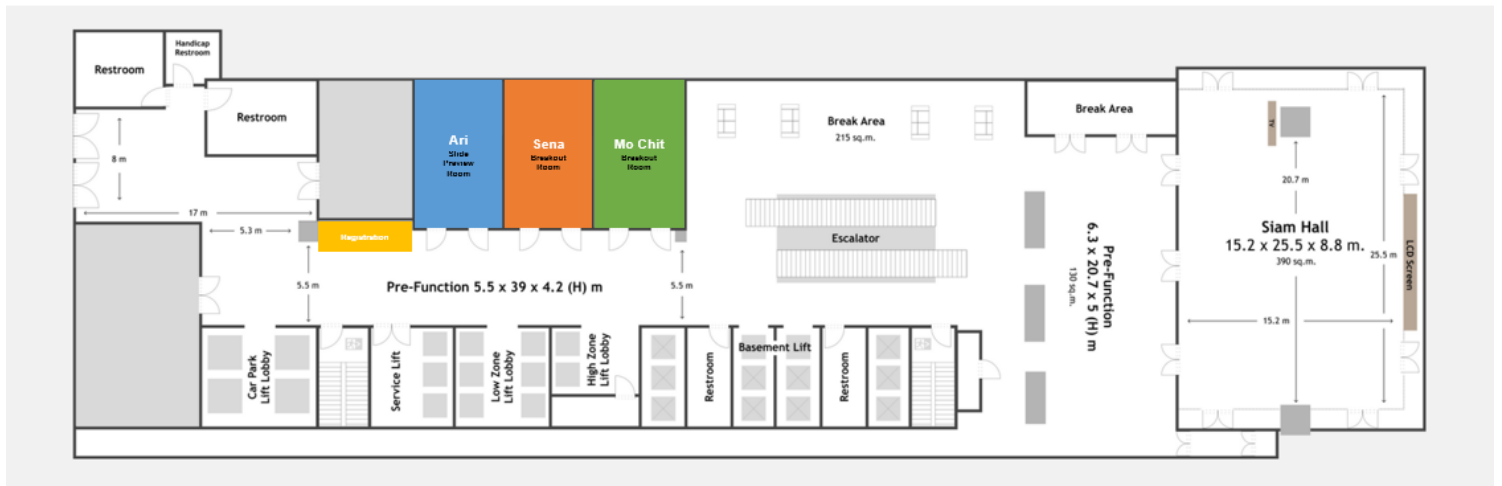
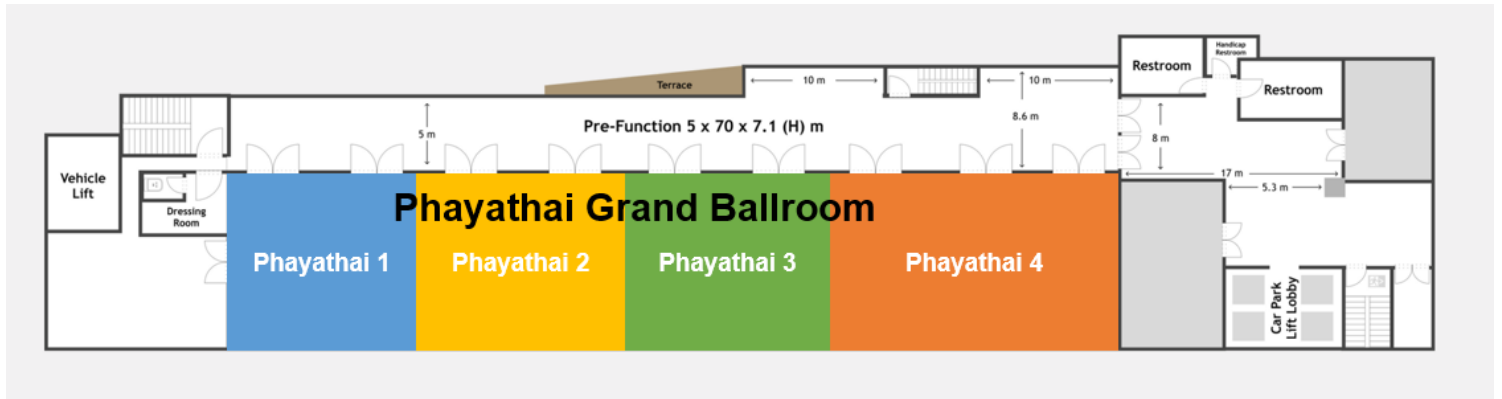
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Yanarin Thunsiribuddhichai

FLOOR PLAN

6th Floor





SCIENTIFIC PROGRAM

Day 1: Thursday October 2, 2025

7:00	Pre-Congress Registration Open			
	CRRT Physician Track Practice-Based Learning in CRRT: The Science and the Art <i>Ashita Tolwani, Manish Kaushik, Nuttha Lumlertgul, Marlies Ostermann, Ian Baldwin, Keith Wille</i>	POCUS Workshop <i>Limited 30 seats (Pre-Registered Only)</i> <i>Kianoush Kashani, Eric Hoste, Thammaporn Naorungroj, Surat Tongyoo, Wasineenart Mongkolpun, Thipdhorn Aritajati,Pattarin Pirompanich, Chaisith Sivakorn, Satit Rojwatcharapibarn, Kritsada Pongsakornkullachart, Napak Samritpab</i>	Peritoneal Dialysis in AKI Workshop <i>Brett Cullis, Raj Chakravarthi, Sunita Bavanandan, Talerngsak Kanjanabuch, Watanyu Parapiboon, Sajja Tatiyanupanwong, Kamol Kositrangsikun, Arin Pisanuwongse, Sukit Raksasuk Paphataya Noosalung, Suwimon Siripunyathikarn</i>	CRRT Nurse Track <i>Ian Baldwin, Sandra Kane-Gill, Khanitha Yimsangyad, Wilaiporn Akkabut, Natthamat Supakulthadasiri</i>
7:45-10:00	Ballroom 1-2 Part 1: CRRT Principles <i>Chair: Manish Kaushik, Nuttha Lumlertgul</i>	Room Sena POCUS Part 1	Room Mo Chit PD in AKI Part 1 <i>Chair: Brett Cullis, Talerngsak Kanjanabuch</i>	Ballroom 4 CRRT Nurse Track Part 1
7:45-8:00	Opening Remarks <i>Ashita Tolwani</i>	See details here .	See details here .	See details here .
8:00-8:20	Patient Selection, Modality, Dose <i>Manish Kaushik</i>			
8:20-8:40	The ABC of the CRRT prescription <i>Ashita Tolwani</i>			
8:40-9:00	Access, Membrane, Circuit <i>Manish Kaushik</i>			
9:00-9:20	Anticoagulation <i>Ashita Tolwani</i>			
9:20-9:40	Solutions and Fluid Balance <i>Nuttha Lumlertgul</i>			
9:40-10:00	Drug Dosing <i>Sandra Kane-Gill</i>			
10:00-10:30	Coffee Break			
10:30-12:30	Ballroom 1-2 Part 2: Implementing CRRT <i>Chair: Marlies Ostermann, Sadudee Peerapornratana</i>	Room Sena POCUS Part 2	Room Mo Chit PD in AKI Part 2	Ballroom 4 CRRT Nurse Track Part 2
10:30-10:50	Nutritional Support During CRRT <i>Piyawan Kittikulnam</i>	See details here .	See details here .	See details here .
10:50-11:10	Dysnatremia, and Acid-Base Disorders <i>Marlies Ostermann</i>			
11:10-11:30	Paper to Digital, E-Prescribing and Charting for CRRT During AKI in the ICU <i>Ian Baldwin</i>			
11:30-11:50	Connectology with Hybrid Systems: ECMO, Apheresis, ECCO2R <i>Keith Wille</i>			
11:50-12:10	Developing Quality Measures for CRRT Delivery <i>Sadudee Peerapornratana</i>			
12:10-12:30	Integrating Multidisciplinary Support Team for CRRT Delivery <i>Ian Baldwin</i>			
12:30-14:00	Ballroom 1-2 Lunch Symposia 1 (Fresenius Medical Care) Enhancing Filter Lifetime in CKRT and Strategic Insights for RCA Implementation <i>Nattachai Srisawat, Raj Chakravarthi</i> <i>Moderators: David Thompson, Chokethawee Ouejjaraphant</i>	Ballroom 4 Lunch Symposia 2 (NorrDia) Extracorporeal Support Made Practical: Evidence-Based Approaches in the ICU Personalized Hemoadsorption with Point-of-Care Control <i>Makariy Mendibaev</i> ECCO2R as Respiratory Support in ARF: Rationale and Application in Clinical Practice <i>Matthias Hilty</i> Optimize Anticoagulation in CRRT: From Evidence to Clinical Practice <i>Nuttapol Pattamin</i>		



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14:00-15:30	Ballroom 3, 4 CRRT Equipment Demonstrations <i>(Physicians and Nurses)</i> Select 2 from 7 stations (45 minutes each) Chair: <i>Atthaphong Phongphithakchai, Prit Kusirisin</i>	Room Sena POCUS Part 3	
	Station 1: Prismax <i>Ashita Tolwani, Manish Kaushik</i> Station 2: Multifiltrate Pro <i>Marlies Ostermann, Suri Tangchithavorngul</i> Station 3: Carpediem <i>Shina Menon, Kongrapun Srisuwan</i> Station 4: CytoSorb <i>Peerapat Thanapongsatorn, Atthaphong Phongphithakchai</i> Station 5: Jafron Hemoadsorption <i>Claudio Ronco, Adisorn Pathumarak</i> Station 6: Aquarius <i>Thomas Rimmele, Nuttapol Pattamin</i> Station 7: ECMO with CRRT, Plasmapheresis <i>Keith Wille, Prit Kusirisin</i>	See details here .	
15:30-16:00	Coffee Break		
16:00-17:55	Ballroom 1-2 and 4 Session 1: Patient Characteristics Plenary 1: Organ Dysfunction in the Critically Ill Patients: Emerging Concepts and AKI Pathophysiology Chair: <i>Kathleen Liu, Nattachai Sisawat</i>		
16:00-16:10	Congress Opening Remarks <i>Ravindra Mehta, Vuddhidej Ophascharoensuk, Kunchit Piyavechviratana</i>		
16:10-16:25	Worsening Kidney Function in Acute Decompensation Heart Failure <i>Claudio Ronco</i>		
16:25-16:40	Organ Crosstalk in AKI <i>Kent Doi</i>		
16:40-16:55	Refractory Shock: Recognition and Management <i>Kianoush Kashani</i>		
16:55-17:10	Managing Patients with ARDS <i>Keith Wille</i>		
17:10-17:40	AI In The ICU: Are We Ready? Yes: <i>Kianoush Kashani</i> No: <i>Shina Menon</i> Maybe: <i>Jay Koyner</i>		
17:40-17:55	Q&A		
18:00-20:00	Ballroom 4, Room Sena, Room Mo Chit Reception / Oral Presentation and Poster Walk Chair: <i>Claudio Ronco, John Kellum, Li Yang</i> Co-chair: <i>Ranitha Ratanarat, Pongsathorn Gojaseni, Anirut Pattaragarn</i>		
20:00	Adjourn		

Day 2: Friday October 3, 2025

7:00	Congress Registration Open			
8:00-8:45	Ballroom 4 Meet the Expert 1 How Do I Use Hemoadsorption in My Practice? <i>Claudio Ronco, Thomas Rimmele</i>	Room Sena Meet the Expert 2 How Do I Manage the Oliguric Patient? <i>Kathleen Liu, Sejoong Kim</i>	Room Mo Chit Meet the Expert 3 How Do I Run Regional Citrate Anticoagulation in My Practice? <i>Ashita Tolwani, Peerapat Thanapongsathorn</i>	
9:00-11:00	Ballroom 1-3 and 4 Session 2: Controversies in Critical Care Nephrology Plenary 2: Challenges in ICU Management Chair: Kianoush Kashani, Kunchit Piyavechviratana			
9:00-9:15	SGLT2 Inhibitors and Critical Illness <i>Marlies Ostermann</i>			
9:15-9:30	Chat GPT Applications in Critical Care Nephrology <i>Kianoush Kashani</i>			
9:30-9:45	Barriers to Effective Patient Education and Follow Up in AKI Recovery <i>Neesh Pannu</i>			
9:45-10:00	Hepatorenal Syndrome: Recognition and Management <i>Marlies Ostermann</i>			
10:00-10:15	Managing Heterogeneity in Critical Illness: Emerging Strategies <i>John Kellum</i>			
10:15-11:00	Special Session: 40 Years of AKI and CRRT: Reflections and Predictions Moderator: Marlies Ostermann and Kianoush Kashani Panel list: Claudio Ronco, John Kellum, Ravindra Mehta, Ian Baldwin, Li Yang, Brett Cullis, Ranistha Ratanarat			
11:00-11:30	Coffee Break			
11:30-12:30	Ballroom 1-3 Workshop 1A Nutritional Strategies for AKI and CRRT: Can We Improve Outcome? Chairs: Thanom Supaporn, Kornlip Phonphok <i>Eric Hoste, Piyawan Kittikulnam</i>	Ballroom 4 Workshop 1B Citrate Anticoagulation for CRRT: How to Use It? Chairs: Paweena Susantilaphong, Wanjak Pongsittisak <i>Ashita Tolwani, Nattachai Srisawat</i>	Room Sena Workshop 1C Personalized Fluid Management with CRRT Chairs: Worawon Chaillimpamontree, Kitrawee Kritmetapak <i>Ravindra Mehta, Thummaporn Naorungroj</i>	Room Mo Chit Workshop 1D Peritoneal Dialysis for AKI Chairs: Suchai Sritippayawan, Sarinya Boongird <i>Brett Cullis, Watanyu Parapiboon, Talermsak Kanjanabuch</i>
12:30-14:00	Ballroom 1-3 Lunch Symposium 3 (Vantive) Optimizing RRT: Data-Driven Perspectives on CRRT Outcomes Chair: Ashita Tolwani RRT Modality Matters in Critically Ill AKI Patients <i>Jay Koyner</i> NetUF Rate and Quality Metrics for CRRT <i>Manish Kaushik</i>		Ballroom 4 Lunch Symposia 4 (CytoSorbents) CytoSorb in the ICU: Addressing Inflammation and Organ Dysfunction <i>Ricard Ferrer</i> Exploring Innovations in Detoxification: The Role of CytoSorb in Intoxication and Drug Overdose Management <i>Maria Soledad Taborda-Küpper</i>	
14:00-15:00	Ballroom 1-3 Workshop 2A Starting, Transitioning, and Stopping RRT for AKI Chairs: Kriengsak Vareesangthip, Naowanit Nata <i>Ravindra Mehta, Nuttha Lumlertgul</i>	Ballroom 4 Workshop 2B Precision Solute Control and Dynamic Dosing with CRRT? Chairs: Sirirat Anutrakulchai, Anan Chuasuwan <i>Ranistha Ratanarat, Manish Kaushik</i>	Room Sena Workshop 2C Assessing of Fluid Responsiveness, POCUS, and Hemodynamic Monitoring Chairs: Warangkana Pichaiwong, Thummaporn Naorungroj <i>Keith Wille, Surat Tongyoo</i>	Room Mo Chit Workshop 2D Plasma Exchange in Critically Ill Patients: Who, When, and How? Chairs: Adisorn Lumpaopong, Kornchanok Vareesangthip <i>Shina Menon, Vincent Wu</i>
15:00-15:30	Coffee Break			



15:30-17:00	Ballroom 1-3 and 4 Session 3: Emerging concept in AKI and CRRT Plenary 3: Novel strategies in AKI management/Challenges and Controversies in Renal Support and CRRT <i>Chair: Dusit Lumlertgul, Kent Doi</i>
15:30-15:45	Role of Functional Reserve on AKI Risk and Recovery <i>Claudio Ronco</i>
15:45-16:00	How Best to Assess Renal Recovery after AKI <i>Jay Koyner</i>
16:00-16:15	Net Balance vs Net Ultrafiltration: What Matters? <i>Ravindra Mehta</i>
16:15-16:30	Starting RRT for AKI: How Late is Too Late? <i>Stephane Gaudry</i>
16:30-16:45	RRT Dose-Intensity in AKI: Time to Revisit <i>Kathleen Liu</i>
16:45-17:00	PIRRT in Critically Ill with AKI: Does It Have a Role? <i>Eric Hoste</i>
17:15-19:15	Ballroom 4, Room Sena Oral Presentation and Poster Walk <i>Chair: Marlies Ostermann, Kent Doi</i> <i>Co-chair: Paweena Susantitaphong, Pattharawin Pattaranithima</i>
19:15	Adjourn

Day 3: Saturday October 4, 2025

7:00	Congress Registration Open			
8:00-8:45	Ballroom 4 Meet the Expert 4 How Do I Manage the Patient with Septic AKI? <i>John Kellum, Nattachai Srisawat</i>	Room Sena Meet the Expert 5 How Do I Use AKI Biomarkers in My Practice? <i>Jay Koyner, Stephane Gaudry</i>	Room Mo Chit Meet the Expert 6 How Do I Adjust Drugs During RRT? <i>Sandra Kane-Gill, Weerachai Chaijamorn</i>	
8:45-10:30	Ballroom 1-3 and 4 Session 4: AKI in Asia Pacific region Plenary 4: Improving outcome of AKI in resource limited setting <i>Chair: Kriang Tungsanga, Vincent Wu</i>			
8:45-9:00	Changing Spectrum of AKI in China <i>Li Yang</i>			
9:00-9:15	Sex and Gender Differences in AKI <i>Nuttha Lumlertgul</i>			
9:15-9:30	Tropical Nephrology: Leptospirosis, Dengue, Malaria <i>Nattachai Srisawat</i>			
9:30-9:45	Pregnancy-Associated AKI: an Unmet Need <i>Raj Chakravarthi</i>			
9:45-10:00	Acute PD vs Acute HD: Which Is the Right Choice? <i>Brett Cullis</i>			
10:00-10:30	Inequity in Healthcare and Effects on AKI/CRRT in Asia Pacific Region <i>Vuddhidej Ophascharoensuk, Raj Chakravarthi, Nattachai Srisawat</i>			
10:30-11:00	Coffee Break			
11:00-12:15	Ballroom 1-3 and 4 Session 5: Improving Outcomes in AKI Plenary 5: Global Burden of AKI <i>Chair: Prapaipim Thirakhuft, Eric Hoste</i>			
11:00-11:15	Changing Epidemiology of AKI: What Have We Learned? <i>Neesh Pannu</i>			
11:15-11:30	New Horizons in AKD Care and Prevention <i>Vincent Wu</i>			
11:30-11:45	Controversies Issues in CRRT: Insights from Korean Guidelines <i>Sejoong Kim</i>			
11:45-12:00	Greening CRRT: Opportunities and Challenges <i>Harin Rhee</i>			
12:00-12:15	Pediatric AKI: Advances and Opportunities <i>Shina Menon</i>			
12:15-13:45	Ballroom 1-3 Lunch Symposia 5 (Vantive) Setting the Stage for ECOS in Critical Care <i>Chair: Ravindra Mehta</i> Tackling the Hyperinflammatory Conditions with Extracorporeal Blood Purification <i>Nattachai Srisawat</i> Expanding Possibilities with ECCO ₂ R: Clinical Evidence and Practice <i>Matthew Cove</i>	Ballroom 4 Lunch Symposia 6 (Jafron Astromed) Hemoadsorption: The State of The Art in Blood Purification Current Trends of Hemoadsorption in the Management of Various Clinical Indication <i>Claudio Ronco</i> Hemoadsorption in Sepsis and ARDS <i>Ranistha Ratanarat</i> Perioperative Use of Hemoadsorption <i>Suneerat Kongsayreepong</i>		
13:45-14:45	Ballroom 1-3 Workshop 3A Adapting CRRT for Patients with Electrolyte and Acid-Base Disorders <i>Chair: Anutra Chittinandana, Surachet Vongsanin</i> <i>Eric Hoste, Nuttapol Pattamin</i>	Ballroom 4 Workshop 3B Hemoadsorption: Technique and Application <i>Chair: Thananda Trakamvanich, Suri Tangchitthavongul</i> <i>Thomas Rimmele, Sadudee Peerapomratana</i>	Room Sena Workshop 3C Optimization of CRRT Program to Improve Outcomes <i>Chair: Sinee Disthabanchong, Opas Tritanon</i> <i>Ian Baldwin, Harin Rhee</i>	Room Mo Chit Workshop 3D Pediatric AKI and CRRT: Caring for the Patient <i>Chair: Anirut Pattaragarn, Konggrapun Srisuwan</i> <i>Shina Menon, Yanarin Thunsinbuddhichai</i>
14:45-15:15	Coffee Break			

15:15-17:30	Ballroom 1-3 and 4 Session 6: Future Trends in CRRT and Critical Care Plenary 6: Emerging Strategies in AKI And Extracorporeal Support Update From Ongoing Trial and Late Breaking Trial <i>Chair: Sejoong Kim, Pongsathorn Gojaseni</i>
15:15-15:30	What's New in Blood Purification in the ICU? <i>Claudio Ronco</i>
15:30-15:45	Clinical Decision Support Systems for AKI Management <i>Neesh Pannu</i>
15:45-16:00	Drug Nephrotoxicity in Onconeurology <i>Sandra Kane-Gill</i>
16:00-16:15	The RELIEVE-AKI Trial <i>Kianoush Kashani</i>
16:15-16:30	ESTOP AKI Trial <i>Jay Koyner</i>
16:30-16:45	TIGRIS Trial <i>John Kellum</i>
16:45-17:00	AKI Epi-2 Trial <i>Eric Hoste</i>
17:00-17:30	Critical Care Nephrology: Year in Review <i>Kianoush Kashani</i>
17:30-17:45	Closing Ceremony (Award Announcement)
17:45	Conference Adjourn

ORAL PRESENTATION

Date: October 2, 2025

Room: Ballroom 4

Chairman:

Dr.Claudio Ronco

Co-chairman:

Dr.Ranistha Ratanarat

Present time	Present code/Presenter	Abstract title
18.00-18.10	O-01 Akinori Maeda <i>University of Tokyo Hospital, Japan</i>	A Scoping Review of MAKE Definitions and Their Growing Use in AKI Research
18.10-18.20	O-02 Veerapatr Nimkietkajorn <i>Buddhachinaraj Hospital Phitsanulok, Thailand</i>	Metformin-associated Lactic Acidosis with Severe Acute Kidney Injury in ICU: Long-term Kidney Outcomes and Clinical Risk Factors
18.20-18.30	O-03 Thitikarn Jungteerapanich <i>Thammasat University, Thailand</i>	Comparative Outcomes of Acute Kidney Injury Before and After Extracorporeal Membrane Oxygenation Initiation: A Retrospective Cohort Study
18.30-18.40	O-04 Prit Kusirisin <i>Chiang Mai University, Thailand</i>	Association Between Acute Kidney Injury, Delirium, and Outcomes in Patients with Critical Illness: A Systematic Review and Meta-Analysis
18.40-18.50	O-05 Priyadarshini John K J <i>Osmania General Hospital, India</i>	The CRRT Conundrum in Indian Public Hospitals: Financial, Infrastructural, and Human Resource Challenges
18.50-19.00	O-31 Prit Kusirisin <i>Chiang Mai University, Thailand</i>	Association Between Mitochondrial Gene Expression and Metabolomic Alterations in Patients with Severe COVID-19 Pneumonia Treated with Cytokine Adsorption Therapy

ORAL PRESENTATION

Date: October 2, 2025
 Chairman: Dr.John Kellum
 Room: Sena
 Co-chairman: Dr.Pongsathorn Gojaseni

Present time	Present code/Presenter	Abstract title
18.00-18.10	O-07 Wittawat Hongmeng <i>Division of Nephrology, Thammasat University, Pathumthani, Thailand, Thailand</i>	Factors Influencing Energy Expenditure in Critically Ill Patients with Acute Kidney Injury
18.10-18.20	O-08 Emwalee Piti <i>Thammasat University Hospital, Thailand</i>	Telemedicine Versus Face-to-face Follow-Up in Post-AKI survivors: A Randomized controlled trial.
18.20-18.30	O-10 Yu-Tang Sung <i>National Taiwan University Hospital (NTUH), Taiwan</i>	Cardiovascular-Kidney-Metabolic Staging Predicts Long-Term Outcomes in Patients with Acute Kidney Disease
18.30-18.40	O-11 Areerat Ounhasuttiyanon <i>Division of Nephrology, Department of Medicine, Siriraj Hospital, Mahidol University, Thailand</i>	Impact of Acute Kidney Injury Severity and Onset on Mortality and Renal Outcomes in Patients Receiving Veno-Arterial Extracorporeal Membrane Oxygenation: A Retrospective Study
18.40-18.50	O-12 Surasak Faisatjatham <i>Division of Nephrology, and Center of Excellence in Critical Care Nephrology, Faculty of Medicine, Chulalongkorn University Excellence Center for Critical Care Nephrology, King Chulalongkorn Memorial Hospital, Thailand</i>	Long-Term Kidney Outcomes in Sepsis-associated Acute Kidney Injury: The Impact of Tropical and Non-Tropical Sepsis
18.50-19.00	O-33 Bhornrattikarn Polhan <i>Phramongkutklao Hospital and College of Medicine, Thailand</i>	Clinical Predictors of Acute Kidney Injury in Exertional Heat Stroke: A Retrospective Cohort from a Thai Military ICU

ORAL PRESENTATION

Date: October 2, 2025
Room: Mo Chit

Chairman: Dr. Li Yang
Co-chairman: Dr. Anirut Pattaragarn

Present time	Present code/Presenter	Abstract title
18.00-18.10	O-13 Win Kulvichit <i>Division of Nephrology, Department of Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand</i>	Comparison of Filter Lifetime between Hypertonic Versus Isotonic Regional Citrate Anticoagulation Protocol during Continuous Renal Replacement Therapy: A Randomized Controlled Trial
18.10-18.20	O-14 Chanon Chiarnpattanodom <i>Thammasat University hospital, Thailand</i>	Impact of Renal Replacement Therapy Timing on Outcomes in Extracorporeal Membrane Oxygenation Therapy: A Retrospective Cohort Study
18.20-18.30	O-16 Yohei Komaru <i>The University of Tokyo Hospital, Japan</i>	Application of Endotoxin Activity Assay for Better Clinical Practice: a scoping review
18.30-18.40	O-17 Jirapat Vamananda <i>Faculty of Pharmaceutical Sciences, Chulalongkorn University, Thailand</i>	Meropenem Dosing Recommendations in Critically Ill Patients Receiving Alternate-Day Prolonged Intermittent Renal Replacement Therapy
18.40-18.50	O-18 Weerasak Pan-Ngern <i>Sirindhorn Khon Kaen Hospital, Thailand</i>	Development of Health Literacy and Clinical Outcomes in the Integrated Model for Slowing and Restoring Kidney Function in Chronic Kidney Disease.

ORAL PRESENTATION

Date: October 3, 2025

Room: Ballroom 4

Chairman: Dr. Marlies Ostermann

Co-chairman: Dr. Paweena Susantitaphong

Present time	Present code/Presenter	Abstract title
17.15-17.25	O-15 Prit Kusirisin <i>Chiang Mai University, Thailand</i>	A Protocol-Based Furosemide Stress Test to Evaluate Renal Recovery During Continuous Renal Replacement Therapy (FST-STOP): A Pilot Randomized Controlled Trial
17.25-17.35	O-19 Yashaswini Saraswathi Bhatt <i>Gandhi Hospital, India</i>	Postoperative Acute Kidney Injury in Patients after Non-Cardiac Surgeries – An Observational Study from a Tertiary Care Teaching Hospital
17.35-17.45	O-20 Kadhir Kadhir Selvan <i>Indian Society of Nephrology, India</i>	Acute Peritoneal Dialysis in AKI and Scrub Typhus: Outcomes
17.45-17.55	O-21 Ahmad Faraz <i>JSS Academy of Higher Education & Research, Mysuru, India</i>	Pregnancy-Related Acute Kidney Injury: A Prospective and Retrospective Observational Study from a Tertiary Care Center in South India
17.55-18.05	O-22 Ukrit Prajantasen <i>Excellence Center for Critical Care Nephrology, King Chulalongkorn Memorial Hospital, Thailand</i>	Epidemiology and Clinical Outcome of Leptospirosis Associated AKI in Thailand: 10 Years Result from Thai-Lepto AKI Study Group
18.05-18.15	O-23 Sorawit Wihakhaphirom <i>Chiang Mai University, Thailand</i>	Long-Term Kidney Outcomes in Diabetic Patients with Severe Lactic Acidosis: Interim Analysis of a Multicenter Observational Study

ORAL PRESENTATION

Date: October 3, 2025
Chairman: Dr.Kent Doi
Room: Sena
Co-chairman: Dr.Pattharawin Pattaranithima

Present time	Present code/Presenter	Abstract title
17.15-17.25	O-25 Thanphisit Trakarnvanich <i>King Chulalongkorn Memorial Hospital, Thailand</i>	A Prospective Study of Venous Excess Ultrasound (VExUS), Lung Ultrasound and Bioimpedance Analysis for Venous Congestion Assessment in Acute Kidney Injury During Continuous Renal Replacement Therapy
17.25-17.35	O-26 Weerinth Puyati <i>Central Chest Institute of Thailand, Thailand</i>	Improving Long-Term Kidney Outcomes in Acute Kidney Injury (AKI) Survivors: Effectiveness of a Multidisciplinary, Education-Focused AKI Clinic
17.35-17.45	O-27 Supawiwat Rodjanasingha <i>Hua-Hin Hospital, Thailand</i>	Preloading Intravenous Magnesium Sulfate to Reduce Vancomycin Induced Nephrotoxicity: An Open - Label, Randomized Controlled Trial (MARVIN study)
17.45-17.55	O-28 Theerapon Sukmark <i>Thungsong Hospital, Nakhon Si Thammarat, Thailand, Thailand</i>	Severe Acute Kidney Injury Reduction with Leptospirosis Care Bundle: A multicenter Randomized Controlled Trial
17.55-18.05	O-29 Anyarin Wannakittirat <i>Naresuan University Hospital, Thailand</i>	The Effects of Sodium-Glucose Cotransporter-2 (SGLT2) Inhibitor on Long-Term Outcomes in Post-Severe Acute Kidney Injury Survivors: 12-month follow-up
18.05-18.15	O-30 Jui Yi Chen <i>Chi Mei Medical Center, Taiwan</i>	Clinical Outcomes of Angiotensin-Converting Enzyme Inhibitors and Angiotensin II Receptor Blockers in Older Adults More Than 85 Years after Acute Kidney Injury
18.15-18.25	O-32 Bastian Lubis <i>Department of Anaesthesiology & Intensive Care, Faculty of Medicine, Universitas Sumatera Utara, Indonesia</i>	Effect of Therapeutic Plasma Exchange on Outcomes of Patients with Autoimmune Neurological Hospitalised in the ICU of Adam Malik Hospital

POSTER PRESENTATION

Date: October 2, 2025

Present code	Presenter	Abstract title
P-02	Phalita Sirichotikul <i>Division of Nephrology, Department of Pediatrics, Phramongkutklao Hospital, Thailand</i>	Demographics, Indications, and Outcomes of Continuous Kidney Replacement Therapy in Critically Ill Children: A Single-Center Experience from Thailand
P-03	Suri Tangchitthavorngul <i>Division of Nephrology, Department of Medicine, Faculty of Medicine, Naresuan University, Phitsanulok, Thailand</i>	Impact of Frailty and Quality of Life on Long-term Survival in Critically Ill Patients after Severe Acute Kidney Injury
P-04	Pimchanok Thamkoson <i>Chonburi Hospital, Thailand</i>	Incidence, Risk factors, and Outcomes of Acute Kidney Injury in ELBW and VLBW Preterm Infants at a Tertiary NICU in Thailand
P-05	Sitanun Chinangkulpiwat <i>Bhumibol Adulyadej Hospital, Royal Thai Air Force, Thailand</i>	Lupus Cystitis Leading to Post-Renal AKI and Renal Vein Thrombosis: A Case of Multi-Organ SLE
P-06	Napat Wongmat <i>American Heart Association Comprehensive Hypertension Center at the University of California Irvine Medical Center, Division of Nephrology, Hypertension and Kidney Transplantation, Department of Medicine, University of California Irvine School of Medicine, United States</i>	Ten-Year Trend of Racial Disparities in Acute Kidney Injury Mortality between Black and White Populations in the United States
P-08	Yanarin Thunsiribuddhichai <i>Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand</i>	Acute Kidney Injury in Overweight/Obese Children with Dengue Hemorrhagic Fever
P-09	Issaree Boonyawannukul <i>Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand</i>	Racial Disparities in Mortality Proportion from Acute Renal Failure: A Population-Based Analysis Using U.S. Mortality Data, 2018–2023

Present code	Presenter	Abstract title
P-10	Supawit Samchusri <i>University of California Irvine, Thailand</i>	Silent Kidneys in the Shadow of Immunotherapy: A Case from the Frontlines of HCC Treatment.
P-11	Bancha Satirapoj <i>Phramongkutklao Hospital and College of Medicine, Thailand</i>	Plasma N-Terminal Pro B-Type Natriuretic Peptide (NT-proBNP) Levels Predict Kidney Function Decline Among Hospitalized Patients at High Cardiovascular Risk
P-12	Wisit Kaewput <i>Phramongkutklao College of Medicine, Thailand</i>	Unexpected Increase in In-Hospital Mortality Among Acute Kidney Injury Patients Receiving Continuous Renal Replacement Therapy: Healthcare Cost and Utilization Project – National Inpatient Sample (HCUP NIS) 2018–2021
P-13	Haizah Nurdin <i>Department of Anesthesiology, Intensive Therapy, and Pain Management, Faculty of Medicine, Hasanuddin University, Indonesia</i>	The Relationship between Renal Resistive Index and Central Venous Pressure with the Incidence of Acute Renal Failure in Critically Ill Patients at Risk with Risk of Acute Renal Failure in ICU
P-14	Rathanon Leevongsakorn <i>Faculty of Medicine, Chulalongkorn University, Thailand</i>	Cardiac-Associated Acute Kidney Injury in Resource-Limited Settings: A Multicenter Cohort Study of Long-Term Outcomes in Southeast Asia and India
P-15	Adisorn Pathumarak <i>Ramathibodi Hospital, Thailand</i>	Machine Learning Model for Predicting Kidney Replacement Therapy Dependence from Acute Kidney Injury Requiring Dialysis in Critically Ill Patients
P-16	Issaree Bunyawannukul <i>University of California, Irvine, Thailand</i>	Impact of the COVID-19 Era on Acute Kidney Injury Mortality: An Analysis of CDC WONDER Data, 2015-2023
P-17	Tanat Lertussavavivat <i>Faculty of Medicine, Chulalongkorn University, Thailand</i>	Influence of Socioeconomic Factors on the Initiation of RRT in Critically Ill Patients
P-18	Peerasit Sae-Lim <i>Department of Internal Medicine, Faculty of Medicine, Prince of Songkhla University, Thailand</i>	Outcomes and Predictors of Acute Kidney Injury after Contrast-Enhanced CT in a Large Real-World Retrospective Cohort
P-20	Mary Lim <i>Singapore General Hospital, Singapore</i>	Prescribing Practices of Sustained Low-Efficiency Dialysis Among Physicians in South-East Asia
P-21	Prasittiporn Tangjitaree <i>King Chulalongkorn Memorial Hospital, Thailand</i>	The Comparison of Circuit Lifespan between Integration and Separation Approach in Extracorporeal Membrane Oxygenation Patient Requiring Continuous Renal Replacement Therapy Support, (E-CRRT Trial)

Present code	Presenter	Abstract title
P-22	Ramya Vajjhala <i>Singapore General Hospital, Singapore</i>	Feasibility of Laboratory Monitoring from Continuous Kidney Replacement Therapy Circuit in the Absence of Conventional Blood Sampling Access: A Case Report
P-24	Kyung Sook Jung <i>Pusan National University, Republic of Korea</i>	Targeted Versus Fixed Dosing of Nafamostat Mesylate Anticoagulation for Continuous Kidney Replacement Therapy
P-26	Adisorn Pathumarak <i>Mahidol University, Thailand</i>	Efficacy of Convection-based Hemodiafiltration Compare with Diffusion-based Hemodialysis in Sepsis-associated Acute Kidney Injury: A Randomized Controlled Trial
P-27	Nurul Zaynah Nordin <i>Hospital Kuala Lumpur, Ministry of Health, Malaysia</i>	Intermittent Hemodialysis Practices, Albumin Priming Variation, and Outcomes in a Resource-Limited ICU
P-28	Toopran Samatha <i>Gandhi Hospital, Hyderabad, India</i>	CRRT Characteristics and Outcomes in Paraquat Associated AKI - A Study from a Tertiary Care Hospital in India
P-35	Narongrit Siri Wattanasit <i>Phramongkutklao Hospital and College of Medicine, Thailand</i>	The Effect of Intravenous Thiamine Supplementation on AKI Outcomes in Sepsis Patients: A Randomized Controlled Trial
P-36	Sejoong Kim <i>Seoul National University Bundang Hospital, Republic of Korea</i>	Sustained Impact of Electronic AKI Alert System: A Decade-Long Analysis
P-50	Panita Chuanramluk <i>Department of Medicine, Khon Kaen Hospital, Thailand</i>	Successful Treatment of Acute Paraquat Poisoning with Continuous Venovenous Hemofiltration and Repeated Hemoadsorption: A Case Report without Long-Term Sequelae
P-56	Bastian Lubis <i>Department of Anaesthesiology & Intensive Care, Faculty of Medicine, Universitas Sumatera Utara, Indonesia</i>	Effect of Continuous Renal Replacement Therapy (CRRT) on Sepsis Induced Acute Kidney Injury (S-AKI) in Intensive Care Unit (ICU) Patients at Rumah Sakit Umum Pusat Haji Adam Malik Medan



POSTER PRESENTATION

Date: October 3, 2025

Present code	Presenter	Abstract title
P-01	Shrignanaprasannambika T <i>Department of Nephrology, JSS Medical college and Hospital, India</i>	Incidence of Aki in Non-Critical Geriatric Population and Correlation with Clinical Profile in Tertiary Care Hospital
P-07	Harin Rhee <i>Pusan National University, Republic of Korea</i>	Clinical Characteristics of Acute Kidney Injury Diagnosed by Decreasing Serum Creatinine Criteria
P-23	Chu Chen <i>Vantive Health LLC, China</i>	Clinical Safety Analysis of Incompatible Disposables in Continuous Renal Replacement Therapy
P-25	Minmin Wang <i>Vantive Health LLC, China</i>	Clinical Demand-Driven Engineering Disparities Between IHD Dialyzers and CRRT Filters: A Multidimensional Analysis
P-29	Watanyu Parapiboon <i>Maharat Nakhonratchasima Hospital, Thailand</i>	Early-Start vs. Conventional-start Peritoneal Dialysis in AKI from Cardiorenal Syndrome Type 1, A Randomized Controlled Trial (STARRT-PD)
P-30	Pudit Chiamwittayanukul <i>Phramongkutklao Hospital and College of Medicine, Thailand</i>	The Neutrophil-to-Lymphocyte Ratio as a Predictive Marker for Acute Kidney Injury in Hospitalized Sepsis Patients.
P-31	Chung-Mo Chang <i>St.Joseph's Hospital, Taiwan</i>	A Pilot Study Protocol Evaluating the Feasibility and Safety of Empagliflozin in Acute Kidney Injury with Residual Renal Function
P-32	Bantita Sirapatpong <i>Department of Medicine, Khon Kaen Hospital, Thailand</i>	Acute Kidney and Liver Injury Following Cyprinid Fish Gallbladder Ingestion: A Case Series from Thailand
P-33	Pongsathorn Gojaseni <i>Bhumibol Adulyadej Hospital, Thailand</i>	Incidence of Acute Kidney Injury Following Initiation of SGLT2 Inhibitor in Acute Heart Failure: A Randomized Controlled Trial
P-34	Sitthikorn Thingphom <i>Division of Nephrology, Department of Internal Medicine, Faculty of Medicine, Prince of Songkla University, Thailand</i>	High concordance of ABG and central laboratory electrolytes enables rapid ICU decision-making in AKI
P-39	Shuang Tong <i>Vantive Health LLC, China</i>	Clinician-Centered Digital Medical Education: Bridging Evidence into Practice for AKI-CRRT Management

Present code	Presenter	Abstract title
P-40	Shuang Tong <i>Vantive Health LLC, China</i>	A Tiered Digital Education Model for AKI/CRRT Training in China: Bridging the Gap in Underserved Settings
P-41	Bussaya Ploypradub <i>Phramongkutklao Hospital, Thailand</i>	Impact of Normal Saline Flush Volume and Patient Factors on Clotting During Hemodialysis
P-42	Khanittha Yimsangyad <i>King Chulalongkorn Memorial Hospital, Thailand</i>	Clinical Outcomes of RRT Initiation in Critically Ill Patients During In-Hours Versus Off-Hours
P-43	Lifang Wei <i>Third People's Hospital Affiliated to Fujian University of Traditional Chinese Medicine, China</i>	Workflow Analysis for Vancomycin Dosing and Monitoring
P-44	Chidttawan Hirunsomboon <i>The College of Pharmacotherapy of Thailand, Thailand</i>	Population Pharmacokinetics of Vancomycin in Critically ill Patients Undergoing Continuous Renal Replacement Therapy
P-45	Supawadee Suppadungsuk <i>Chakri Naruebodindra Medical Institute, Thailand</i>	Evaluating the Role of Lower Extremity Elastic Bandage in Patients with Diuretic-Resistant Heart Failure
P-46	Jathurong Kittrakulrat <i>Chulalongkorn University, Thailand</i>	Combined Use of Oxiris and HA-330 in an Elderly Patient With Biliary Sepsis: A Case of Successful Cytokine Storm Control
P-47	Stephanie Ler <i>Ng Teng Fong General Hospital, Singapore</i>	Membranous Therapeutic Plasma Exchange Utilising Prismaflex® in Drug-intolerant Thyroid Storm
P-48	Nattachai Srisawat <i>Chulalongkorn University, Thailand</i>	Extracorporeal Blood Purification With the oXiris Filter for Patients With Sepsis and Hyperinflammatory Conditions: The Asia-Pacific oXiris Expert Meeting 2024 Consensus Statements
P-49	Juthamash Sangsuk <i>Chiangkham Hospital, Thailand</i>	Combined Blood Purification Therapy Two-Step Approach for Management of Hypertriglyceridemia Induced Acute Severe Necrotizing Pancreatitis
P-51	Yifan Wei <i>Vantive Healthcare Trading (Shanghai) Co., Ltd., China</i>	Acute Kidney Injury and Renal Replacement Therapy in China: Current Trends and Practices from a National Clinical Survey

Present code	Presenter	Abstract title
P-52	Sitanun Chinangkulpiwat <i>Bhumibol Adulyadej Hospital, Royal Thai Air Force, Thailand</i>	Toluene-Related AKI: Single-Session Dialysis as an Effective Rescue Strategy
P-53	Tee Tat Khoo <i>Hospital Sultan Idris Shah Serdang, Malaysia</i>	Acute Kidney Injury in Extracorporeal Membrane Oxygenation (ECMO) Patients: A Single-Center Retrospective Study
P-54	Thaya Naksawasdi <i>Bhumibol Adulyadej Hospital, Royal Thai Air Force, Thailand</i>	Extracorporeal Blood Purification in Heatstroke
P-55	Napat Tangjitcharoen <i>Chakri Naruebodindra Medical Institute Ramathibodi Hospital, Mahidol University, Thailand</i>	Seronegative Immune-Mediated Necrotizing Myopathy with Rhabdomyolysis-Induced Acute Kidney Injury: The Role of Medium Cut-Off Membrane Dialysis
P-57	Sei-Hong Min <i>Hallym University Sacred Heart Hospital, Republic of Korea</i>	Impact of Early vs. Late Initiation of Continuous Renal Replacement Therapy on Composite Outcomes Including AKD and Mortality: A Multicenter retrospective Cohort Study (LINKA cohort)



SPEAKER'S ABSTRACT



Pre-Congress (Practice-Based Learning in CRRT: The Science and the Art)
Thursday October 2, 2025
11:10-11:30 hr.

Paper to Digital, E-Prescribing and Charting for CRRT during AKI in the ICU

Ian Baldwin

Austin Health, Dept. of Intensive Care (Affiliate), Australia

Recent experience during the COVID-19 Pandemic mandated new paperless documentation and a surge into e-prescribing for CRRT. Intensive Care Unit (ICU) clinical information system (CIS) may not provide for CRRT beyond the basic data fields for fluid balance charting. Contemporary needs are prescribing therapy mode settings, fluids used, fluid balance, anticoagulation methods, biochemistry data and results, forward plans, and other decisions associated with CRRT during the course of an illness in ICU. The final construct is a role sensitive shared design with nurses, pharmacists and doctors having different access to functionality, different screen views, entries, sign off needs and charting. The three key domains are prescribing (orders), charting (recording), forward planning and consideration of deviations (monitoring). The removal of paper has some benefits and the new approach with Live and networked digital function creates a new future. The future may also include machine learning and AI with decision making and more for clinicians to use with prescribing.

Suggested reading.

Ian Baldwin, Jian Wen Chan, Stuart Downs, Connor Palmer; e-Prescribing, Charting, and Documentation for Continuous Renal Replacement Therapy: A Green Intensive Care Unit and Nephrology Initiative. *Blood Purif* 2025 54(1): 18-27; <https://doi.org/10.1159/000541487>

Arabi YM, Azoulay E, Al-Dorzi HM, Phua J, Salluh J, Binnie A, et al. How the COVID-19 pandemic will change the future of critical care. *Intensive Care Med.* 2021;47(3):282-91.

Stevens JS, Velez JCQ, Mohan S. Continuous renal replacement therapy and the COVID pandemic. *Semin Dial.* 2021;34(6):561-6.



Karkar A, Ronco C. Prescription of CRRT: a pathway to optimize therapy. *Annals of intensive care*. 2020;10(1):32.

Neyra JA, Yessayan L, Thompson Bastin ML, Wille KM, Tolwani AJ. How To Prescribe And Troubleshoot Continuous Renal Replacement Therapy: A Case-Based Review. *Kidney360*. 2021;2(2):371-84.

Teixeira JP, Neyra JA, Tolwani A. Continuous KRT: A Contemporary Review. *Clin J Am Soc Nephrol*. 2023;18(2):256-69.

Verma S, Palevsky PM. Prescribing Continuous Kidney Replacement Therapy in Acute Kidney Injury: A Narrative Review. *Kidney Med*. 2021;3(5):827-36.

Zamanzadeh D, Feng J, Petousis P, Vepa A, Sarrafzadeh M, Karumanchi SA, et al. Data-driven prediction of continuous renal replacement therapy survival. *Research square*. 2023.



Pre-Congress (Practice-Based Learning in CRRT: The Science and the Art)
Thursday October 2, 2025
12:10-12:30 hr.

Integrating Multidisciplinary Support Team for CRRT Delivery

Ian Baldwin

Austin Health, Dept. of Intensive Care (Affiliate), Australia

Continuous Renal Replacement Therapy (CRRT) requires a group of people providing expertise along the 'pipeline' for successful clinical use and can include vendors, those in the local hospital supply chain, biomedical technicians, pharmacy, clinicians; medical and nursing. In some centres the model of care and the CRRT program is associated with the local dialysis or nephrology team. In any case the Intensive Care Unit (ICU) clinical team requires a smaller group who should be acknowledged and supported as the 'champions' with a role to resource and sustain the program, undertake quality and audit, key communications. The champions are best represented by key doctors, nurses, local managers, teachers and clinician nurses. When CRRT is considered a program or specialty initiative, team meetings are vital to keep momentum and manage change or updates and the champions team are best to write and maintain a policy or protocol. E-mail lists, smart phone apps, and or notice board news letters are some ideas for linking to the clinical users across a 24/7 ICU setting. The turnover and constant new people in larger ICU's can make the champions group work constant, and succession planning is always a key strategy for keeping the use of CRRT to a high standard and be well resourced. The frequency of use helps negate many needs as familiarity and high exposure ensures confidence and more. Some publications are available to refer and this presentation will provide a review of key ideas for the multidisciplinary support team for CRRT delivery.

Suggested reading.

1. Yu X, Ouyang L, Li J, Peng Y, Zhong D, Yang H, Zhou Y. Knowledge, attitude, practice, needs, and implementation status of intensive care unit staff toward continuous renal replacement therapy: a survey of 66 hospitals in central and South China. BMC Nurs. 2024 Apr 26;23(1):281.
2. Teixeira JP, Neyra JA, Tolwani A. Continuous KRT: A Contemporary Review. Clin J Am Soc Nephrol. 2023 Feb 1;18(2):256-269.



3. Lee KH, Sol IS, Park JT, Kim JH, Shin JW, Park MR, Lee JH, Kim YH, Kim KW, Shin JI. Continuous Renal Replacement Therapy (CRRT) in Children and the Specialized CRRT Team: A 14-Year Single-Center Study. *J Clin Med*. 2019 Dec 31;9(1):110.
4. Rhee H, Jang GS, Han M, Park IS, Kim IY, Song SH, Seong EY, Lee DW, Lee SB, Kwak IS. The role of the specialized team in the operation of continuous renal replacement therapy: a single-center experience. *BMC Nephrol*. 2017 Nov 13;18(1):332
5. Oh HJ, Lee MJ, Kim CH, Kim DY, Lee HS, Park JT, Na S, Han SH, Kang SW, Koh SO, Yoo TH. The benefit of specialized team approaches in patients with acute kidney injury undergoing continuous renal replacement therapy: propensity score matched analysis. *Crit Care*. 2014 Aug 13;18(4):454.
6. Rewa OG, Eurich DT, Noel Gibney RT, Bagshaw SM. A modified Delphi process to identify, rank and prioritize quality indicators for continuous renal replacement therapy (CRRT) care in critically ill patients. *J Crit Care*. 2018 Oct;47:145-152.
7. Baldwin I, Mottes T. Acute kidney injury and continuous renal replacement therapy: A nursing perspective for my shift today in the intensive care unit. *Semin Dial*. 2021;34(6):518-29.



Session 1: Patient Characteristics / Plenary 1: Organ Dysfunction in the
Critically Ill Patients: Emerging Concepts and AKI Pathophysiology
Thursday October 2, 2025
16:25-16:40 hr.

Organ Crosstalk in Acute Kidney Injury

Kent Doi

*Department of Emergency and Critical Care Medicine, The University of
Tokyo, Japan*

Numerous clinical studies have shown that acute kidney injury (AKI) is often complicated by dysfunction of distant organs, which is a cause of the high mortality incidence associated with AKI. Experimental studies have elucidated many mechanisms of AKI-induced distant organ injury including the heart and the lung, which include inflammatory cytokines, oxidative stress, and immune responses. This presentation provides an update on evidence of organ crosstalk and potential therapeutics for AKI-induced organ injuries



Meet the Expert 2
Friday October 3, 2025
08:00-08:45 hr.

How Do I Manage the Oliguric Patient?

Sejoong Kim
Seoul National University College of Medicine, South Korea

Oliguria is a common and often alarming sign in critically ill patients, reflecting underlying renal hypoperfusion, tubular injury, or systemic dysregulation. Effective management requires timely differentiation between pre-renal, intrinsic, and post-renal causes, while avoiding both under- and over-resuscitation. In this session, I will present a structured diagnostic approach to oliguria, incorporating urine biochemistry, imaging, and dynamic assessments. I will also discuss the nuanced role of diuretics, fluid management strategies, and the timing of renal replacement therapy in oliguric patients, based on current guidelines and clinical experience.



Session 5: Improving Outcomes in AKI / Plenary 5: Global Burden of AKI
Saturday October 4, 2025
11:30-11:45 hr.

Controversial Issues in CRRT: Insights from Korean Guidelines

Sejoong Kim
Seoul National University College of Medicine, South Korea

Despite global advances in the delivery of continuous renal replacement therapy (CRRT), significant variability persists in indications, modality choices, and prescription strategies. In Korea, national guidelines were recently updated to address key controversies including CRRT initiation timing, dose intensity, anticoagulation, and fluid management. This talk will highlight the evidence and rationale behind these recommendations, with special attention to areas where Korean clinical practice diverges from international norms. Emphasis will be placed on practical decision-making in real-world ICU settings and ongoing efforts to integrate AI-based support systems into CRRT protocols.



Session 5: Improving Outcomes in AKI / Plenary 5: Global Burden of AKI
Saturday October 4, 2025
11:45-12:00 hr.

Greening CRRT: Opportunities and Challenges

Harin Rhee

Pusan National University, School of medicine, Nephrology

Greening of intensive care is essential; however, it is often challenging in critically ill patients, as the greening process often requires governmental level or health care leadership level top-down support. However, there still exist individual-level efforts that may work for greening. In this lecture, I will briefly share my experience.

Continuous kidney replacement therapy is the most common method of dialysis in the intensive care unit, requiring large amounts of fluid. In South Korea, CRRT dose is often delivered much higher than the KDIGO recommendation (20~25 mL/kg/hr), thus we did a quality improvement study that reduced (optimized) CRRT dose prescription. Reducing the dose prescription by 3.3 mL/kg/h resulted in savings of approximately 6.7 L of fluid and 1.3 dialysate packages per person per day, without compromising dialysis efficacy. Although these are small changes at the individual patient level, their impact on the environment would be substantial if similar fluid-saving strategies were adopted in centers worldwide.



Workshop 3C
Saturday October 4, 2025
13:45-14:45 hr.

Optimization of CRRT Program to Improve Outcomes

Harin Rhee

Pusan National University, School of medicine, Nephrology

Although KRT is commonly applied worldwide, there are minimal established criteria for monitoring the quality of care delivered. This symposium will outline the characteristics of top-tier CRRT programs and strategies for quality improvement by integrating data from CRRT devices and clinical information. The quality matrix for CRRT proposed in the 22nd ADQI conference will be briefly reviewed, and the importance of systematic dashboards and a team-based approach will also be discussed.

Quality metrics for CRRT and importance of team-based management:
Experience in South Korea: Harin Rhee

Quality improvement using CRRT dashboard: Ian Baldwin



ORAL PRESENTATION ABSTRACT

A Scoping Review of MAKE Definitions and Their Growing Use in AKI Research

Akinori Maeda^{1,2}, Ryota Inokuchi³, Rinaldo Bellomo², Kent Doi^{1,*}

¹ *Department of Emergency and Critical Care Medicine, University of Tokyo Hospital, Tokyo, Japan*

² *Department of Intensive Care, Austin Hospital, Melbourne, Australia*

³ *Department of Clinical Engineering, The University of Tokyo, Tokyo, Japan*

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Abstract:

Objectives: Acute kidney injury (AKI) is associated with persistent renal dysfunction, dialysis dependence, and mortality. Accordingly, the concept of major adverse kidney events (MAKE) has been adopted as a composite endpoint to assess the impact of AKI. However, the criteria and observation periods used to operationalize MAKE vary widely across studies.

Materials and Methods: We conducted a systematic scoping review to evaluate heterogeneity in MAKE definitions. Four major academic databases were searched for studies employing MAKE as an endpoint in AKI-related research. The search included articles published up to November 3, 2023. Additionally, we performed a PubMed search using the same query to assess publication trends through 2025.

Results: A total of 122 studies were included. We identified substantial heterogeneity in the criteria used for each MAKE component and in the observation periods, with 13 different timeframes reported. Persistent renal dysfunction was assessed using estimated glomerular filtration rate (34%) or serum creatinine (48%), with 38 distinct definitions. Dialysis criteria also varied significantly. MAKE rates differed by up to 7.0% depending on observation period and by 36.4% depending on dialysis definitions. Notably, the number of PubMed-indexed articles using MAKE has increased annually, with 33 articles in both 2022 and 2023, followed by 58 in 2024 and 49 in the first half of 2025.

Discussion and Conclusions: There is marked heterogeneity in MAKE definitions, particularly regarding component criteria and observation periods. The increasing number of publications highlights the growing relevance of MAKE in AKI research. Our findings underscore the need for consensus and standardization to ensure comparability and reliability of MAKE-based outcomes in future clinical trials.

Keywords: Major Adverse Kidney Events, Composite endpoint, Acute kidney injury, Dialysis dependence

Metformin-associated Lactic Acidosis with Severe Acute Kidney Injury in ICU: Long-term Kidney Outcomes and Clinical Risk Factors

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Abstract:

Objectives: Although metformin-associated lactic acidosis (MALA) is an uncommon condition, it is linked to a high short-term mortality rate when it occurs. Given the paucity of data regarding the long-term outcomes of patients with MALA, this study aimed to evaluate 2-year major adverse kidney events (MAKE) in critically ill patients with MALA and severe acute kidney injury (AKI).

Materials and Methods: Patients aged 18 years or older diagnosed with MALA and severe AKI were enrolled from intensive care units (ICU) across 24 hospitals between April 2019 and December 2023, as part of the India and Southeast Asia Renal Replacement Therapy (InSEA-RRT) registry. MALA was defined by recent metformin use, metabolic acidosis (arterial pH <7.35 or serum bicarbonate <15 mmol/L), and elevated serum lactate (>5 mmol/L). Severe AKI, defined as AKI stage 3 according to the Kidney Disease Improving Global Outcomes (KDIGO) criteria. The primary outcome was 2-year MAKE, defined as a composite endpoint including persistent kidney dysfunction, long-term dialysis, and all-cause mortality two years after enrollment.

Results: Among 179 patients, 50 (27.9%) died during hospitalization. Of the survivors, 42 (33.1%) experienced 2-year MAKE, comprising 22 deaths (17.3%), 15 cases of persistent kidney dysfunction (11.8%), and 5 required long-term dialysis (3.9%). The overall 2-year MAKE incidence rate was 21.5 per 100 person-years (95% CI 15.5–29.1). At two years follow-up, the incidence rates per 100 person-years for new-onset chronic kidney disease (CKD), CKD progression, kidney failure requiring long-term dialysis, and all-cause mortality were 74.1 (95% CI 52.5–100), 6.3 (95% CI 0.2–35), 7.7 (95% CI 2.8–16.7), and 10.9 (95% CI 7–16.3), respectively. Multivariable-adjusted analysis identified increasing age and lack of AKI recovery at 28 days or hospital discharge as independent risk factors for 2-year MAKE.

Discussion and Conclusions: ICU patients with MALA and severe AKI experience poor long-term clinical outcomes. Therefore, vigilant monitoring and treatment is essential, especially in high-risk individuals. Further study is required to evaluate targeted interventions that may help reduce mortality and morbidity in this population.

Keywords: Metformin-associated lactic acidosis, Acute kidney injury, Long-term outcomes, Major adverse kidney events

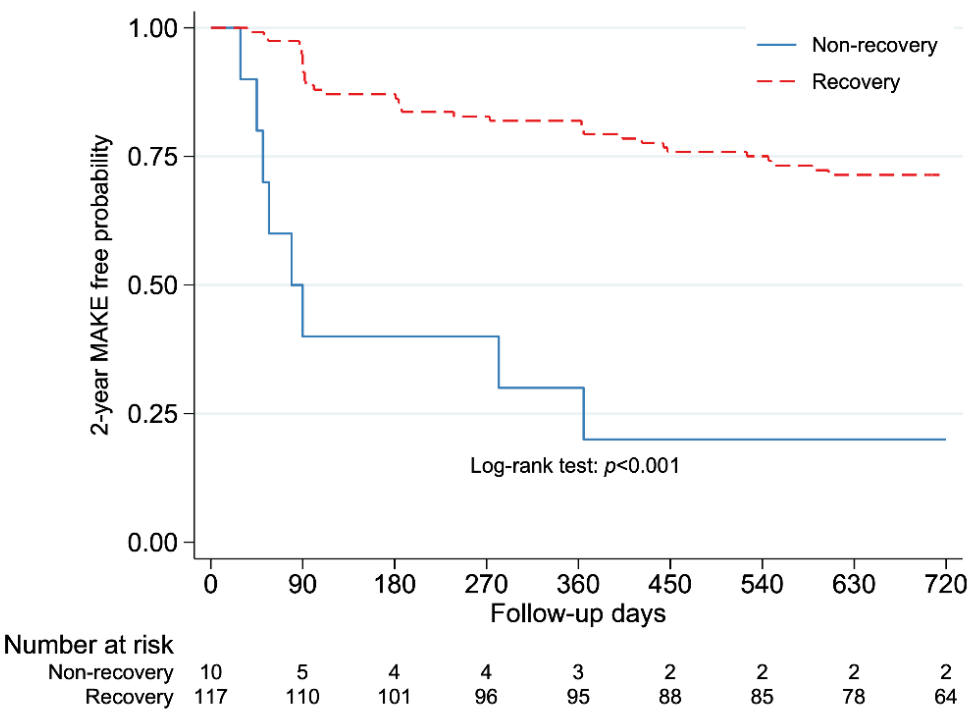


Figure1. The Kaplan-Meier curve for 2-year MAKE in patients by kidney recovery status at 28 days or hospital discharge

Comparative Outcomes of Acute Kidney Injury Before and After Extracorporeal Membrane Oxygenation Initiation: A Retrospective Cohort Study

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Abstract:

Objectives: Acute kidney injury (AKI) is a common and serious complication among critically ill patients receiving extracorporeal membrane oxygenation (ECMO). This study aimed to evaluate the incidence, timing, and clinical outcomes of AKI in ECMO-treated patients, focusing on the differences between AKI occurring before versus after ECMO initiation.

Materials and Methods: We conducted a retrospective cohort study of all adult patients who received ECMO therapy at Thammasat University Hospital between January 2020 and May 2025. Patients were classified into three groups: (1) AKI prior to ECMO initiation, (2) AKI after ECMO initiation, and (3) no AKI. Demographic data, clinical characteristics, ECMO parameters, and serial laboratory values were analyzed to compare outcomes across groups. Multivariable logistic regression was used to identify factors associated with in-hospital mortality.

Results: A total of 42 patients who received ECMO therapy were included. Of these, 4 patients (9.5%) did not develop AKI, 11 (26.2%) developed before-ECMO AKI, and 27 (64.3%) developed after-ECMO AKI. Baseline characteristics were generally comparable across groups, except for significantly higher serum creatinine levels in the before-ECMO AKI group at both baseline (1.8 vs. 1.1 vs. 1.1 mg/dL; $p < 0.001$) and ICU admission (2.6 vs. 1.4 vs. 1.1 mg/dL; $p = 0.001$). ICU mortality, in-hospital mortality, and length of stay did not differ significantly among groups. However, compared to the after-ECMO AKI group, patients with before-ECMO AKI had higher rates of severe AKI (81.8% vs. 81.5%; $p = 0.002$), CRRT use (63.4% vs. 62.9%; $p = 0.05$), and hyperbilirubinemia (72.7% vs. 22.2%; $p = 0.012$). In multivariable analysis, CRRT requirement was the only independent predictor of in-hospital mortality (OR 10.9; 95% CI 1.9–60.1; $p = 0.006$).

Discussion and Conclusions: AKI was highly prevalent among ECMO-treated patients, with distinct characteristics between before-ECMO AKI and after-ECMO AKI groups. Patients with before-ECMO AKI had more severe kidney injury, higher CRRT use, and increased hyperbilirubinemia. Only CRRT requirement independently predicted in-hospital mortality.

Keywords: Acute Kidney Injury, Extracorporeal Membrane Oxygenation, Renal Replacement Therapy

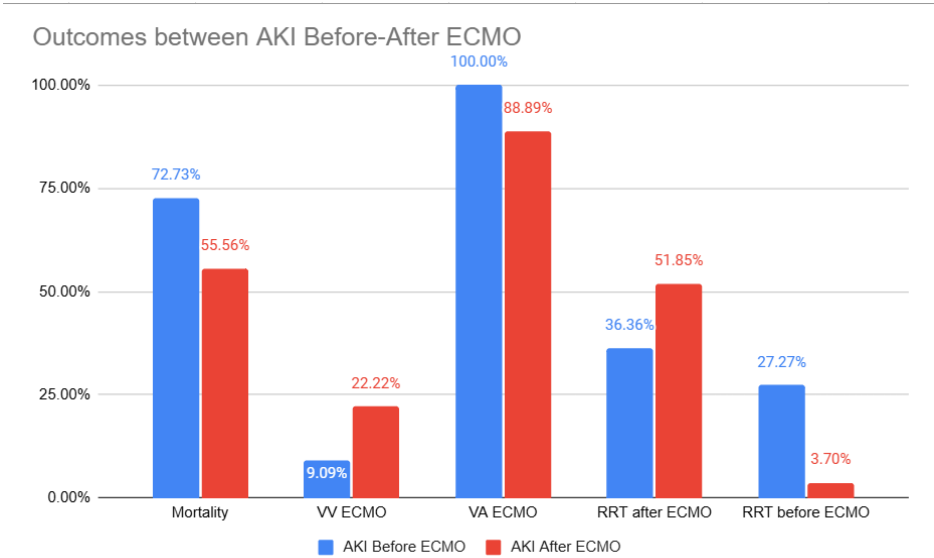


Figure1. Outcomes between AKI Before-After ECMO

Association Between Acute Kidney Injury, Delirium, and Outcomes in Patients with Critical Illness: A Systematic Review and Meta-Analysis

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Abstract:

Objectives: Acute kidney injury (AKI) and delirium are common complications of critical illness. However, relatively few studies have evaluated the relationship between these two conditions. We systematically synthesized existing evidence to better understand this association among critically ill patients through a systematic review and meta-analysis.

Materials and Methods: This study was registered in PROSPERO (CRD420251001864). We searched Ovid MEDLINE, Embase, CINAHL, Scopus, Web of Science Core Collection, and the Cochrane Library for English-language publications from January 2000 to January 2025. Eligible studies included clinical trials reporting both AKI and delirium in patients admitted to intensive care unit (ICU). Case reports, case series, and pre-clinical studies were excluded. Two reviewers independently screened, selected, extracted data, and assessed study quality. The primary outcome was the proportion of critically ill patients with AKI who developed delirium. Secondary outcomes included delirium incidence stratified by AKI severity, mortality, use of mechanical ventilation (MV), receipt of renal replacement therapy (RRT), vasopressor use, and length of stay.

Results: Eighteen observational studies comprising 158,694 patients were included. Overall quality, assessed using the Newcastle-Ottawa Scale, was moderate. The pooled proportion of delirium among patients with AKI was 32% [95% confidence interval (CI) 18-47%]. Stratified analysis by AKI stage showed the following odds ratios (OR) for delirium; stage 1, OR 1.17 (95%CI -0.2-2.54;p=1.00,I²=0%), stage 2, OR 1.22 (95%CI -0.92-3.35;p=1.00,I²=0%), and stage 3, OR 1.79 (95%CI 0.24-3.33;p=0.75,I²=0%). Delirium was associated with higher mortality [risk ratio (RR) 2.36; 95%CI 1.61-3.47;p<0.01,I²=79%), greater MV use (RR 2.08; 95%CI 1.46-2.98;p<0.01,I²=99%), greater RRT use (RR 3.12; 95%CI 1.89-5.15;p<0.01,I²=76%), more vasopressor use (RR 1.61; 95%CI 1.20-2.16;p<0.01,I²=79%), longer ICU stays [mean difference (MD) 3.54 days; 95%CI 1.20-5.87;p<0.01,I²=99%], and longer hospital stays (MD 4.78 days; 95%CI 3.48-6.09;p<0.01,I²=91%) compared to patients with AKI not experiencing delirium.



Discussion and Conclusions: Delirium is common among critically ill patients with AKI and is associated with worse clinical outcomes and greater health resource use. Strategies to improve the recognition and monitoring of delirium may enhance ICU care and mitigate adverse patient outcomes.

Keywords: Acute kidney injury; Critical illness; Delirium; Outcomes; Renal replacement therapy.

The CRRT Conundrum in Indian Public Hospitals: Financial, Infrastructural, and Human Resource Challenges

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Abstract:

Objectives: Continuous Renal Replacement Therapies (CRRT) are vital for critically ill patients with acute kidney injury. In India, implementing CRRT faces significant challenges due to resource demands, infrastructure, and trained personnel. This study assessed CRRT service accessibility and application in India's state-funded public sector hospitals, outlining limitations and proposing improvements. The study specifically aimed to evaluate CRRT services in state-funded public hospitals, where services are free.

Materials and Methods: A telephonic survey was done to collect data on CRRT service availability, machine numbers, and funding sources in these hospitals.

Results: CRRT services are markedly constrained, largely unavailable except in Odisha, Kerala, Tamil Nadu, and Telangana. Funding primarily comes from cashless government schemes with variable allocations (e.g., \$540 in Telangana to unlimited in Odisha). CRRT duration varies (24 hours to 1 week) linked to funding and patient condition, with standard full-day costs at \$500-\$800. Public health schemes, like Aarogyasri, cap reimbursement at \$540, aiding access. Most centers have 3-4 machines. Primary indications include hemodynamic instability, sepsis, poisoning, and pregnancy-related AKI. Free CRRT has improved nephrology training. Barriers include irregular disposable availability, lack of trained staff, insufficient nephrology services, and limited tertiary care. High infrastructure costs, inadequate policymaker vision, insufficient funding, and low health literacy also contribute. The 48-72 hour CRRT cost is approximately \$1100, often unaffordable for public sector patients, and delayed initiation in septic AKI increases mortality. Essential CRRT components include infrastructure, accessibility, affordability, human resources, appropriate indication, and accurate dosage. Healthcare barriers include inadequate ICU facilities, geographical disparities, and limited multidisciplinary teams. Lack of domestic manufacturing inflates disposable costs, and critical care services are limited by personnel and infrastructure gaps.

Discussion and Conclusions: CRRT utilization in Indian public sector hospitals faces substantial financial, infrastructural, and human resource challenges. Strategic interventions are crucial for enhancing cost-effectiveness and clinical efficiency.

Keywords: CRRT, public sector hospitals, limitations and challenges

	Telangana	Kerala	Tamil Nadu	Odisha	Karnataka	Andhra Pradesh	Maharashtra	Uttar Pradesh	Central India	Delhi NCR	Jammu Kashmir & Northeast India
Availability Of CRRT	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No
Funded by Government	Yes	Yes	Yes	Yes							
Name of the Scheme	Aarogyaasree		CMCHIS	BSKY							
Ceiling amount(USD)	540	Unlimited	867USD	Unlimited							
Duration of CRRT	24 Hrs	72 Hrs-1 week	48 Hours	72 Hours							
No of machines	4	4	6	6							
Facility in districts	No	No	No	No							
Preferred over IHD	No	Yes	No	No							
Preferred over PD	Yes	Yes	No	Yes							
Preferred over SLED	Yes	No	No	Yes							
Sessions till date	425	750	150	50							
CRRT use since	2 years	10 years	5 years	1 year							

Table 1. Access, funding, and regulatory differences of the use of CRRT across different states of the country

DOMAIN	BARRIERS	POTENTIAL SOLUTIONS
Patient-Related	Low health literacy (90% adults) - Delayed healthcare-seeking - High cost (USD 1100 for 48–72h CRRT) - Transport issues	Community awareness programs - Inclusion of CRRT in early AKI alerts - Expand government scheme coverage (Ayushman Bharat/Aarogyaasree) - Develop emergency transport systems
Healthcare-Related	Limited ICU infrastructure at primary/secondary care - Shortage of trained intensivists/nephrologists - No domestic manufacturing of consumables	Strengthen ICU capacity at PHCs/CHCs - Telemedicine support for remote ICU/CRRT management - Facilitation of local manufacturing of CRRT disposables
Community-Related	Poor road access to tertiary centres - Only ~2.3 ICU beds/100,000 population - Lack of critical care specialists	Improve ambulance/transport access - Public-private partnerships to expand ICU access - Mobile ICU/CRRT outreach models
Economic/Policy-Related	High cost vs. capped reimbursement (\$540/session) - Unequal distribution of resources	Adjust reimbursement to match actual cost - Cluster-based fund allocation (high-need districts) - Budget reallocation based on AKI incidence
Operational/Clinical	Overuse of CRRT duration - Inconsistent dosing and stopping - Filter downtime and inefficiency	Protocol-driven CRRT use - Monitor filter life, fluid balance, interruptions - Establish unit-level CRRT audit and quality metrics
Resource Utilization	High machine cost per centre - Staffing burden	Shared machine model across hospitals (hub-and-spoke) - Cross-train ICU nurses/technicians in CRRT monitoring
Modality Selection	Inflexible use of CRRT over alternatives	Consider PIRRT (Prolonged Intermittent RRT) in low-resource settings - Leverage evidence from meta-analyses supporting PIRRT in critical illness

Table2. barriers and potential solutions for delivery of crrt in resource limited setting

Factors Influencing Energy Expenditure in Critically Ill Patients with Acute Kidney Injury

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Abstract:

Objectives: The study aimed to identify factors influencing energy expenditure in critically ill patients with acute kidney injury (AKI), develop a predictive equation, evaluate its accuracy compared to other estimation methods and categorize patients into metabolic groups (hypometabolic, normometabolic, hypermetabolic).

Materials and Methods: A cross-sectional study was conducted at two medical ICUs between March and November 2023. Eighty critically ill patients with AKI were enrolled. Indirect calorimeter was used to measure indirect calorimetry energy expenditure (ICEE), and relevant data were gathered. Regression analyses, including stepwise forward modeling, were used to identify factors affecting ICEE and develop a predictive equation, while Bland-Altman plots and proportional bias analysis were employed to evaluate agreement and bias between ICEE and estimated energy expenditure methods.

Results: Significant factors influencing energy expenditure included body weight (BW), age, and serum creatinine (Cr). The developed predictive equation, “TEE-cAKI,” was: $\text{ICEE (kcal)} = 1275.385 + 9.517(\text{BW}) + 71.257(\text{Cr}) - 6.694(\text{age})$. Metabolic categorization showed 45% of patients were hypermetabolic, 36.25% normometabolic, and 18.75% hypometabolic. Bland-Altman analysis revealed that TEE-cAKI provided closer approximations than weight-based methods. However, it showed a significant proportional bias.

Discussion and Conclusions: The TEE-cAKI equation offers a practical alternative for estimating energy expenditure in resource-limited settings, providing tailored nutritional guidance for critically ill patients with AKI when applied with consideration of its limitations. It is strongly recommended that this equation undergo external validation to confirm its accuracy.

Keywords: critically ill, acute kidney injury, energy expenditure, predictive equation, indirect calorimetry (IC)

Factors influencing energy expenditure in critically ill patients with acute kidney injury

Background:

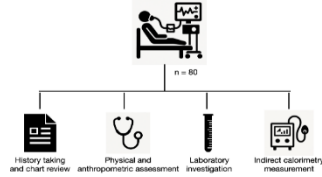
- Nutrition support is crucial in critical ill patients with AKI.
- Despite limited availability, indirect calorimetry (IC) is the gold standards to measure energy expenditure.

Aims:

- To identify factors influencing energy expenditure
- To establish energy expenditure predictive equation and evaluate its accuracy
- To categorize patients into metabolic groups

Methods:

- Setting: 2 medical ICUs, Thammasat University Hospital, Thailand
- Population: critically ill patients (mechanical ventilated) with AKI



Results:

Factors affecting indirect calorimetry energy expenditure (ICEE)

Age	BW
p = 0.002	p = < 0.001
Cr	Lactate
p = 0.004	p = 0.045
PaO ₂	PaCO ₂
p = 0.022	p = 0.031

A stepwise forward model regression analyses with modification

TEE-cAKI equation

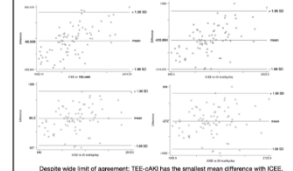
$$\text{ICEE (kcal)} = 1275.385 + 9.517(\text{BW}) + 71.257(\text{current Cr}) - 6.694(\text{age})$$

$$R^2 = 23.96\%, p < 0.001$$

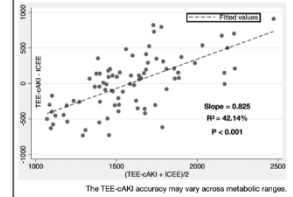
Metabolism categorization by ICEE/BEE		
Hypometabolism (ICEE/BEE < 0.9)	Normo-metabolism (ICEE/BEE 0.9 - 1.3)	Hypermetabolism (ICEE/BEE > 1.3)
18.75%	36.25%	45%

BEE = basal energy expenditure

Comparison of accuracy of ICEE with TEE-cAKI equation and estimated predictive values of 20, 25, and 30 kcal/kg/day



A proportional bias analysis



CONCLUSION: The TEE-cAKI equation offers a practical alternative for estimating energy expenditure in resource-limited settings, providing tailored nutritional guidance for critically ill patients with AKI when applied with consideration of its limitations.

Wankawee Jeerangsapasuk, Wittawat Hongmeng, Pichaya Tantiyavarong, Autchara Khantason, and Aphichat Chatkrailert, 2025

Telemedicine Versus Face-to-face Follow-Up in Post-AKI survivors: A Randomized Controlled Trial.

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Abstract:

Objectives: Acute kidney injury (AKI) survivors are at increased risk of recurrent AKI, chronic kidney disease (CKD), and cardiovascular complications. Regular follow-up with a nephrologist is recommended; however, accessibility challenges, particularly in rural populations, limit optimal care delivery. Telemedicine may offer a feasible alternative, but its effectiveness in post-AKI care remains underexplored.

Materials and Methods: A single-center, randomized controlled trial was conducted at Thammasat University Hospital, enrolling patients who survived hospitalization with stage 2–3 AKI. Patients were randomized to receive either telemedicine follow-up via secure video consultations using the “TUH TELEMED” application or face-to-face follow-up in the outpatient nephrology clinic for a 6-month period. The primary outcomes were feasibility measures, including follow-up adherence, serum creatinine monitoring, and blood pressure measurement. The secondary outcomes were renal outcomes and patient-centered outcomes such as satisfaction, travel time, and waiting time.

Results: A total of 56 post-AKI patients were enrolled, with 29 assigned to face-to-face and 27 to telemedicine follow-up. The mean age was 63.9 ± 13.8 years, and 50% male. Baseline characteristics were comparable. Follow-up adherence was high in both groups and not significantly different (92.6% vs. 89.6%, $p = 0.70$). Serum creatinine monitoring was completed in 92.6% of telemedicine patients and 100% of face-to-face patients ($p = 0.14$), while blood pressure measurement rates were 96.3% and 100% ($p = 0.29$). There were no significant differences between groups in mortality, readmission, AKI recovery, CKD progression, or recurrent AKI. Patient satisfaction scores were high in both groups, with a trend toward higher satisfaction in the telemedicine group (9.4 ± 0.7 vs. 9.1 ± 0.7 , $p = 0.08$). Travel time and waiting time were significantly lower in the telemedicine group (0 hours vs. 1.8 ± 0.5 hours and 0 hours vs. 0.9 ± 0.2 hours; both $p < 0.001$).

Discussion and Conclusions: In this randomized controlled trial, telemedicine follow-up for post-AKI patients was feasible and yielded clinical outcomes comparable to traditional face-to-face follow-up. It also significantly reduced travel and waiting times while maintaining high patient satisfaction. These findings support telemedicine as a practical, effective, and patient-centered strategy to improve accessibility to post-AKI care.

Keywords: Telemedicine, post-AKI, AKI survivors, face-to-face

Cardiovascular-Kidney-Metabolic Staging Predicts Long-Term Outcomes in Patients with Acute Kidney Disease

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Abstract:

Objectives: The Cardiovascular-Kidney-Metabolic (CKM) syndrome offers an integrated framework for risk stratification. Yet, its prevalence and prognostic value in acute kidney disease (AKD) survivors of dialysis-requiring acute kidney injury (AKI-D) are not well defined. We examined the association between CKM stage and major cardiorenal outcomes in a nationwide AKI-D cohort.

Materials and Methods: We performed a retrospective cohort study using Taiwan's National Health Insurance Database (2015–2022). Adults (≥ 18 years) hospitalized with AKI-D who remained dialysis-free ≥ 90 days post-discharge were included. Baseline CKM stage was categorized as early (Stages 0–2), intermediate (Stage 3), or advanced (Stage 4). Primary outcomes were long-term all-cause mortality, cardiovascular mortality, and major adverse kidney events (MAKE); the secondary outcome was progression to Stage 4 from earlier stages. Multivariable Cox models estimated adjusted hazard ratios (aHRs) with 95% confidence intervals (CIs). Population attributable fractions (PAFs) for CKM Stages 3 and 4 were calculated assuming causality.

Results: Among 22,566 patients (mean age 68.2 years; 58.9% male), 33.8% had early, 35.6% intermediate, and 30.6% advanced-stage CKM. Over a median follow-up of 2.8 years, all-cause mortality occurred in 40.3%, 52.9%, and 57.3%, and MAKE in 73.7%, 87.4%, and 86.1% of these groups ($p < 0.001$). Cardiovascular mortality was 9.6% in early and 18.1% in intermediate-stage CKM. Compared with early stage, aHRs (95% CIs) for all-cause mortality were 1.18 (1.12–1.25) for intermediate and 1.26 (1.20–1.33) for advanced stage; for MAKE, 1.14 (1.09–1.18) and 1.15 (1.10–1.19); and for cardiovascular mortality, 1.34 (1.22–1.48) and 2.48 (2.27–2.72), respectively. PAFs for Stages 3 and 4 were 11.6% and 16.4% for all-cause mortality, 8.0% and 9.5% for MAKE, and 24.3% and 64.1% for cardiovascular mortality. Progression to Stage 4 was more common with Stage 3 than with Stages 0–2 (42.7% vs. 25.7%, $p < 0.001$).

Discussion and Conclusions: In AKI-D survivors, CKM stage at 90 days post-discharge independently predicted long-term mortality, MAKE, and cardiovascular mortality, with intermediate and advanced stages accounting for a substantial share of events. CKM staging also identified patients at greater risk of progression, supporting its integration into post-AKD care for risk-aligned surveillance and preventive strategies.

Keywords: Acute kidney disease, Cardiovascular-Kidney-Metabolic (CKM) Syndrome

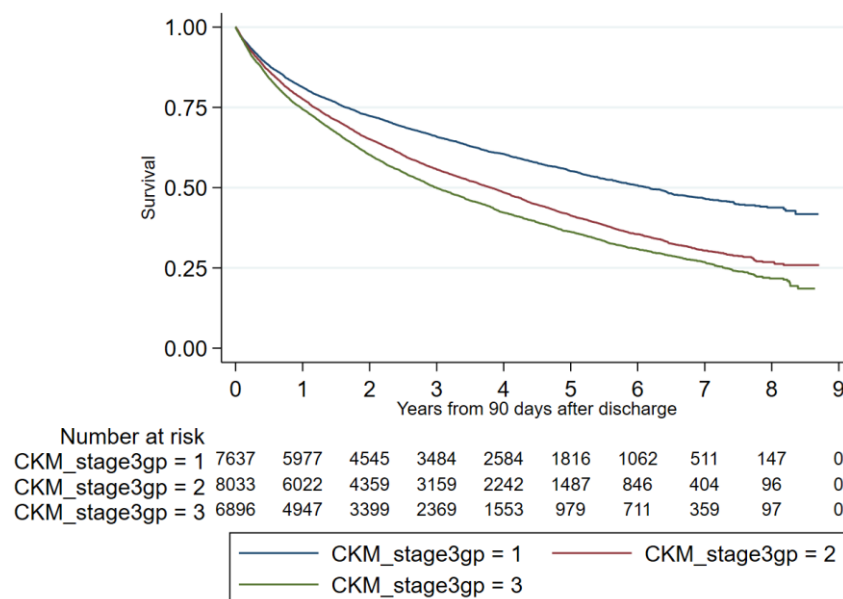


Figure 1. KM all cause mortality comparing CKM stage in AKD patient

Sample characteristic of AKI-D patients who had no dialysis for 90 days from discharge 2015-2022									
	All		CKM stage0-2		CKM stage3		CKM stage4		P
	n	%	n	%	n	%	n	%	
Total	N=22566		N=7637	33.84	N=8033	35.6	N=6896	30.56	
Age (mean/SD)	68.2	14.5	63.7	15.9	69.4	13.3	71.6	12.8	<.0001
Gender									
Male	13298	58.9	4889	64.0	4401	54.8	4008	58.1	<.0001
Total amision days	27.8	33.7	32.7	45.1	23.7	28.0	27.1	22.3	
Baseline eGFR	52.2	35.1	74.4	33.0	34.3	27.9	48.6	31.3	<.0001
CCI score(mean/SD)	4.0	2.6	3.1	2.7	4.5	2.4	4.3	2.4	<.0001
Comorbidity									
DM history	7720	34.2	2196	28.8	2948	36.7	2576	37.4	<.0001
HTN history	14333	63.5	3969	52.0	5568	69.3	4796	69.5	<.0001
CHF history	6633	29.4	978	12.8	1882	23.4	3773	54.7	<.0001
CKD histroy	11610	51.4	1946	25.5	5880	73.2	3784	54.9	<.0001
Gout history	7489	33.2	1630	21.3	3296	41.0	2563	37.2	<.0001
Previous antiplatet	2912	12.9	668	8.7	880	11.0	1364	19.8	<.0001
Previous statin	8969	39.7	2348	30.7	3380	42.1	3241	47.0	<.0001
During admission									
Sepsis	9361	41.5	4011	52.5	2774	34.5	2576	37.4	<.0001
Prolonged mechanical ventilation>=4 days	8485	37.6	3854	50.5	1931	24.0	2700	39.2	<.0001
Re-intubation of MV	898	4.0	403	5.3	219	2.7	276	4.0	<.0001
Chest tube insertion	1286	5.7	589	7.7	271	3.4	426	6.2	<.0001
ICU	16549	73.3	6219	81.4	4910	61.1	5420	78.6	<.0001
Cardiac surgery	2454	10.9	881	11.5	511	6.4	1062	15.4	<.0001
Intestine surgery	480	2.1	271	3.5	118	1.5	91	1.3	<.0001
MV	10156	45.0	4412	57.8	2426	30.2	3318	48.1	<.0001
CT	6750	29.9	2693	35.3	1769	22.0	2288	33.2	<.0001
Hypovolemic shock	483	2.1	232	3.0	127	1.6	124	1.8	<.0001
Following time (days)	1032.4	800.9	1131.8	827.1	1019.6	787.3	937.2	774.2	<.0001
Longterm outcome (based on varying follow-up durations among participants)									
All-cause mortality	11285	50.0	3079	40.3	4253	52.9	3953	57.3	<.0001
MAKE (re-dialysis, ESRD, persistent renal dys	18592	82.4	5631	73.7	7021	87.4	5940	86.1	<.0001
MACE (non-fatal MI, stroke, CV death)	5648	25.0	1115	14.6	1909	23.8	2624	38.1	<.0001
CKM stage 4 (CHD, HF, stroke, PAOD, Afib)	5392	34.4	1963	25.7	3429	42.7	-	-	<.0001
CV_mortality	2190	14.0	735	9.6	1455	18.1	-	-	<.0001

Table 1. Sample characteristics and result of AKI-D patients who had no dialysis for 90 days from discharge 2015-2022

Impact of Acute Kidney Injury Severity and Onset on Mortality and Renal Outcomes in Patients Receiving Veno-Arterial Extracorporeal Membrane Oxygenation: A Retrospective Study

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Abstract:

Objectives: Acute kidney injury (AKI) is common in patients receiving veno-arterial extracorporeal membrane oxygenation (VA-ECMO) and is associated with increased mortality. This study aimed to assess the impact of AKI severity and timing of onset on mortality and renal outcomes.

Materials and Methods: We conducted a single-center retrospective study of adult patients who received VA-ECMO between January 2018 and December 2022. AKI was defined according to Kidney Disease: Improving Global Outcomes (KDIGO) criteria and classified by severity (non-severe vs. severe) and onset (before vs. after ECMO initiation). Severe AKI was defined as stage 3 AKI. The primary outcome was 3-month mortality. Secondary outcomes included 1-year mortality, chronic kidney disease (CKD) at 3 months and 1 year, and nephrology follow-up after discharge.

Results: A total of 131 patients were included (mean age 60 years; 69.5% male). VA-ECMO indications included post-cardiac surgery (48.9%), cardiogenic shock (25.2%), extracorporeal cardiopulmonary resuscitation (20.6%), and pulmonary embolism (5.3%). AKI occurred in 124 patients (94.7%), with 55% requiring renal replacement therapy (RRT). Among AKI cases, 79.8% developed AKI before ECMO initiation and 20.2% after. Severe AKI occurred in 62.1% of patients. Patients with severe AKI had higher baseline creatinine and lactate levels and longer ECMO duration. Three-month mortality was higher in patients with severe AKI (71.2%) compared to those without (34.0%) (adjusted HR: 2.59; 95% CI: 1.44–4.63; P=0.001), and in patients with AKI before ECMO (65.2%) compared to after (33.3%) (P=0.007). CKD at 3 months was more frequent in the severe AKI group (66.7% vs. 29.0%, P=0.007). Only 28.6% of patients had nephrology follow-up after discharge.

Discussion and Conclusions: AKI is highly prevalent in patients receiving VA-ECMO. AKI severity and onset before ECMO initiation are associated with increased mortality and CKD. Post-discharge nephrology follow-up remains suboptimal.

Keywords: Acute kidney injury, Extracorporeal membrane oxygenation, Veno-arterial ECMO, Renal replacement therapy, Chronic kidney disease, Mortality

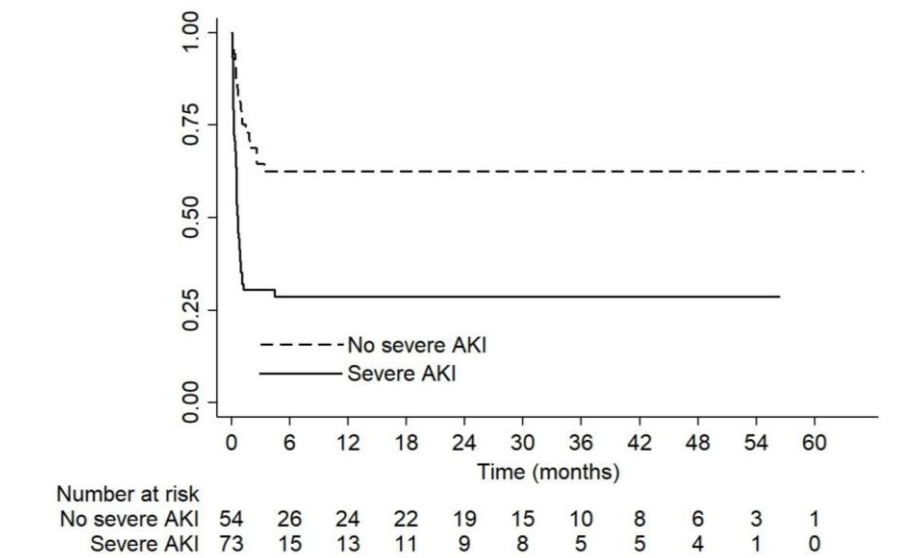


Figure 1: Kaplan–Meier estimates of mortality according to acute kidney injury (AKI) severity

Variables	Total (N=131)	No severe AKI (N=54)	Severe AKI (N=77)	P-value
ICU mortality, N (%)	65(49.6%)	14(25.9%)	51(66.2%)	<0.001
Hospital mortality, N (%)	68(51.9%)	16(29.6%)	52(67.5%)	<0.001
3-month mortality, N (%)	68(56.7%) N=120	16(34%) N=47	52(71.2%) N=73	<0.001
1-year mortality, N(%)	71(62.3%) N=114	17(39.5%) N=43	54(76.1%) N=71	<0.001
Nephrologist follow-up after discharge, N (%)	16(28.6%) N=56	4(11.8%) N=34	12(54.5%) N=22	<0.001
CKD at 3 months, N (%)	23(44.2%) N=52	9(29%) N=31	14(66.7%) N=21	0.007
CKD at 1 year, N (%)	19(45.2%) N=42	9(36%) N=25	10(58.8%) N=17	0.145
Serum Cr at discharge, mg/dl	1.08 (0.66,2.52) N=62	0.77 (0.57,1.12) N=38	2.54(1.53,3.18) N=24	0.000
GFR at discharge, mL/min/1.73 m ²	76.24 (26.79,104.94) N=62	91.79 (75.24,107.00) N=38	22.50(20.13,45.63) N=24	0.000
Serum Cr at 3 months, mg/dl	1.03 (0.77,1.66) N=52	0.95 (0.64,1.25) N=31	1.66(1.04,2.37) N=21	0.001
GFR at 3 months, mL/min/1.73 m ²	74.84 (39.18,93.73) N=52	88.92 (57.50,96.26) N=31	38.61(22.2,71.64) N=21	0.001
Serum Cr at 1 year, mg/dl	1.17 (0.88,1.69) N=42	1.03 (0.88,1.30) N=25	1.61(1.14,2.21) N=17	0.016
GFR at 1 year, mL/min/1.73 m ²	63.97 (39.42,83.00) N=42	69.90 (53.89,92.20) N=25	47.76(25.59,68.84) N=17	0.039

Table 1: Clinical outcomes according to AKI severity in patients receiving VA-ECMO

Long-Term Kidney Outcomes in Sepsis-associated Acute Kidney Injury: The Impact of Tropical and Non-Tropical Sepsis

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Abstract:

Objectives: Sepsis-associated acute kidney injury (SA-AKI) is a major contributor to long-term adverse outcomes. In Southeast Asia, tropical infections are common causes of SA-AKI. Little is known for long term kidney outcome on this specific setting. We aimed to compare long-term kidney outcomes among patients with tropical SA-AKI, non-tropical SA-AKI, and non-sepsis-associated AKI (non-SA-AKI).

Materials and Methods: We analyzed data from the India and Southeast Asia Renal Replacement Therapy (InSEA-RRT) registry, a multicenter prospective cohort study conducted from April 2019 to December 2023 across 24 hospitals in Southeast Asia and India. Adult critically ill patients with stage 3 AKI, defined by Kidney Disease: Improving Global Outcomes (KDIGO) criteria, were enrolled. SA-AKI was defined as AKI occurring within 7 days of sepsis onset based on Sepsis-3 criteria, and further classified as tropical or non-tropical based on the underlying etiology. The primary outcome was 2-year major adverse kidney events (MAKE), defined as a composite of persistent kidney dysfunction, long-term dialysis, or all-cause mortality. In patients without pre-existing chronic kidney disease (CKD), the incidence of new-onset CKD was also compared. Multivariable Cox models were used to estimate adjusted hazard ratios (aHRs) with adjustment for country and initial kidney replacement therapy modality.

Results: Among 2,178 patients with stage 3 AKI, 1,495 had SA-AKI. Of the 1,062 survivors, 66 had tropical SA-AKI, 609 non-tropical SA-AKI, and 387 non-SA-AKI. The incidence rate of 2-year MAKE among patients with SA-AKI was 47.4 per 100 person-years (95% confidence interval [CI]: 42.5–52.6). Tropical SA-AKI was associated with a lower risk of 2-year MAKE compared to non-tropical SA-AKI (aHR 0.38; 95% CI: 0.22–0.67; P=0.001) and non-SA-AKI (aHR 0.46; 95% CI: 0.26–0.82; P=0.008). Non-tropical SA-AKI was associated with a higher risk of 2-year MAKE than non-SA-AKI (aHR 1.24; 95% CI: 1.01–1.53; P=0.039), primarily due to increased mortality (aHR 1.64; 95% CI: 1.26–2.13; P<0.001). Among patients without pre-existing CKD, tropical SA-AKI was associated with a lower risk



of new-onset CKD compared to non-tropical SA-AKI (aHR 0.38; 95% CI: 0.15–0.95; P=0.038) and non-SA-AKI (aHR 0.34; 95% CI: 0.13–0.84; P=0.019).

Discussion and Conclusions: Long-term kidney outcomes after stage 3 AKI differ by sepsis etiology. Tropical SA-AKI was associated with a lower risk of MAKE and new-onset CKD.

Keywords: sepsis-associated acute kidney injury, tropical infection, tropical sepsis, major adverse kidney events

Comparison of Filter Lifetime between Hypertonic Versus Isotonic Regional Citrate Anticoagulation Protocol during Continuous Renal Replacement Therapy: A Randomized Controlled Trial

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Abstract:

Objectives: Preventing premature filter clotting is essential for effective continuous renal replacement therapy (CRRT). Regional citrate anticoagulation (RCA) is the standard method, but no head-to-head trials have compared hypertonic and isotonic RCA protocols. This study compared the efficacy and safety of these two approaches.

Materials and Methods: We conducted a single-center, superiority randomized controlled trial between August 2024 and February 2025 at King Chulalongkorn Memorial Hospital, Thailand. Adult patients requiring CRRT with AN69 filters were randomized to hypertonic RCA (4% trisodium citrate) or isotonic RCA (Citra-HF). CRRT delivery, systemic and circuit ionized calcium monitoring, and adjustments followed standardized protocols. The primary outcome was total filter lifetime (initiation until 72 h or any termination cause), with a superiority margin of 8 h. Secondary outcomes included adjusted total filter lifetime (termination due to clotting), related adverse events, and hospital mortality.

Results: Seventy patients were enrolled (35 per arm). Baseline characteristics and CRRT quality metrics were similar, except filtration fraction, which was lower in the isotonic arm (16% vs. 40%, $p < 0.001$). Hypertonic RCA achieved longer total filter lifetime than isotonic RCA (64.8 ± 13 h vs. 42.9 ± 25.3 h; difference 21.9 h, 95%CI 12.1–30.1, $p < 0.001$) and longer adjusted total filter lifetime (53 ± 18.8 h vs. 30.3 ± 22.2 h; difference 22.7 h, 95%CI 5.9–37.9, $p = 0.007$). Hypertonic RCA was associated with more metabolic complications (hyponatremia, metabolic alkalosis, hypocalcemia), while hospital mortality was identical (60% vs. 60%, $p = 1.00$).

Impact of Renal Replacement Therapy Timing on Outcomes in Extracorporeal Membrane Oxygenation Therapy: A Retrospective Cohort Study

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Abstract:

Objectives: Patients undergoing extracorporeal membrane oxygenation (ECMO) often require renal replacement therapy (RRT). However, the impact of RRT timing in relation to ECMO initiation remains poorly understood. This study aims to evaluate the incidence of RRT use during ECMO therapy and assess how the timing of RRT affects clinical outcomes.

Materials and Methods: We conducted a retrospective cohort study of patients who received ECMO therapy at Thammasat University Hospital between January 2020 to May 2025. Patients were categorized into three groups: those who did not receive RRT, those who received RRT before ECMO initiation, and those who started RRT after ECMO initiation. Demographic data, clinical characteristics, ECMO parameters, and serial laboratory values were collected and analyzed to compare outcomes across groups. Multivariable logistic regression was used to identify factors associated with in-hospital mortality.

Results: A total of 42 patients were included in the study. Of these, 8 did not receive RRT, 4 received RRT before ECMO, and 22 started RRT after ECMO initiation. Comorbidities—including hypertension, dyslipidaemia, chronic kidney disease, and coronary artery disease—had similar incidences between the groups, and showed no statistically significant differences. Laboratory included baseline serum creatinine levels were also comparable between groups. ECMO duration was significantly longer in patients who started RRT after ECMO compared to those who received RRT beforehand (10 days [IQR 5–21] vs. 5.5 days [IQR 4–11]; $p = 0.0265$). Post-ECMO complications—including hyperbilirubinemia, acute liver failure, and massive bleeding—did not differ significantly between groups ($p = 0.20$, 0.49 , and 0.61 , respectively). ICU and in-hospital mortality, as well as ICU and hospital length of stay, showed no significant differences. Multivariable analysis did not identify any factors independently associated with increased in-hospital mortality.

Discussion and Conclusions: RRT is frequently required in patients receiving ECMO. The timing of RRT initiation, whether before or after ECMO, did not significantly impact clinical outcomes, mortality rates, or length of stay. However, initiating RRT after ECMO was associated with a longer ECMO duration.

A Protocol-Based Furosemide Stress Test to Evaluate Renal Recovery During Continuous Renal Replacement Therapy (FST-STOP): A Pilot Randomized Controlled Trial

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Abstract:

Objectives: Continuous renal replacement therapy (CRRT) is commonly used to manage critically ill patients with acute kidney injury (AKI). However, the optimal timing for CRRT discontinuation remains unclear. Although furosemide stress test (FST) is often used to guide CRRT initiation, limited evidence supports its role in assessing renal recovery. This study aimed to evaluate whether FST could facilitate CRRT discontinuation.

Materials and Methods: This pilot, prospective, open-label, randomized controlled trial was conducted in adult patients with stage 3 AKI who had received CRRT for at least 48 hours in the intensive care unit (ICU) at Chiang Mai University Hospital, Thailand. Participants were randomly assigned (1:1) to receive either protocol-based FST (Figure 1) or standard care. The primary endpoint was the number of patients successfully weaned from CRRT. Secondary endpoints included urine output on day 2 and 5, 30-day mortality, dialysis dependence at 30 days, ventilator-free days, ICU and hospital length of stay, and adverse events.

Results: Twenty-four patients were enrolled (12 per group), with a mean age of 70.3 ± 15.6 years. The median furosemide dose was 1,000 mg/day (interquartile range, IQR 525-1,000) in the FST group and 500 mg/day (IQR 0-1,000) in the standard care group ($p = 0.182$). CRRT was successfully discontinued in 6 patients (50%) in the FST group and 4 (33.3%) in the standard care group ($p = 0.408$). On day 2, urine output was 990 mL/day in the FST group versus 373 mL/day in the standard care group ($p = 0.299$). By day 5, it was 1,428 mL/day versus 933 mL/day, respectively ($p = 0.386$). There were no significant differences in 30-day mortality (66.7% vs 66.7%, $p = 1.000$), dialysis dependence (41.7% vs. 66.7%, $p = 0.219$), length of ICU stay [23.5 days (IQR 11.0-29.5) vs. 23.5 (13.5-37.5), $p = 0.773$], length of hospital stay [28 days (17.5-70.0) vs. 30 days (18.5-39.5), $p = 0.583$], or ventilator-free days [5 days (0-28.5) vs. 2.5 days (0-6), $p = 0.401$]. No significant adverse events were observed.

Discussion and Conclusions: In this pilot trial, FST appeared feasible for assessing kidney recovery during CRRT without adverse events. However, the small sample size limits the statistical power of the findings.

Keywords: Acute kidney injury; Continuous renal replacement therapy; Furosemide; Renal recovery; Renal replacement therapy

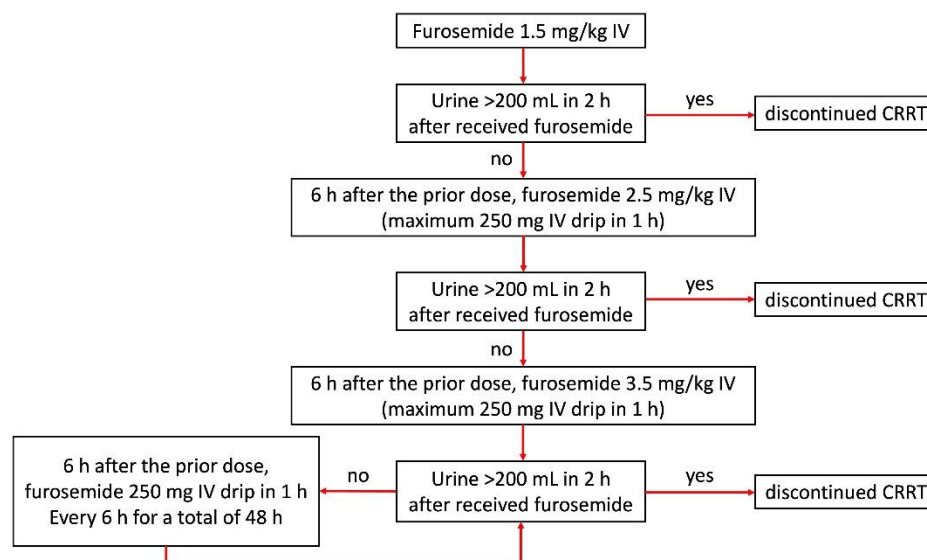


Figure 1. Protocol-based furosemide stress test

Application of Endotoxin Activity Assay for Better Clinical Practice: a scoping review

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Abstract:

Background and objective: The Endotoxin Activity Assay™ (EAA) is a commercially available clinical test that quantifies endotoxin activity in human whole blood samples within approximately 30 minutes. This study aims to comprehensively review the published literatures on EAA and to explore usage trends and potential effective applications.

Method: We conducted a scoping review using search formulas focused on EAA measurement in human subjects. The search was performed on May 13, 2025, using four major databases: Embase, Web of Science, MEDLINE, and CENTRAL. After full-text screening, cohort characteristics and other clinically relevant metrics of each study were extracted.

Results: Our systematic search and screening process identified 95 articles published between 2002 and 2025 that reported EAA results in adult and pediatric patients. Most studies were conducted in Europe (38.9%), Asia (35.8%), and North America (14.7%). The most common study population was ICU patients with sepsis or septic shock (31.6%), followed by those undergoing cardiac surgery, general ICU patients, and patients with cirrhosis. Nearly half of the studies (44.2%) measured EAA levels more than twice per patient, suggesting that serial endotoxin monitoring is of clinical interest. Among 50 prospective studies found in our review, three randomized clinical trials—conducted in North America, Thailand, and Switzerland—were identified. All of those studies investigated effect of blood purification therapies (PMX-DHP and/or oXiris) for septic shock, using $EAA \geq 0.6$ as an inclusion criterion.

Conclusion: Our result highlights the over 20-year history of EAA measurement in various clinical settings, particularly its role in guiding blood purification therapy for septic patients. Together with other biomarkers, EAA has the potential to be part of precision medicine in the ICU by identifying patient subgroups most likely to benefit from targeted interventions such as blood purification.

Keywords: Endotoxin Activity Assay, blood purification, PMX, sepsis, scoping review

Meropenem Dosing Recommendations in Critically Ill Patients Receiving Alternate-Day Prolonged Intermittent Renal Replacement Therapy

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Abstract:

Objectives: Septic acute kidney injury is commonly found in critically ill patients. This kidney complication allows the use of kidney replacement therapy especially in prolonged renal replacement therapy (PIRRT) to effectively remove excess fluid and accumulated waste product. Meropenem is a carbapenem antibiotic that has been utilized for managing sepsis and septic shock in intensive care units. Based on pharmacokinetic (PK) properties, meropenem can be removed via PIRRT. However, meropenem PK studies in patients with PIRRT are lacking. Our study aimed to evaluate the probability of target attainment (PTA) of various meropenem regimens in critically ill patients receiving alternate-day PIRRT utilizing Monte Carlo simulation (MCS)

Materials and Methods: Mathematical models with first order elimination were created using published demographic and PK in adult critically ill patients. Different alternate-day PIRRT with dialysis technique and effluent rate of 18L/h with various PIRRT duration of 4, 6, 8, 10 h were performed in the models. Early and late PIRRT occurred at the beginning of and 14-20 h after drug administration. MCS predicted drug disposition during the first 48 hour in 10,000 virtual patients for each drug dosing regimens. The desired pharmacodynamic (PD) target to calculate PTA was 40% of free drug concentration exceeds 1 and 4 times the minimum inhibitory concentration (MIC) of 2 mg/L (fT/1MIC, fT/4MIC, respectively). The optimal dosing regimens were defined as the ones that reached 90% of PTA in each PIRRT setting.



Results: PTAs of all the recommended meropenem dosing regimens in available clinical resources were evaluated in our models. For the aggressive target as $ft/4MIC$, both hemodialysis and hemofiltration modalities shared the same dosing recommendations of 1 g loading dose, followed by 500 mg every 8 hours for the PIRRT with the duration of ≤ 8 hours. In addition, the 10-hour PIRRT with both modalities, the meropenem dosing regimen of 1 g every 12 hours was required to overcome the PD target. Undoubtedly, the lower PD target of ft/MIC needed less meropenem doses of 500 mg every 12 hours in all PIRRT modalities compared to the aggressive one.

Discussion and Conclusions: Some meropenem dosing regimens recommended in clinical resources could not attain the PTA target. PIRRT characteristics such as duration of treatment and PD targets are considerably responsible for individualized dosing regimens. Clinical validation is crucial to confirm our results.

Keywords: meropenem, prolonged renal replacement therapy, pharmacokinetics, critically ill patient, Monte Carlo simulation

Development of Health Literacy and Clinical Outcomes in the Integrated Model for Slowing and Restoring Kidney Function in Chronic Kidney Disease.

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Abstract:

Objectives: Chronic kidney disease (CKD) is a growing global health concern, leading to reduced quality of life and increased healthcare costs. Health literacy is a crucial factor in enabling patients to make informed decisions and adopt behaviors that delay kidney function decline. This study aimed to develop and evaluate an integrated model to enhance health literacy and clinical outcomes among patients with CKD.

Materials and Methods: The mixed method in three phases, the study began with action research involving 60 patients with stage 2-3 CKD who also had diabetes or hypertension. Key findings revealed a lack of awareness about the harmful effects of nephrotoxic drugs, which informed the design of a targeted intervention. In the second phase, a quasi-experimental approach was used to provide remote pharmaceutical care through the Line Official Account (Line OA), integrating physicians, pharmacists, nurses, and community health volunteers. Clinical outcomes such as blood pressure, blood glucose, HbA1c, and estimated glomerular filtration rate (eGFR) were tracked. In the final phase, health literacy was promoted through group discussions, storytelling, and behavioral change activities.

Results: After six months, significant improvements were observed: 62.0% of participants showed increased health literacy, 25.5% achieved target HbA1c levels, 59.1% reached target blood pressure, and 17.3% showed improved eGFR. These results were significantly better than those in the control group ($p < 0.001$).

Discussion and Conclusions: An integrated care model combining multidisciplinary collaboration and digital health tools can effectively enhance health literacy and clinical outcomes in CKD patients, supporting broader application in primary care. The model was later expanded to 460 patients in Sirindhorn Hospital's primary care network, yielding consistent results. The study supports the effectiveness of an integrated approach to CKD management and recommends broader implementation in primary healthcare settings.

Keywords: Health literacy, Clinical outcomes, Kidney function, Chronic kidney disease, Rational drug use

Postoperative Acute Kidney Injury in Patients after Non-Cardiac Surgeries – an Observational Study from a Tertiary Care Teaching Hospital.

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Abstract:

Objectives:

1. Determine the incidence of PO-AKI in patients undergoing major non-cardiac surgeries.
2. Identify perioperative risk factors contributing to PO-AKI.

Methods: This retrospective observational study was conducted at Gandhi Hospital, a tertiary care teaching hospital, and included patients undergoing major and minor non-cardiac surgeries between May 2022 and May 2025.

Results: In this multi-specialty surgical cohort of over 30,000 patients, AKI occurred in 10.5%, with the highest incidence in General Surgery (12.4%), followed by Urology and Neurosurgery. Key mortality predictors included elevated pre- and post-RRT creatinine, advanced age, hypoalbuminemia, high qSOFA scores, intra- and postoperative hypotension, prolonged surgery, inotrope use, and nephrotoxic drug exposure.

General Surgery and Urology showed stronger creatinine-related associations; Neurosurgery and ENT had greater hemodynamic instability and inotrope dependence.

Discussion: Among 30,294 surgical patients across six specialties, AKI occurred in 10.5% (n=3193), with the highest rates in General Surgery and Urology (~12%) and the lowest in Orthopaedics and ENT (~7%). RRT requirement was uncommon, peaking in General Surgery (1.54%). Preoperative renal dysfunction, particularly elevated creatinine, consistently predicted mortality, with significant associations in Urology, Orthopaedics, and ENT, aligning with Felix Kork et al., who noted even minor creatinine rises worsen outcomes. Persistent post-RRT azotaemia in Urology and Orthopaedics further predicted poor prognosis. Advanced age (Orthopaedics, ENT) and hypoalbuminemia (General Surgery, Urology) emerged as important non-modifiable and nutritional risk factors. In Neurosurgery, leucocytosis and shorter dialysis duration correlated with worse survival.

Across all specialties, non-survivors exhibited higher qSOFA scores, more frequent intra- and postoperative hypotension, greater inotrope use, longer surgeries, and higher nephrotoxic drug exposure, consistent with Meersch et al.'s observation



Conclusion: In this study of 30,294 surgical patients, AKI occurred in 10.5%, most commonly in General Surgery and Urology. Mortality was linked to elevated preoperative creatinine, hypoalbuminemia, age, azotaemia, CKD, and hypertension. Non-survivors had higher qSOFA scores, intraoperative hypotension, greater inotrope use, and nephrotoxic exposure.

Keywords: Post operative acute kidney injury

Acute Peritoneal Dialysis in AKI and Scrub Typhus: Outcomes

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Abstract:

Objectives: Acute kidney injury in intensive care patients remains as an independent predictor of mortality. In scrub typhus, the serious issues during late presentation are distributive shock, oliguric acute kidney injury (AKI) and Multiple organ dysfunction syndrome (MODS). In this study we evaluated the outcome of early acute peritoneal dialysis (PD) in scrub typhus patients with AKI and shock in a resource limited setting in rural tamil nadu.

Materials and Methods: This is a prospective study done in 20 patients who had scrub typhus with AKI and shock. We included patients from 15 yrs to 60 yrs of age, admitted in ICU, hemodynamically unstable, on inotropic support, stage 3 AKI as per AKIN classification. Acute PD was performed early, in patients with AKI stage 3, hemodynamically unstable and not fit for sustained low efficiency dialysis. Acute PD was done percutaneously with the guidance of virees needle, guide wire and dilator. The catheter was placed in the right iliac fossa region using seldinger technique .1.5% dextrose, PD solution was used with 1 litre dwell volume, 10 minutes inflow, 30 minutes dwell and 15 minutes outflow time. The negative or positive balance after every 2 dwells were documented and the outcomes were analyzed.

Results: Mean age of our patients was 41 ± 12 years with male, female ratio of 2:1. Average duration of fever was 14 ± 4 days. 12 Patients were oliguric and 8 patients had anuria. 30% patients had acute liver injury, 30% had Acute respiratory distress syndrome (ARDS) and 10% had severe left ventricular dysfunction. Average time for hemodynamic stabilisation was 36 ± 4 hrs, PD duration was 77 ± 12 hrs. Average icu stay was 84 ± 14 hrs. Urine output improved more than 0.8ml/kg/hr at a average duration of 46 ± 8 hrs. 15% mortality was observed and after two months of follow up, all patients discharged had normal renal parameters and radiological renal findings in ultrasound.

Discussion and Conclusions: Acute PD not only improved renal parameters and electrolyte imbalance, but also effective in improving the hemodynamics, fluid balance, urine output, end organ recovery, shortening ICU stay and early reversal of catabolic state in patients with AKI and scrub typhus.

Keywords: Acute peritoneal dialysis, acute kidney injury, scrub typhus

Pregnancy-Related Acute Kidney Injury: A Prospective and Retrospective Observational Study from a Tertiary Care Center in South India

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Abstract:

Objectives: Pregnancy-related acute kidney injury (PRAKI) is a critical obstetric complication with significant implications for both maternal and fetal outcomes. Despite improved antenatal care, PRAKI continues to contribute to maternal morbidity and mortality in developing countries. This study aimed to evaluate the incidence, etiologies, clinical features, risk factors, and outcomes of PRAKI in a tertiary care hospital.

Materials and Methods: A mixed-method (prospective and retrospective) observational study was conducted at the Department of Nephrology, JSS Hospital, Mysuru, from September 2023 to March 2025. All pregnant women diagnosed with AKI, defined by KDIGO criteria, were included. Data on demographics, clinical features, laboratory findings, obstetric history, risk factors, dialysis requirements, and maternal-fetal outcomes were collected using a structured proforma. Statistical analysis was done using SPSS v26, with $p < 0.05$ considered significant.

Results: Among 60 patients with PRAKI, the most affected age group was 28–35 years (44.3%). The majority (56.7%) delivered after 37 weeks of gestation. Common presenting symptoms included hypertension (30%), vomiting (15%), and decreased urine output (10%). Key risk factors for AKI were postpartum hemorrhage (60%) followed by preeclampsia (44.3%). Renal replacement therapy was required in 30% of patients. ICU admission was necessary in 71.7%, and 28.3% required ventilatory support. Biochemical investigations revealed elevated serum creatinine (mean 1.67 ± 0.66 mg/dL) and blood urea (mean 54.98 ± 20.87 mg/dL). Complete renal recovery occurred in 70%, while 15% had partial recovery and 11.7% succumbed—predominantly due to sepsis (57.1%). Renal biopsy in partial recoveries showed patchy cortical necrosis (8.3%), acute tubular injury (5%), and thrombotic microangiopathy (1.7%). Significant predictors of adverse outcomes included HELLP syndrome ($p = 0.005$), seizures ($p = 0.007$), vomiting ($p = 0.009$), LDH ($p = 0.007$), sepsis ($p = 0.001$), and inotrope requirement ($p = 0.011$).



Discussion and Conclusions: PRAKI is a severe but often reversible condition with timely intervention. Early recognition of risk factors such as sepsis, hemorrhage, and hypertensive disorders, coupled with aggressive supportive care, can significantly improve outcomes. Comprehensive antenatal care, standardized treatment protocols, and access to critical care are pivotal in reducing the burden of PRAKI in low-resource settings.

Keywords: Pregnancy, Acute Kidney Injury, Obstetric Complications, Postpartum Hemorrhage, Sepsis, Dialysis, Maternal Mortality, India, Intensive Care, CRRT.

Epidemiology and Clinical Outcome of Leptospirosis Associated AKI in Thailand: 10 Years Result from Thai-Lepto AKI Study Group

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Abstract:

Background: Leptospirosis is highly prevalent in tropical regions and is one of a major cause of acute kidney injury (AKI) in the region. AKI in leptospirosis is linked to prolonged hospitalization, increased need for dialysis, and mortality rates. However, the incidence and outcome of leptospirosis associated AKI in endemic areas is still uncertain.

Objective: To determine the incidence, clinical outcomes, and independent risk factors of AKI among patients with confirmed leptospirosis in an endemic region.

Materials and Methods: We performed retrospective analysis from multicenter cohort study included patients from inpatients and outpatients setting. AKI was diagnosed by KDIGO criteria and leptospirosis was confirmed by any positive of MAT, blood PRC, and blood culture. This study aims to evaluate the incidence and the outcome of leptospirosis associated. Multivariable logistic regression was used to predict the independent risk factors for AKI.

Results: Among a total of 1,051 clinically suspected leptospirosis patients, 614 were diagnosed leptospirosis. The incidence of leptospirosis associated AKI was 33.8% compared to 13.7% in non-leptospirosis patients, $p < 0.001$. The mean age of the patients was 48 ± 16 and most were males (80 %). We found total bilirubin > 1.9 g/dL, hematocrit level, WBC $> 11,000/\mu\text{L}$ and platelet $< 150 \times 10^9/\text{L}$ as risk factors for leptospirosis associated AKI. The mortality in leptospirosis was 10% in patients in leptospirosis associated AKI compared to 1% in non-AKI group, $p < 0.001$.

Discussion and Conclusions: Leptospirosis-associated AKI affects over one-third of leptospirosis patients. AKI in this context is associated with markedly higher mortality. These findings underscore the need for early risk stratification and prompt management in endemic regions.

Keywords: Leptospirosis, AKI, incidence, outcome

Long-Term Kidney Outcomes in Diabetic Patients with Severe Lactic Acidosis: Interim Analysis of a Multicenter Observational Study

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Abstract:

Background: Metformin, the first-line oral antidiabetic agent, may offer renoprotective benefits through its glucose-lowering effects but carries a risk of lactic acidosis. However, data on both short-term and long-term kidney outcomes remain limited. This study aimed to investigate these outcomes in this population.

Methods: We conducted a multicenter retrospective observational study at three medical centers in Northern Thailand (Chiang Mai University Hospital, Jomthong Hospital, and Nakornping Hospital) between 2006 and 2023. Adult diabetic patients admitted with serum lactate levels >4 mmol/L were included. Exclusion criteria were chronic kidney disease (CKD) stage 4-5, death within 24 hours of admission, other causes of acidosis, trauma, immunosuppression, pregnancy, kidney transplantation, or missing baseline creatinine or medication data. The primary outcome was the rate of acute renal replacement therapy (RRT) during admission between metformin users and non-users. Secondary outcome was an incidence of major adverse kidney events (MAKE), defined as mortality, dialysis dependence, or doubling of serum creatinine at 30, 60, and 90 days.

Results: We performed an interim analysis of 148 participants, including 106 metformin users and 42 non-users. Baseline estimated glomerular filtration rate (eGFR) was comparable between groups (73.67 vs 67.46 mL/min/1.73 m², $p = 0.181$), while mean lactate levels were significantly higher in the metformin group (11.27 vs 8.68 mmol/L, $p = 0.034$). The average metformin dose was $1,850 \pm 762$ mg/day. Metformin users had a significantly higher rate of acute RRT [relative risk (RR) 2.87, 95% confidence interval (CI) 1.07-7.67, $p = 0.019$] but demonstrated lower mortality across all time points [hazard ratio (HR) 0.44, 95% CI 0.24-0.79, $p = 0.006$]. No significant differences were observed in the rates of doubling serum creatinine at 30 days (9.50% vs 6.82%, $p = 0.645$), 60 days (6.31% vs 6.56%, $p = 0.970$), or 90 days (8.32% vs 10.27%, $p = 0.828$). Dialysis dependence was not observed in either group.

A Prospective Study of Venous Excess Ultrasound (VExUS), Lung Ultrasound and Bioimpedance Analysis for Venous Congestion Assessment in Acute Kidney Injury During Continuous Renal Replacement Therapy

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Abstract:

Objectives: We aimed to evaluate the association between VExUS and 28-day mortality in critically ill patients with acute kidney injury (AKI) undergoing CRRT

Materials and Methods: We conducted a prospective cohort study at the King Chulalongkorn Memorial Hospital from December 01, 2023, to November 30, 2024. Critically ill patients with AKI underwent serial ultrasound assessments by two performers on days 1 and 3 after CRRT initiation. VExUS score and its individual components, including inferior vena cava diameter and distensibility, hepatic vein, portal vein, and portal vein pulsatility fraction (PVPF), as well as intrarenal vein Doppler, central venous pressure (CVP), N-terminal pro B-type natriuretic peptide (NT-proBNP), bioimpedance vector analysis (BIVA), and lung ultrasound, were measured and evaluated for correlations. Venous congestion was defined as a VExUS score of ≥ 2 . The primary outcome was the association between VExUS score and 28-day all-cause mortality (NCT06254703)

Results: A total of 54 patients were included, for whom 95 ultrasound assessments were performed. Venous congestion was documented in 18.5% and 29.4% of the first and second assessments, respectively. The VExUS score on day 1 (grade 0-1: reference; grade 2-3: hazard ratio [HR]: 3.067, 95% confidence interval [CI]: 1.33-7.07), but not its individual components, CVP, NT-proBNP, BIVA, or lung ultrasound score, was associated with 28-day mortality. The multivariate analysis also showed an independent association between VExUS score grades 2-3 and 28-day mortality (adjusted HR: 1.64, 95% CI: 1.04-2.59), after adjusting for age and Sequential Organ Failure Assessment (SOFA) score. Additionally, the VExUS score showed no correlation with CVP ($r = 0.16$, $p = 0.32$), NT-proBNP ($r = 0.054$, $p = 0.60$), BIVA ($r = 0.09$, $p = 0.36$), and lung ultrasound ($r = 0.11$, $p = 0.43$). Changes in VEXUS grading correlated with cumulative balance at day 3, with patients who had VEXUS gr 2-3 on day 1 and 3 having the highest cumulative balance (10133 mL, IQR 6281-15649) compared with other groups.

Discussion and Conclusions: Venous congestion detected by VExUS was common and associated with 28-day mortality. VExUS has the potential to guide volume assessment at the bedside in patients undergoing CRRT

Keywords: Venous congestion, venous excess ultrasound, lung ultrasound, continuous renal replacement therapy, bioimpedance analysis

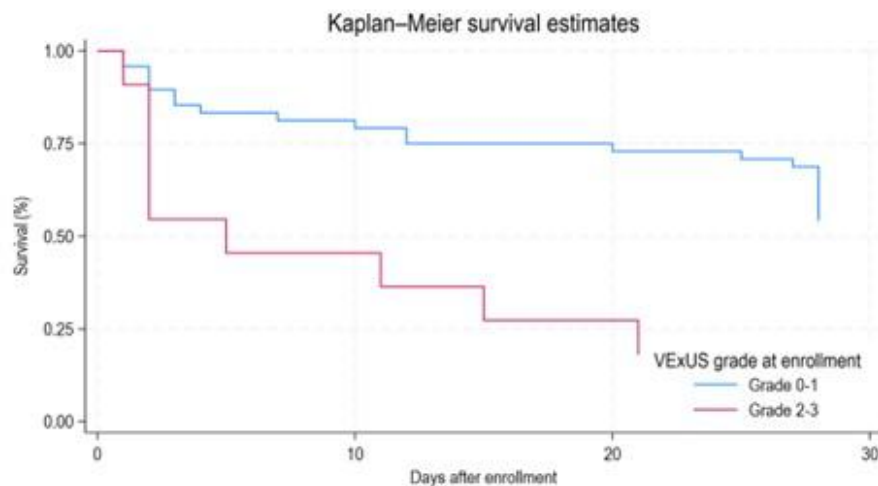
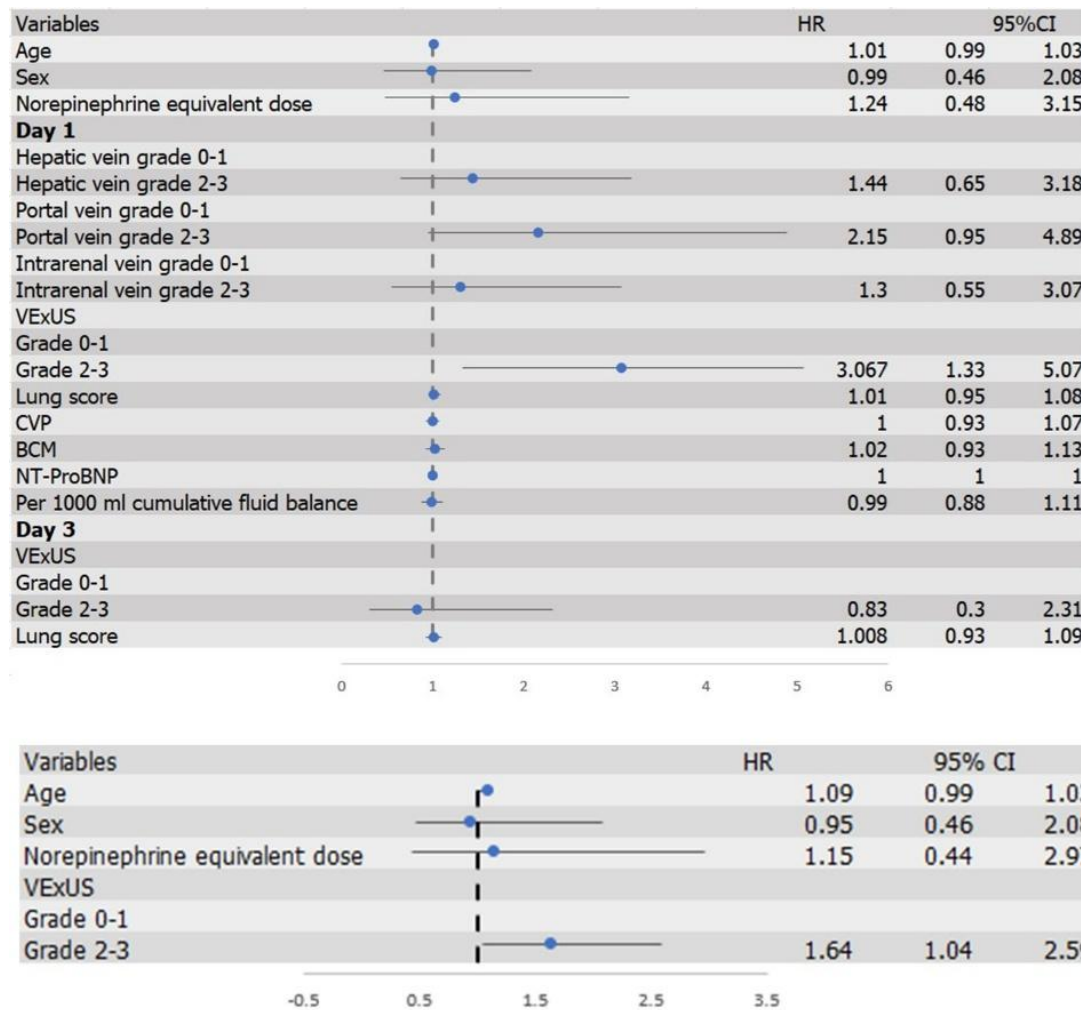


Figure1. Kaplan-Meier curves illustrating survival according to Venous Excess Ultrasound (VExUS) grading at enrolment in the first 28 days after enrolment (Log-rank P=0.003)



Improving Long-Term Kidney Outcomes in Acute Kidney Injury (AKI) Survivors: Effectiveness of a Multidisciplinary, Education-Focused AKI Clinic

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Abstract:

Objectives: A multidisciplinary Acute Kidney Injury (AKI) Clinic—comprising nephrologists, pharmacists, dietitians, and nurses has shown promise in enhancing patient awareness and knowledge among post-AKI survivors. However, its impact on long-term renal outcomes remains underexplored.

Materials and Methods: We conducted a retrospective study of patients who attended the Post-AKI Clinic at the Central Chest Institute of Thailand between 2021 and 2024, with a follow-up period of 12 months. Each clinic visit included a structured, 4-step patient education program focusing on AKI awareness, medication safety, dietary counseling, and long-term kidney health. The primary outcome was the incidence of major adverse kidney events (MAKE). Secondary outcomes included the rates of chronic kidney disease (CKD) progression, new-onset CKD, recurrent AKI, and progression of albuminuria. Effectiveness outcomes assessed follow-up adherence (loss to follow-up rates), the frequency of renal function monitoring, and the number of educational sessions delivered.

Results: Of 160 enrolled patients (mean age 68.3 years), 49.4% exhibited renal recovery at hospital discharge. At 12 months, 88 patients completed follow-up; 22.5% were referred to primary care, and 12.1% had died. The overall incidence of MAKE was 22.6%, significantly higher among patients without renal recovery at discharge (32.7%) compared to those with recovery (16.0%; $P = 0.03$). CKD progression and recurrent AKI occurred in 25% of patients, while 12.1% experienced progression of albuminuria. For effectiveness outcomes, serum creatinine was measured at every visit, and 77.4% of patients had at least two urinary albumin-to-creatinine ratio (UACR) assessments during the follow-up period. Each visit involved a comprehensive evaluation by the multidisciplinary care team.

Discussion and Conclusions: The multidisciplinary Post-AKI Clinic improved follow-up adherence and renal function monitoring and was associated with a favorable trend in reducing major kidney-related events. Further controlled studies are needed to confirm these findings.

Keywords: Multidisciplinary, Post-AKI, acute kidney injury, MAKE

	Total, N=124	Renal recovery at discharge, N=75	Non-renal recovery at discharge, N=49	P-value
Loss to follow-up/Referral	36 (22.5)	21 (21.9)	15 (23.4)	0.82
MAKE ^a	28 (22.6)	12 (16)	16 (32.7)	0.03
Death	15 (12.1)	10 (13.3)	5 (10.2)	0.60
Doubling serum creatinine	15 (12.1)	3 (4.0)	12 (24.5)	0.001
RRT ^b	5 (4.0)	2 (2.7)	3 (6.1)	0.34
CKD Progression ^c	31 (25.0)	17 (22.7)	14 (28.6)	0.46
Denovo CKD ^d	26 (20.9)	8 (10.7)	18 (36.7)	<0.001
Recurrent AKI	31 (25)	18 (24)	13 (26.5)	0.75
Progression of albuminuria	15 (12.1)	7 (9.3)	8 (16.3)	0.24
Readmission	42 (33.9)	23 (30.7)	19 (38.8)	0.35

^aMAKE; major adverse kidney events at 365 d were comprised of death, incident dialysis (requirement for CRRT), and persistent renal dysfunction death (doubling of serum creatinine or eGFR < 50% from baseline)

^bNew RRT; new case of RRT

^cCKD progression; change of staging of CKD by eGFR criteria in previous history of chronic kidney disease

^dDenovo CKD; newly diagnosis of chronic kidney disease by eGFR criteria in no previous history of CKD

Table 1. Comparison of long-term outcomes according to renal recovery at discharge

Preloading Intravenous Magnesium Sulfate to Reduce Vancomycin Induced Nephrotoxicity: An Open - Label, Randomized Controlled Trial (MARVIN Study)

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Abstract:

Background and Objectives: Vancomycin-associated acute kidney injury (AKI) remains a significant concern in hospitalized patients, especially those with underlying chronic kidney disease (CKD). Magnesium deficiency has been implicated in increased susceptibility to nephrotoxicity. This study aimed to evaluate the renoprotective effect of intravenous magnesium sulfate in preventing AKI among patients receiving vancomycin.

Methods: This open-label, randomized controlled trial enrolled 60 hospitalized adult patients receiving vancomycin. Participants were randomly assigned in a 1:1 ratio to receive either adjunctive intravenous magnesium sulfate or standard care. The primary outcome was a composite of AKI, requirement for renal replacement therapy (RRT), or all-cause mortality. Secondary outcomes included AKI reversal rate, length of hospital stay, and incidence of hypermagnesemia.

Results: The composite outcome occurred in 23.3% of patients in the magnesium group versus 36.7% in the control group ($p = 0.25$). Notably, the AKI reversal rate was significantly higher in the magnesium group (73.3%) compared to the control group (46.7%, $p = 0.02$), particularly in patients with baseline CKD stage 3 ($p = 0.042$). No serious adverse events related to hypermagnesemia were observed. The Kaplan–Meier analysis for time-to-event outcomes demonstrated favorable but non-significant trends toward benefit in the magnesium group.

Conclusion: Intravenous magnesium sulfate may enhance renal recovery in vancomycin-induced AKI, especially among high-risk CKD patients. Although the reduction in the composite outcome did not reach statistical significance, the observed trends and safety profile suggest a potential role for magnesium as a renoprotective adjunct. Larger, blinded trials are warranted to confirm these findings.

Keywords: Magnesium sulfate, Vancomycin, Acute kidney injury, CKD, Renoprotection, Randomized controlled trial

Severe Acute Kidney Injury Reduction with Leptospirosis Care Bundle: A multicenter Randomized Controlled Trial

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Abstract:

Background: Leptospirosis is one of the most important zoonosis that cause high case fatality rate (CFR) in Thailand. To alleviate disease severity, early diagnosis with prompt management is crucial. To achieve that, we proposed a leptospirosis care bundle model, using Thai-Lepto score as an early detective tool at primary care units with further directly fast-track management protocol through the involving hospitals.

Objective: To study the effectiveness of the leptospirosis care bundle for decreasing severity of leptospirosis in the patients who admitted to the hospitals.

Materials and Methods: A pragmatic cluster randomized, multicenter controlled trial was conducted during September 2018 to December 2024 at 12 participating hospitals (clusters) in Nakhon Si Thammarat and Sisaket provinces (Figure). All clusters with pair-matched and constrained randomization were assigned to intervention (leptospirosis care bundle) or control (usual care) groups. Leptospirosis was confirmed diagnosis by any positive of blood PCR, urine PCR, or MAT. Multiple (10) imputation were used for handling missing data. The effect size and its precision was estimated with risk difference and 95 % confidence interval, the median difference was computed by (1,000 samples) bootstrapping method.

Results: 6 and 6 clusters of the intervention and control group were seemly comparable in number of beds of the participating hospitals and distribution area of the two provinces. In intention-to-treat analysis of 322 suspected cases, 75 (59 %) and 129 (66 %) patients were confirmed leptospirosis cases in the care bundle and usual care group, respectively. The primary outcomes of the care bundle group showed better trend, but not yet significantly lower rate of AKI ($p=0.15$). The secondary outcomes showed significantly lower (44 -> 28%) severe AKI (stage 3) with risk difference 0.16 (0.02, 0.29) and shorter (5.6 -> 2.9 days) length of hospital stay with median difference (95 % CI) = 2.73 (0.02, 4.44) days. And also,

	Usual care [§] (n= 129)	Care Bundle [§] (n=75)	Risk ratio [§] (95 % CI)	Risk/Median [§] difference (95 % CI)	P Value [§]	Forest Plot [§]
Primary outcome						
AKI in 72 hour (Stage 1, 2, 3), % (n)	0.51 (66)	0.44 (33)	0.87 (0.60, 1.25)	0.07 (-0.07, 0.21)	0.39	
Secondary outcomes						
Severe AKI (Stage 3) [¶] , % (n)	0.44 (57)	0.28 (21)	0.64 (0.42, 0.98)	0.16 (0.02, 0.29)	0.03	
Glasgow Coma Score < 10 [¶] , % (n)	0.04 (6)	0.01 (1)	0.30 (0.05, 1.86)	0.03 (-0.01, 0.07)	0.26	
Norepinephrine use [¶] , % (n)	0.32 (41)	0.24 (18)	0.75 (0.49, 1.16)	0.08 (-0.05, 0.20)	0.27	
On ventilator [¶] , % (n)	0.09 (12)	0.07 (5)	0.74 (0.35, 1.57)	0.02 (-0.05, 0.10)	0.57	
Platelet < 50x10 ³ [¶] , n (%)	0.35 (45)	0.24 (18)	0.69 (0.44, 1.07)	0.11 (-0.02, 0.24)	0.11	
Total bilirubin ≥ 6 mg/dL [¶] , n (%)	0.14 (18)	0.11 (8)	0.78 (0.43, 1.07)	0.03 (-0.06, 0.12)	0.57	
Lung hemorrhage, % (n)	0.13 (17)	0.10 (8)	0.81 (0.44, 1.49)	0.02 (-0.06, 0.11)	0.62	
ICU admission, % (n) (post-hoc)	0.37 (47)	0.28 (21)	0.76 (0.51, 1.15)	0.09 (-0.05, 0.22)	0.23	
Death, % (n)	0.07 (9)	0.01 (1)	0.19 (0.03, 1.22)	0.06 (0.01, 0.11)	0.14	
Length of hospital stay (day), median (Q1, Q3)	5.6 (2.9, 6.8)*	2.9 (1.5, 5.7)*	-	2.73 (1.02, 4.44)*	0.03	
[¶] Complied with Sequential Organ Failure Assessment (SOFA) Score [§] Multiple (10) imputation *Bootstrapping 1,000 sample [§] Forest Plot of risk/median difference (95% CI)						

Table1: Summary key results (primary & secondary outcomes) for each study group

The Effects of Sodium-Glucose Cotransporter-2 (SGLT2) Inhibitor on Long-Term Outcomes in Post-Severe Acute Kidney Injury Survivors: 12-Month Follow-Up

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Abstract:

Objectives: Currently, there is no specific treatment for post AKI survivors, one of the highest risk groups of the renal and non-renal adverse long-term outcomes. This study aimed to determine whether the sodium-glucose cotransporter-2 inhibitor (SGLT2i) can decrease 1-year Major Adverse Kidney Events (MAKE365) in post AKI setting.

Materials and Methods: Multicenter randomized controlled trial, involving severe AKI survivors from 3 tertiary care hospitals, who were dialysis independence, and had at least an estimated glomerular filtration rate (eGFR) of 20 mL/min/1.73m². The participants were randomized to receive empagliflozin 10 mg/day or matching placebo for 1 year after the incident AKI. The primary outcome was MAKE365, defined as end-stage kidney disease, a sustained decrease in eGFR $\geq 25\%$ or doubling of serum creatinine for $\geq 50\%$ from baseline, or death at 1 year after the incident AKI.

Results: A total of 200 participants were included in this study, 102 patients in placebo group and 98 patients in empagliflozin group. AKI stage 3 was predominated in both groups, with renal replacement therapy required for 23% and 30% of patients in each group. MAKE365 occurred in 39% in the placebo group and 38% in the empagliflozin group; $p = 0.88$. The incident rate ratio indicated a significant reduction in recurrent AKI in the empagliflozin group (66 per 100 person-years vs. 34 per 100 person-years respectively, IRR 0.51, 95% CI 0.31, 0.84, $p = 0.008$)

Discussion and Conclusions: Empagliflozin could not show reducing in MAKE365 but showed potential benefits on reducing recurrent AKI.

Keywords: AKI, SGLT2 inhibitor, Post AKI, CKD

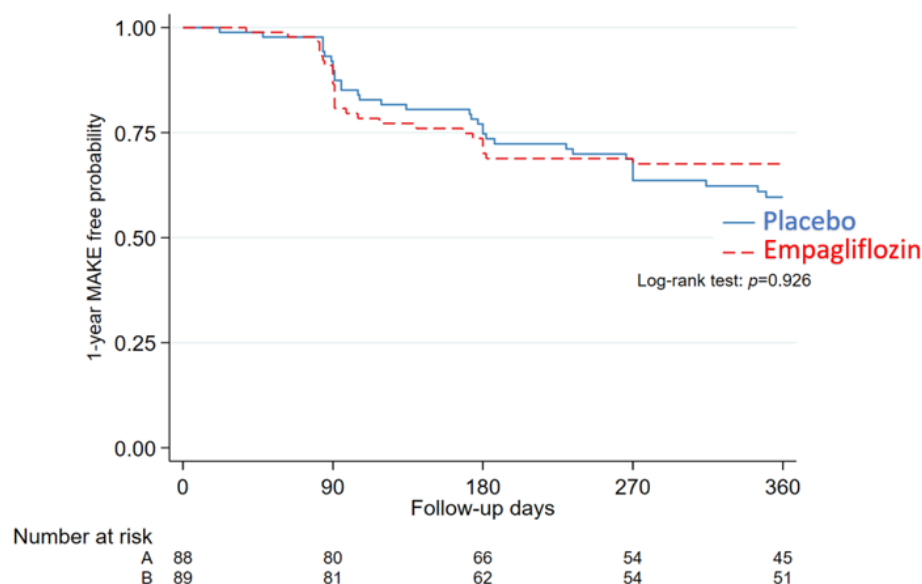


Figure 1. MAKE free survival

Parameters	Placebo	Empagliflozin	p-value
Primary outcome			
1 year MAKE, n (%)	35 (39)	34 (38)	0.88
Secondary outcomes			
MAKE criteria, n (%)	(N=89)	(N=89)	
Dead	10 (11)	4 (5)	0.095
Persistent renal dysfunction	25 (28)	30 (34)	0.42
Dialysis dependence	0 (0)	0 (0)	NA
Clinical Assessment			
Recurrent AKI, n (%)	28/83 (34)	18/87 (21)	0.056
1-year recurrent AKI rate (95% CI), per 100 person-years	66 (48, 89)	34 (21, 51)	0.008*
Readmission, n (%)	27/83 (33)	23/87 (26)	0.38
1-year readmission rate (95% CI), per 100 person-years	56 (40, 77)	48 (33, 68)	0.54
Heart failure event, n (%)	15/83 (18)	11/87 (13)	0.33
1-year heart failure rate (95% CI), per 100 person-years	34 (21, 51)	38 (25, 56)	0.68
Stroke (new event)	(N=79) 3/74 (4)	(N=80) 2/78 (3)	0.68 (Fisher's exact)
Hypertension (new event)	(N=14) 3/4 (75)	(N=7) 1/1 (100)	1.00 (Fisher's exact)
Kidney function (M12)			
Serum creatinine	(N=54) 1.2 (1.0–1.7)	(N=50) 1.4 (1.1–1.9)	0.31
eGFR	(N=54) 51 (36–70)	(N=49) 46 (35–55)	0.12
MAU/Cr (absolute values)	(N=23) 3.4 (1.2–12.4)	(N=25) 3.2 (2.6–17.4)	0.45
New CKD (any), n/N (%)	13/38 (34)	13/27 (48)	0.26
CKD progression (any), n/N (%)	15/44 (34)	24/56 (43)	0.37
MAU/Cr progression (any), n (%)	21/57 (37)	30/60 (50)	0.15
Acute GFR slope (M0, M3) unit per month, mean (SD; 95% CI)	N=80 0.57 (SD 5.79; 95% CI -0.72–1.85)	N=78 -1.08 (SD 4.54; 95% CI -2.10–0.05)	0.049
Chronic GFR slope (M3, M6, M9, M12) unit per month, mean (SD)	N=72 -0.36 (2.78)	N=72 0.13 (2.38)	0.26
Total GFR slope (M0, M3, M6, M9, M12) unit per month, mean (SD)	N=82 -0.34 (2.01)	N=85 -0.19 (2.37)	0.65
Reduction in MAU/Cr at M12/last visit (M0-M12), median (IQR)	(N=18) 16.0 (-8.9–65.6)	(N=21) 17.5 (-35.3–56.6)	0.60 (Mann-Whitney U exact test)
Current medications at 1-year follow-up			
ACEIs/ARBs	33/53 (62)	38/56 (68)	0.54
Calcium channel blocker	29/53 (55)	23/56 (41)	0.15
Mineralocorticoid antagonist	6/53 (11)	9/56 (16)	0.47
Beta blocker	26/53 (49)	27/56 (48)	0.93
Diuretics	22/52 (42)	13/56 (23)	0.034
Vasodilators	14/53 (26)	8/56 (14)	0.11
Alpha blockers	11/52 (21)	5/56 (9)	0.074

* Incident rate ratio (IRR) empagliflozin vs placebo = 0.51 (95% CI 0.31, 0.84)

Table 1. Primary and secondary outcome

Clinical Outcomes of Angiotensin-Converting Enzyme Inhibitors and Angiotensin II Receptor Blockers in Older Adults More Than 85 Years after Acute Kidney Injury

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Abstract:

Objectives: Angiotensin-Converting Enzyme inhibitors/Angiotensin II Receptor Blockers (ACEi/ARB) therapy is recommended to slow kidney disease progression and improve outcomes after acute kidney injury (AKI). While their benefits are recognized, data on their potential effects in very old adults (≥ 85 years) after AKI remain limited. The overall risks and benefits, including potential adverse events, are still uncertain in this group. This study investigates the clinical impact of ACEi/ARB use in this high-risk population.

Materials and Methods: This cohort study utilized data from the TriNetX Collaborative Network. Adults aged ≥ 85 years who underwent dialysis during hospitalization and subsequently discontinued dialysis upon discharge were included. Patients who died, required long-term dialysis, or had prior ACEi/ARB use before discharge were excluded. Based on ACEi/ARB initiation within 90 days post-discharge, patients were categorized into ACEi/ARB and control groups. One-to-one propensity score matching was applied to balance baseline characteristics. Outcomes, including all-cause mortality, and major adverse kidney events (MAKE), major adverse cardiovascular events (MACE), were analyzed using Cox proportional hazards models in an emulated target trial analysis.

Results: Among 73,941 patients with AKI after dialysis withdrawal, 2,742 (3.7%) received ACEi/ARB therapy. After propensity score matching, ACEi/ARB use was associated with a lower risk of all-cause mortality (aHR = 0.65; 95% CI: 0.47–0.91; $p = 0.01$) and MAKE (aHR = 0.70; 95% CI: 0.58–0.84; $p < 0.01$). The observed protective effect of ACEi/ARB on MAKE was more pronounced in patients with hypertension (p for interaction = 0.01). However, there was no significant effect-modification in aHR of MACE by any selected potential moderators. We also noted ACEi/ARB use was associated with a higher risk of hypotension (aHR = 1.29; 95% CI: 1.02–1.63; $p = 0.04$) and hyperkalemia (aHR = 1.97; 95% CI: 1.22–3.19; $p < 0.01$).

Discussion and Conclusions: Among very old adults (≥ 85 years) with AKI after dialysis withdrawal, ACEi/ARB therapy was significantly associated with lower risks of mortality and MAKE but an increased risk of hypotension and hyperkalemia. The benefits on MAKE were more pronounced in patients with hypertension, highlighting a potential subgroup

advantage. These findings support the cautious use of ACEi/ARB in this high-risk population.

Keywords: Acute kidney injury; Angiotensin-Converting Enzyme Inhibitors; Angiotensin II Receptor Blockers; Older Adults

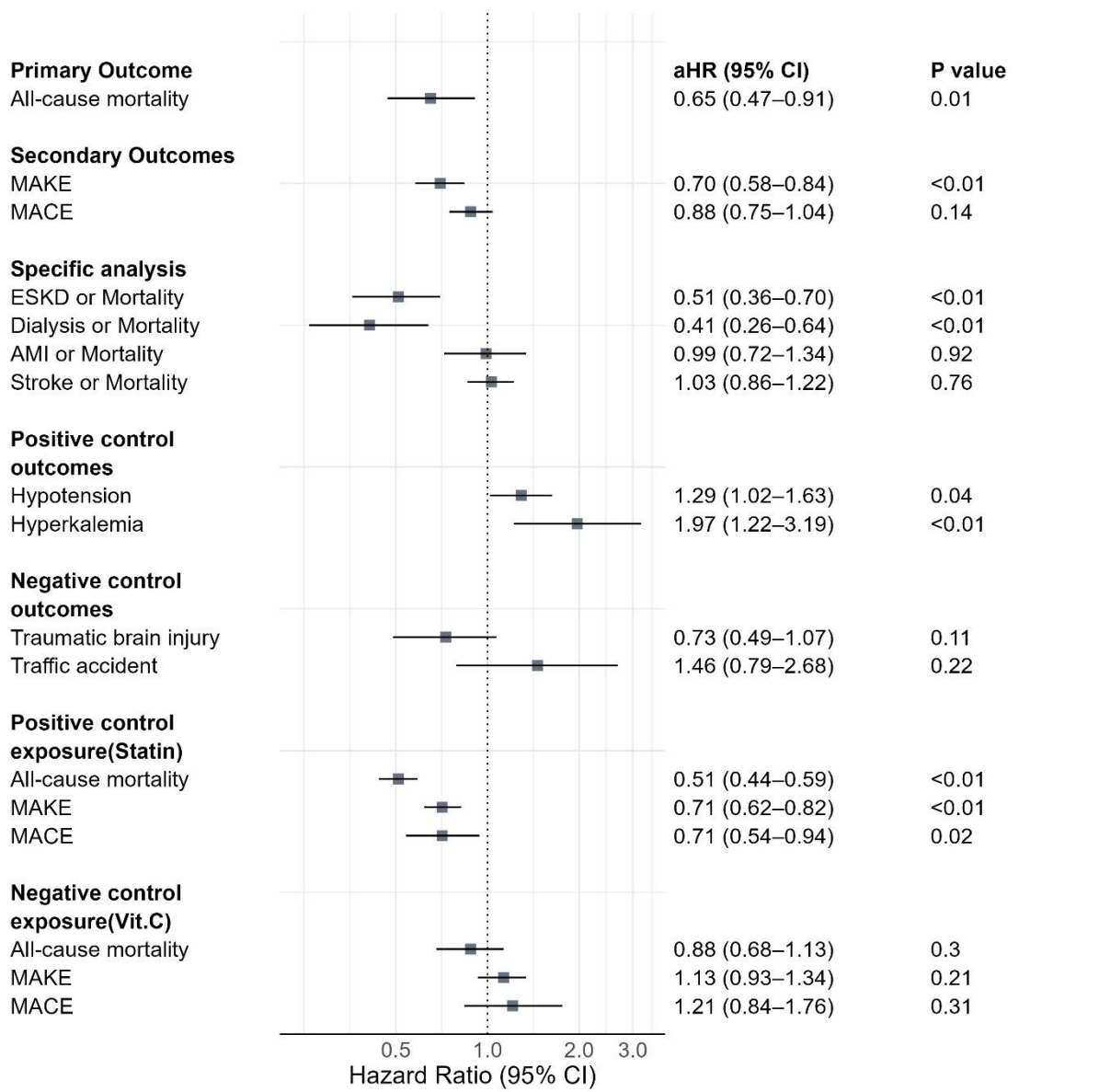


Figure1. Assessment of primary and secondary outcomes, specificity analysis, and outcome controls in ACEi/ARB (n = 2,736) versus non-users (n = 2,736) among in older adults more than 85 years with AKD

Characteristics	Before matching			After matching		
	ACEi/ARB (n=2,742)	Control (n=71,199)	Std. diff.	ACEi/ARB (n=2,736)	Control (n=2,736)	Std. diff.
Demographics						
Age (mean ± SD, year)	88.5 ± 1.8	88.8 ± 1.7	0.18	88.5 ± 1.8	88.5 ± 1.8	<0.01
Male	1,091(40.0)	27,637(39.0)	0.02	1,091(40.0)	1,091(40.0)	<0.01
White	1,996(73.0)	51,240(72.1)	0.02	1,996(73.0)	1,921(70.2)	0.06
Asian	159(5.8)	5100(7.2)	0.06	159(5.8)	211(7.71)	0.08
Comorbidities						
Chronic kidney disease	1,542(56.4)	32,769(46.1)	0.21	1542(56.4)	1,541(56.3)	<0.01
Hypertension	2,545(93.0)	51,090(71.9)	0.58	2,545(93.0)	2,539(92.8)	<0.01
Ischemic heart disease	1,396(51.0)	24,995(35.2)	0.32	1,396(51.0)	1,393(50.9)	<0.01
Diabetes mellitus	969(35.4)	17,365(24.4)	0.24	969(35.4)	951(34.8)	0.01
Heart failure	1,136(41.4)	17,593(24.7)	0.34	1,135(41.5)	1,108(40.5)	0.02
Medications						
Diuretics	1,856(67.7)	30,724(43.2)	0.53	1,855(67.8)	1,903(69.6)	0.04
Insulin	1,006(36.7)	19,682(27.6)	0.23	1,006(36.8)	1,001(36.6)	<0.01
Oral hypoglycemic agents	584(21.3)	5,217(7.3)	0.42	583(21.3)	594(21.7)	<0.01
Beta blockers	2,009(73.3)	38,434(54.0)	0.43	2,008(73.4)	2,059(75.3)	0.05
Laboratory tests						
Creatinine (mg/dL)	76.9 ± 33.0	74.4 ± 32.3	0.07	76.9 ± 33.0	80.2 ± 34.9	0.02
Hb >12 g/dL	2,197(80.1)	47,152(66.2)	0.32	2,197(80.3)	2,214(81.9)	0.02
Glycated hemoglobin (%)	6.2 ± 1.5	6.2 ± 1.5	<0.01	6.2 ± 1.5	6.2 ± 1.5	<0.01
LDL (mg/dl)	84.7 ± 35.8	87.0 ± 38.1	0.06	84.7 ± 35.8	83.7 ± 36.4	0.03
BMI (kg/m ²)	26.6 ± 5.6	25.1 ± 5.7	0.26	26.6 ± 5.6	26.4 ± 6.3	0.03

Table 1. Pre- and post-match baseline characteristics of the older adults more than 85 years with acute kidney disease between ACEi/ARB and control group.

Association Between Mitochondrial Gene Expression and Metabolomic Alterations in Patients with Severe COVID-19 Pneumonia Treated with Cytokine Adsorption Therapy

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Abstract:

Objectives: Severe COVID-19 pneumonia can trigger cytokine storms, contributing to significant morbidity and mortality. Cytokine adsorption therapy has emerged as a promising treatment. Therefore, we sought to investigate the clinical benefits of hemoperfusion by evaluating changes in inflammation, metabolomic profiles, and circulating mitochondrial function in patients with COVID-19.

Materials and Methods: We conducted a prospective observational study in adults with severe COVID-19 pneumonia admitted to the intensive care unit at Chiang Mai University Hospital. Patients with acute respiratory distress syndrome (ARDS) and elevated inflammatory markers were included and classified into either the hemoperfusion or control group. We compared clinical outcomes – including severity scores (APACHE II and SOFA) and $\text{PaO}_2/\text{FiO}_2$, along with inflammatory cytokines, metabolomic, and circulating mitochondrial profiles on day 7 post-treatment.

Results: Seventeen patients were enrolled. Eight received hemoperfusion, and nine did not. In the hemoperfusion group, all severity scores significantly decreased, and $\text{PaO}_2/\text{FiO}_2$ significantly increased. Inflammatory markers and metabolomic profiles were also significantly reduced, while mitochondrial complex IV activity was markedly suppressed. At day 7, clinical outcomes had improved in the hemoperfusion group compared with the control group. Correlation analysis revealed that changes in the APACHE II score positively correlated with IFN-gamma, leukotriene E4, and prostaglandin B2 levels. Alterations in the SOFA score positively correlated with IL-8, IFN-gamma, and thromboxane B3. Improvement in $\text{PaO}_2/\text{FiO}_2$ were positively correlated with IL-6 and prostaglandin B2 levels.

Discussion and Conclusions: Hemoperfusion therapy could mitigate the severity of COVID-19-associated ARDS via the amelioration of inflammatory markers, metabolomic profiles, and mitochondrial function.

Keywords: COVID-19; Cytokine storm; Hemoperfusion; Metabolome, Mitochondria

Effect of Therapeutic Plasma Exchange on Outcomes of Patients with Autoimmune Neurological Hospitalised in the ICU of Adam Malik Hospital

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Abstract:

Objectives: Therapeutic plasma exchange (TPE) can remove circulating pathogenic substances such as autoantibodies from the bloodstream thereby improving clinical outcomes. Diseases such as *Myasthenia Gravis* and *Guillain-Barre Syndrome* often cause paralysis that requires intensive care, one of the expected uses of TPE. The purpose of this study was to determine the effect of TPE on the outcome of patients with neurological autoimmunity treated at Adam Malik Hospital Medan.

Materials and Methods: Analytical retrospective study was used in patients with neurological autoimmune disorders who performed TPE and were attached to a ventilator at Adam Malik Hospital Medan. Demographic data, clinical outcomes, duration of ventilator use, assessment of changes in neurological autoimmune scores using *Myasthenia Composite Scale* (MCS) and *Guillain Barre Disability Scale* (GBDS) before and after TPE (1-2 cycles) were analysed using descriptive and inferential statistical methods.

Results: Of the 22 patients who underwent TPE, 16 people with *myasthenia gravis* underwent TPE and 9 people with *Guillain Barre Syndrome* underwent TPE, but no significant difference was found between the two ($p > 0.05$). In contrast, there was a decrease in MCS values after TPE, with a significant difference between the two groups ($p < 0.05$).

Discussion and Conclusions: TPE was shown to have a positive impact on the outcomes of patients with neurological autoimmunity in the ICU of Adam Malik Hospital Medan. Further research is needed to explore the long-term effects and optimisation of TPE protocols in this population.

Keywords: autoimmune neurological, Guillain-Barre Syndrome, ICU, Myasthenia Gravis, Therapeutic Plasma Exchange

Characteristics	MG	GBS	p-value
Gender (n,%)			
Male	6 (46,15%)	4 (44,4%)	0,937
Women	7 (53,8%)	5 (55,5%)	0,851
Age (Mean±SD, years)	47,62±17,71	37,11±16,9	0,115
BMI (Mean±SD, kg/m)²	26,3±4,71	23,5±5,8	0,273
Ventilator use (n, %)			
Yes	13 (100%)	9 (100%)	0,193
No	0	0	0,113
TPE cycle (n, %)			
1 Cycle	10 (76,9%)	6 (66,6%)	0,253
2 Cycle	3 (23,1%)	3 (33,3%)	0,277

Table 1 Data Characteristics Table

Outputs	MG	GBS	p-value
Duration of Ventilator Use (Mean±SD, days)	11,8±5,3	11,2±7,1	0,341
Outputs	1 Cycle	2 Cycle	p-value
MG	12,6±7,2	15±7,9	0,951
GBS	10,3±2,5	9,2±2,9	0,694

Table 2 Comparison of Ventilator Length of Use by Cycle in MG and GBS patients undergoing TPE

Outputs	MG	GBS	p-value
Pneumonia	5 (22,7%)	1 (4,5%)	0,346
Electrolyte Imbalance	1 (4,5%)	1 (4,5%)	0,464
Outputs	1 Cycle	2 Cycle	p-value
MG			
Pneumonia	2 (40%)	3 (60%)	0,207
Electrolyte Imbalance	1 (100%)	0 (0%)	0,441
GBS			
Pneumonia	0 (0%)	1 (100%)	0,453
Electrolyte Imbalance	0 (0%)	1 (100%)	0,453

Table 3 Comparison of complications by Cycle in MG and GBS patients undergoing TPE

Outputs	MG	GBS	p-value
Life	4 (44,4%)	4 (44,4%)	0.512
Died	9 (55,5%)	5 (55,5%)	0.145
Outputs	1 Cycle	2 Cycle	p-value
MG			
Life	1 (25%)	3 (75%)	0,071
Died	4 (44,4%)	5 (55,5%)	
GBS			
Life	1 (25%)	3 (75%)	0,058
Died	1 (20%)	4 (80%)	

Table 4 Comparison of outcomes by cycle in MG and GBS patients undergoing TPE

Score	MG	GBS	p-value
<i>Myasthenia Composite Scale</i>	29,15±6,40	26,76±5,57	0,001
<i>Guillain Barre Disability Scale</i>	5,00±0,00	4,09±1,44	0,064
Outputs	1 Cycle	2 Cycle	p-value
<i>Myasthenia Composite Scale</i>	26,72±4,69	25,72±5,29	0,910
<i>Guillain Barre Disability Scale</i>	4,72±0,90	3,73±1,68	0,087

Table 5 Changes in Autoimmune Neurological Score after TPE by cycle

Clinical Predictors of Acute Kidney Injury in Exertional Heat Stroke: A Retrospective Cohort from a Thai Military ICU

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Abstract:

Background: Exertional heat stroke (EHS) is a severe medical emergency frequently encountered in military settings, especially among young, active males during high-intensity training in hot environments. Acute kidney injury (AKI) is a common complication associated with significant morbidity and mortality, but predictive factors specific to this population remain underexplored.

Objectives: This study aimed to (1) identify clinical and laboratory predictors associated with AKI in patients with EHS admitted to a military ICU, and (2) assess the incidence and clinical outcomes of AKI in this population.

Materials and Methods: We conducted a retrospective cohort study including 50 consecutive male patients diagnosed with EHS and admitted to the ICU at Phramongkutklao Hospital between January 2013 and December 2024. AKI was defined based on KDIGO 2012 criteria. Clinical characteristics, laboratory values, and outcomes were compared between AKI and non-AKI groups. Univariate and multivariate logistic regression analyses were performed to identify independent predictors.

Results: Among 50 patients (100% male), 38 (76%) developed AKI. Univariate analysis identified the following variables significantly associated with AKI: initial core body temperature (OR 2.16; 95% CI 1.21–3.87; $p=0.009$), Glasgow Coma Score (OR 0.67; 95% CI 0.51–0.89; $p=0.005$), body mass index (OR 1.48; 95% CI 1.15–1.91; $p=0.003$), ALT (OR 1.04; 95% CI 1.01–1.07; $p=0.01$), and CPK level (OR 3.33; 95% CI 1.02–10.89; $p=0.047$). In multivariate analysis, no variable reached statistical significance, though elevated BMI (OR 3.5; 95% CI 0.74–16.38; $p=0.113$) and CPK level (OR 2.86; 95% CI 0.43–4.56; $p=0.165$) showed suggestive trends.



Discussion and Conclusions: AKI was observed in over three-quarters of critically ill EHS patients in this Thai military cohort. While multiple clinical and biochemical factors were associated with AKI in univariate analysis, none were independently predictive in multivariate modeling. These findings highlight the need for larger, multicenter studies to develop robust prediction tools and prevention strategies for heat-related kidney injury in high-risk military populations.

Keywords: Exertional heat stroke, acute kidney injury, critical care, military medicine, risk prediction, rhabdomyolysis



POSTER PRESENTATION ABSTRACT

Incidence of AKI in Non-Critical Geriatric Population and Correlation with Clinical Profile in Tertiary Care Hospital

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Abstract:

Objectives: This study aims to contribute essential insights into the epidemiological patterns of AKI in geriatric population. It aims to investigate AKI incidence in non-critical geriatric populations and its correlation with clinical profiles.

Materials and Methods: A single-centre cross-sectional study was conducted from July 2024 to December 2024 in a tertiary care hospital in Mysuru. The study included cases with AKI incidence and age above 60, excluding known CKD cases on maintenance hemodialysis and critically ill patients. Comprehensive histories and thorough investigations were performed, including renal function tests, urine analysis, and abdominal ultrasonography.

Results: The study revealed a notable 18.29% incidence of AKI in the total studied population. The mean age of cases was approximately 70.01 years, though no statistically significant correlation was observed between AKI incidence and age, male cases exhibited a higher prevalence. Diabetes and hypertension were present in 15.62% of AKI cases, significantly correlating with the incidence. Renal cause of AKI was 78.1%, while pre-renal and postrenal causes were also significantly correlated with AKI cases. Management primarily involved conservative approaches, surgical interventions like DJ stenting, and hemodialysis. The mean peak estimated glomerular filtration rate (eGFR) improved significantly post-intervention, particularly among male and female cases.

Discussion and Conclusions: The study underscores a substantially high incidence of AKI in non-critical geriatric populations, with sepsis due to infections being the most common renal cause. Regular renal function screenings in geriatric populations are crucial, and prompt intervention for any derangement is essential to prevent mortality and morbidity associated with AKI.

Keywords: AKI, elderly, Geriatric

Demographics, Indications, and Outcomes of Continuous Kidney Replacement Therapy in Critically Ill Children: A Single-Center Experience from Thailand

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Abstract:

Objectives: Continuous kidney replacement therapy (CKRT) is widely used in critically ill patients with acute kidney injury (AKI) with various outcomes. Sepsis and percentage of fluid overload have been associated with poor prognosis.

Materials and Methods: We conducted a single-center, retrospective cohort study of children aged < 18 years old with AKI requiring CKRT from 2017 to 2024 to describe demographics, indications, methods, short- and long-term outcome. Subgroup analysis based on sepsis and fluid overload were performed. Multivariate logistic regression was used to identify predictors of mortality.

Results: A total of 27 patients (median age 7.2 years) were included. Main indications were from fluid overload (85.2%) and the most common mode was continuous venovenous hemofiltration (CVVH) (92.6%). The median duration was 4 days with dose of 30 ml/kg/hr. 18 patients (66.7%) had sepsis at CKRT initiation. The in-hospital mortality rate was 77.8%. Subgroup analysis of sepsis and fluid overload with outcome of the patients were not statistically significant. However, there was some trending towards significance in sepsis and hospital length of stays (p-value 0.089) and in patients with high fluid overload (> 10%) and mortality (p-value 0.174). No factor was significantly associated with mortality in multivariate analysis.

Discussion and Conclusions: Critically ill children with AKI requiring CKRT have high mortality. Although not statistically significant, sepsis and fluid overload showed a trend toward worse outcomes, suggesting the need for early recognition and management.

Keywords: Acute kidney injury, Continuous kidney replacement therapy, Pediatrics

Table 1 Demographic characteristics and CKRT prescription (n=27 patients)

Variable	
Age, yr	7.2 (3.6-12.5)
Sex, n (%)	
• Male	14 (51.9)
• Female	13 (48.1)
Body weight, kg	20 (14.8-40)
Admission diagnosis, n (%)	
• Cardiac disease	14 (51.9)
• Infectious disease	5 (18.5)
• Malignancy	3 (11.1)
• Kidney disease	2 (7.4)
• Autoimmune disease	1 (3.7)
• Others	2 (7.4)
Presence of sepsis-induced AKI, n (%)	18 (66.7)
Extracorporeal membrane oxygenation, n (%)	9 (33.3)
Percentage of fluid overload	6.4 (0-14)
Indication for CKRT, n (%)	
• Volume overload	23 (85.2)
• Electrolyte imbalance	2 (7.4)
• Intoxication	1 (3.7)
• Uremic symptom	1 (3.7)
Mode of CKRT, n (%)	
• CVVH	25 (92.6)
• CVVHD	1 (3.7)
• CVVHDF	1 (3.7)
Dose of CKRT, mL/kg/hr	30 (25-33)
Duration of CKRT, day	4 (2-6)
Anticoagulant, n (%)	
• Heparin	21 (77.8)
• No	6 (22.2)
Complication, n (%)	
• No	16 (59.3)
• Clot	9 (33.3)
• Hypotension	2 (7.4)

Table 2 Outcomes in children receiving CKRT with sepsis and those without sepsis

Variable	All (n=27)	Sepsis (n=18)	Without sepsis (n=9)	p-value
Duration of CKRT, day	4 (2-6)	2 (2-6)	6 (2-10)	0.190
ICU length of stay, day	11 (6-17)	13 (5.8-17)	7 (6-22)	0.737
Hospital length of stay, day	15 (10-35)	20 (11.5-56.3)	11 (6.5-25)	0.089
Ventilator day, day	9 (5-13)	10.5 (5-13.3)	7 (5.5-15)	0.918
In-hospital mortality, n (%)	21 (77.8)	15 (83.3)	6 (66.7)	0.326

Table 3 Outcomes in children receiving CKRT with percentage of fluid overload < 10 and ≥ 10%

Variable	All (n=27)	%FO < 10 (n=16)	%FO ≥ 10 (n=11)	p-value
Duration of CKRT, day	4 (2-6)	2.5 (2-6)	5 (2-11)	0.315
ICU length of stay, day	11 (6-17)	11 (7-16.3)	14 (5-25)	0.980
Hospital length of stay, day	15 (10-35)	19.5 (10.3-46.3)	15 (5-33)	0.415
Ventilator day, day	9 (5-13)	9 (6-12.5)	9 (5-15)	0.961
In-hospital mortality, n (%)	21 (77.8)	11 (68.8)	10 (90.9)	0.174

Table 4 Univariate and multivariate analysis examining the association between demographic and clinical variables and mortality in children requiring CKRT

Variable	Univariate analysis		Multivariate analysis	
	Crude odd ratio (95% CI)	p-value	Adjusted odd ratio (95% CI)	p-value
Age	1.12 (0.94-1.34)	0.197	1.15 (0.84-1.57)	0.374
Sex				
• Male	0.15 (0.02-1.52)	0.108	0.14 (0.01-1.99)	0.147
• Female	Ref		Ref	
BW	1.01 (0.96-1.05)	0.818	0.97 (0.90-1.05)	0.465
Admission diagnosis				
• Cardiac disease	Ref		Ref	
• Infectious disease	1.43 (0.85-2.43)	0.170	1.31 (0.45-3.80)	0.618
Presence of sepsis				
• Yes	2.50 (0.39-16.05)	0.334	2.34 (0.12-45.39)	0.575
• No	Ref		Ref	
Extracorporeal membrane oxygenation				
• Yes	0.33 (0.03-3.31)	0.342	0.65 (0.04-10.93)	0.768
• No	Ref		Ref	
Percentage of fluid overload	0.93 (0.80-1.07)	0.289	0.95 (0.79-1.14)	0.552
Postoperative of cardiac disease				
• Yes	1.82 (0.27-12.17)	0.538	1.97 (0.08-50.41)	0.682
• No	Ref		Ref	

Impact of Frailty and Quality of Life on Long-term Survival in Critically Ill Patients after Severe Acute Kidney Injury

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Abstract:

Objectives: Critically ill patients with severe acute kidney injury (AKI) frequently exhibit frailty and reduced quality of life (QoL). However, the association between frailty, QoL, and long-term survival outcomes, particularly in resource-limited settings, remains uncertain. This study aimed to assess the long-term impact of severe AKI on frailty and quality of life.

Materials and Methods: We analyzed data from the India and Southeast Asia Renal Replacement Therapy (InSEA-RRT) registry, a multicenter prospective cohort study conducted between April 2019 and December 2023 across 24 hospitals in Southeast Asia and India. Critically ill patients with AKI stage 3, as defined by the Kidney Disease Improving Global Outcomes (KDIGO) criteria, were enrolled. Frailty severity was assessed with the clinical frailty scale (CFS) and EuroQol-5 Dimensions-5 Level (EQ5D5L) index for assessed QoL. Patients were classified as having clinical frailty (CFS ≥ 5) and EQ5D5L index ≤ 0 (bad health with death = 0) at 3 months after enrollment. The primary outcome was two-year survival. The survival analysis was performed using a mixed model adjusted for correlation

within country, age, sex, comorbidities, AKI etiology, and renal recovery status at hospital discharge.

Results: A total of 2,315 patients were enrolled, 1,033 (47%) died during hospitalization. At 3 months post-AKI, clinical frailty was present in 134/472 (28.4%) survivors, and 49/474 (10.3%) had an EQ5D5L index ≤ 0 . Overall 2-year mortality was significantly higher in patients with clinical frailty versus non-frail patients (37% vs. 11%, $p<0.001$) and those with an EQ5D5L index ≤ 0 versus an EQ5D5L index > 0 (51% vs. 15%, $p<0.001$). Both clinical frailty and an EQ5D5L index ≤ 0 were associated with shorter survival (adjusted hazard ratio [aHR], 3.73; 95% CI, 2.28-6.11; $p<0.001$ and aHR, 3.41; 95% CI, 2.14-5.44; $p<0.001$, respectively).

Discussion and Conclusions: Clinical frailty and poor QoL were independently associated with long-term mortality among critically ill patients after severe AKI. Assessing clinical frailty and QoL may be essential to identify potential targets for intervention. Further research is needed to identify effective strategies to improve long-term outcomes in this high-risk population.

Keywords: Acute kidney injury, frailty, quality of life, long-term outcomes.

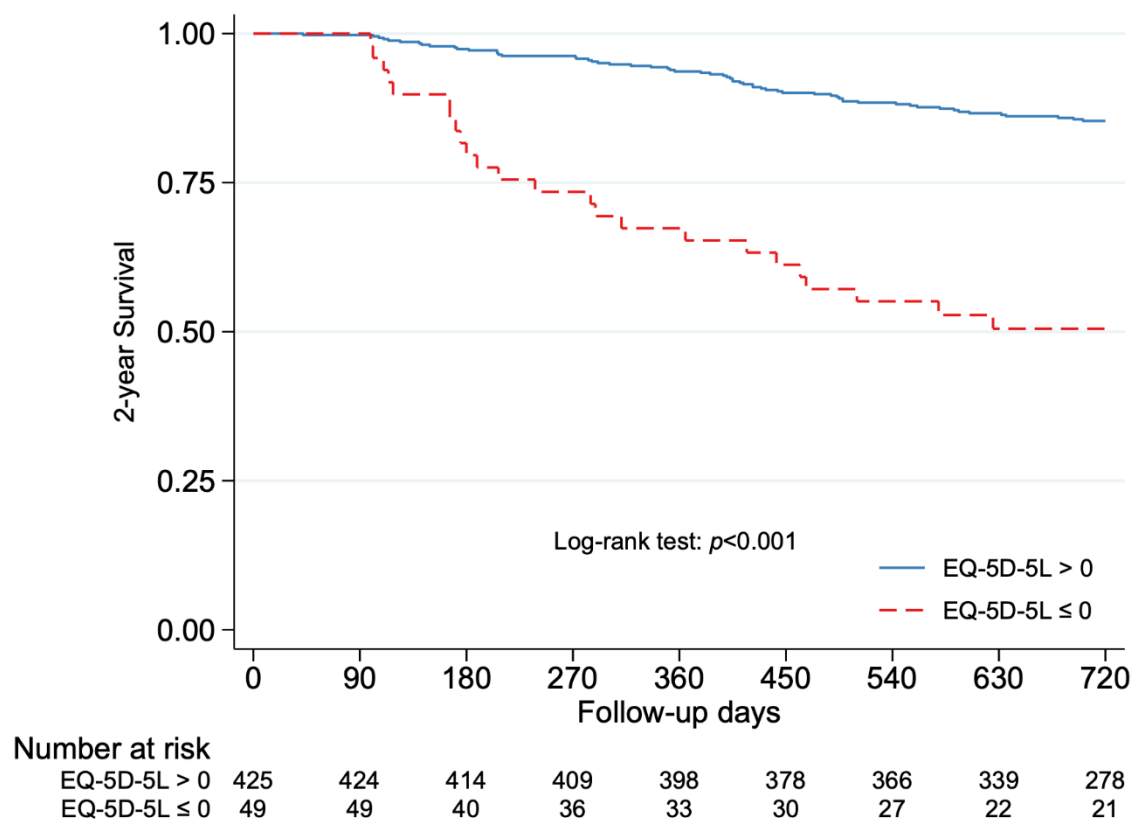


Figure1. Kaplan-Meier survival curves

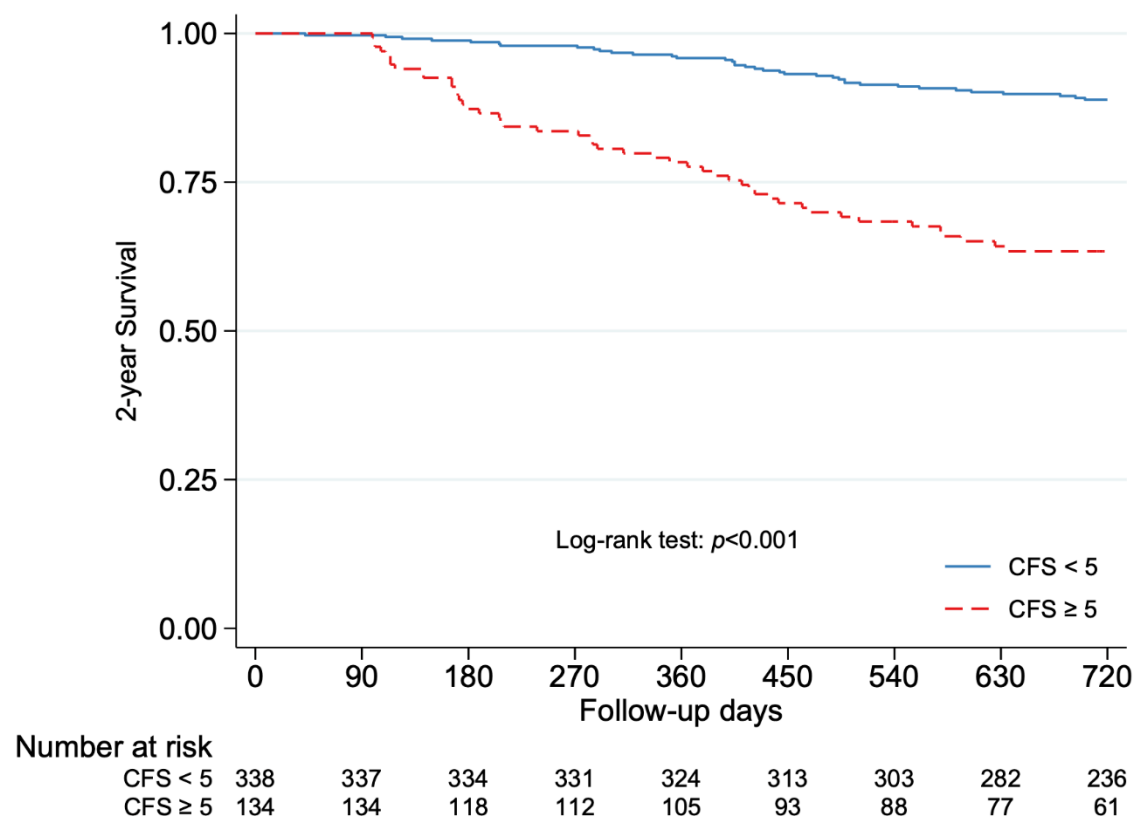


Figure2. Kaplan-Meier survival curves

Incidence, Risk factors, and Outcomes of Acute Kidney Injury in ELBW and VLBW Preterm Infants at a Tertiary NICU in Thailand

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Abstract:

Background: Acute kidney injury (AKI) increasingly contributes to poor outcome in neonatal intensive care unit (NICU), especially in very low birth weight (VLBW) and extremely low birth weight (ELBW) preterm infants. Current studies on incidence and risk factors remain limited and variable.

Objectives: This cohort study investigated the incidence, risk factors, and outcomes of AKI in ELBW and VLBW preterm infants admitted to the NICU at Chonburi Hospital.

Methods: All ELBW and VLBW preterm infants admitted to our NICU between January 2020 to December 2023 were enrolled. Those who died prior to 72 hours of life, had congenital renal abnormality, or had no serum creatinine level were excluded. AKI was diagnosed using the modified neonatal KDIGO criteria. The study included risk factors, survival length of hospital stay, and mortality as outcomes.

Results: AKI occurred in 17.8% of 180 VLBW infants and 22.2% of 108 ELBW infants. The significant risk factors included birth weight ≤ 750 g (adjusted odds ratio (OR) 5.36; 95% confident interval (CI): 1.71-16.81, $p=0.004$), intraventricular hemorrhage (IVH) 3-4 (adjusted OR 8.83; 95%CI 1.88- 41.41, $p=0.006$), Patent ductus arteriosus (PDA) (adjusted OR 5.23; 95%CI 1.42-19.24, $p=0.013$), and Apgar score ≤ 7 at 5 minutes (adjusted OR 5.00; 95%CI 1.53-16.33, $p=0.008$). AKI was significantly associated with mortality (OR 7.75; 95%CI 3.09-19.45, $p<0.001$), and the mean difference in length of hospital stay was 29.54 days (95%CI: 16.78, 42.30, $p<0.001$).

Conclusion: AKI commonly occurred in ELBW and VLBW preterm infants. Significant risk factors included lower birth weight, low Apgar score, the presence of PDA, and IVH. AKI was also associated with increased mortality and prolonged hospital stay. Early recognition and timely intervention may enhance the survival rate.

Keywords: acute kidney injury (AKI), extremely low birth weight (ELBW), very low birth weight (VLBW), NICU, Intraventricular hemorrhage (IVH), patent ductus arteriosus (PDA), and Apgar score

Lupus Cystitis Leading to Post-Renal AKI and Renal Vein Thrombosis: A Case of Multi-Organ SLE

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Abstract:

Objectives: This report presents a case of post-renal AKI in a patient with active SLE, characterized by lupus cystitis with obstructive uropathy and concurrent bilateral renal vein thrombosis (RVT).

Materials and Methods: Lupus cystitis is a rare manifestation of systemic lupus erythematosus (SLE) characterized by urinary bladder inflammation. Although uncommon, severe bladder dysfunction can lead to obstructive uropathy. This condition may, in extremely rare cases, cause compression of the renal veins, leading to venous stasis and subsequent RVT.

Results: A 28-year-old Thai woman with a one-year history of polyarthritis presented with recent gastrointestinal (GI) symptoms and seizure. Computed tomography (CT) revealed GI vasculitis, and neuropsychiatric SLE was suspected. Laboratory findings were also consistent with autoimmune hemolytic anemia. She was diagnosed with active SLE and started on intravenous (IV) dexamethasone 10 mg/day.

On hospital day 13, she developed severe colicky suprapubic pain lasting approximately one hour, exacerbated by urination. Physical examination revealed low-grade fever with marked suprapubic tenderness, without guarding or costovertebral angle tenderness. Laboratory tests showed AKI (serum creatinine increased from 0.96 to 1.3 mg/dL). CT imaging demonstrated diffuse bladder wall thickening, bilateral hydronephrosis, and newly developed thrombosis of both renal veins and the inferior vena cava (IVC). The provisional diagnosis was lupus cystitis, which led to post-renal AKI and subsequent thrombosis from bilateral renal vein compression. Cystoscopy confirmed diffuse bladder inflammation with a trabeculated, hyperemic mucosa, Hunner's ulcers, and petechial hemorrhages.

She was treated with high-dose IV methylprednisolone for 3 days, followed by IV cyclophosphamide (800 mg), hydroxychloroquine, and low molecular weight heparin. Although her condition initially improved, she developed a spontaneous bladder rupture two days after receiving cyclophosphamide, which was managed conservatively. By hospital day 40, she was discharged in stable condition with complete resolution of AKI (serum creatinine 0.7 mg/dL). Mycophenolate mofetil was initiated as maintenance therapy in the outpatient setting.

Discussion and Conclusions: Although uncommon, lupus cystitis can lead to post-renal AKI and RVT. Early recognition and prompt immunosuppressive therapy are key to favorable outcomes.

Keywords: Lupus cystitis, renal vein thrombosis (RVT), Post-Renal AKI, obstructive uropathy, SLE

Parameters	Results	Reference Range
Hemoglobin	8.7	12.0-14.9 g/L
Hematocrit	25.8	37.0-45.7 %
MCV	80.6	83-97 fl
WBC	11340	4400-10300/ul
Platelet	93,000	179-435 x10 ³ /ul
INR	1.11	0.91 - 1.08 sec
Creatinine	0.96	0.51-0.95 mg/dL
Sodium	136	135 - 145 mmol/L
Potassium	2.8	3.5 - 5.1 mmol/L
Chloride	107	98 - 107 mmol/L
Bicarbonate	17	22 - 29 mmol/L
Albumin	2.4	3.5-5.5 g/dL
C3	38.4	90-180 mg/dL
C4	3.0	10-40 mg/dL

Urine	Results	Reference Range
Specific gravity	1.014	1.003-1.030
Protein	2+	Negative
Blood	3+	Negative
WBC	5-10	0-5/HPF
RBC	50-100	0-2/HPF
24 hours urine protein	1824	mg/24hours
24 hours urine creatinine	638	mg/24hours

Serology	
ANA	homogenous pattern 1 : 160
Anti-dsDNA	< 1:10
Lupus anticoagulant	Negative APTT 27.2(normal 25.7-33.3) dRVVT 48 (normal 33.2-48.2)
Beta-2 -glycoprotein 1(IgG IgM IgA)	Negative
Anti-cardiolipid (IgG IgM IgA).	Negative
Protein S activity	57(Female normal 59-118%)
Protein C level	161 (70-140)

Table 1. Laboratory data on admission

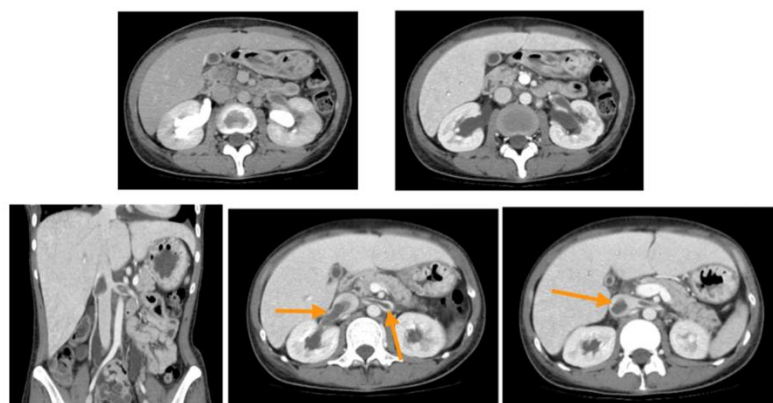


Figure 1: New finding of IVC thrombosis and bilateral renal vein thrombosis at area of renal vein passed by ureters. Thickening of urinary bladder wall with worsening bilateral hydronephrosis was seen.

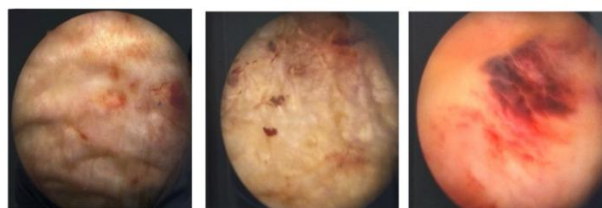


Figure 2: Cystoscopy - Trabeculation at posterior and lateral wall of bladder, hemorrhagic cystitis, submucosal edema

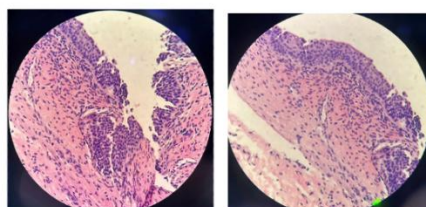


Figure 3: Histopathological - lymphocytic infiltration in lamina propria

Ten-Year Trend of Racial Disparities in Acute Kidney Injury Mortality Between Black and White Populations in the United States

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Abstract:

Objectives: Acute Kidney Injury (AKI) is one of the common causes of morbidity and mortality. However, the magnitude of AKI on mortality among different races in the United States is unknown. This study aims to examine the mortality rate from AKI between Black and White populations over a decade.

Materials and Methods: A retrospective cohort study using the CDC WONDER Multiple Cause of Death database over 10 years from 2014 to 2023. We included only Black and White population groups in the United States with Acute Kidney Injury (AKI) as the underlying cause of death. The association between annual AKI mortality between Black and White was examined by relative risks (RR).

Results: From 2014 to 2023, AKI mortality rate in the Black population ranged from 14.0 to 28.6 per 100,000 people, while it ranged from 11.1 to 14.6 per 100,000 people in the White population. During ten years of observation. Blacks had a significantly higher AKI-related mortality compared with Whites every year, with RR ranging from 1.17 to 1.96 (p-values < 0.01). The highest disparity was observed in 2014. The Black population had about 14 more deaths per 100,000 people from AKI compared with the White population (RR 1.96, 95% CI 1.73–2.21, P < 0.001). The smallest gap was in 2015 (RR = 1.17, P < 0.001).

Discussion and Conclusions: We found that Black Americans had higher death rates from acute kidney injury (AKI) in every year studied when compared with White Americans. While the AKI mortality has been trending down in Blacks, the higher mortality in Blacks compared to those in Whites suggests a possible biological or genetic risk of AKI mortality in Blacks. However, non-biological factors, including socioeconomic factors, may contribute to

this disparity. Early detection and preventive strategies for AKI might help decrease the mortality rate, particularly among at-risk populations like Blacks.

Keywords: AKI, racial disparities, black population, white population, mortality

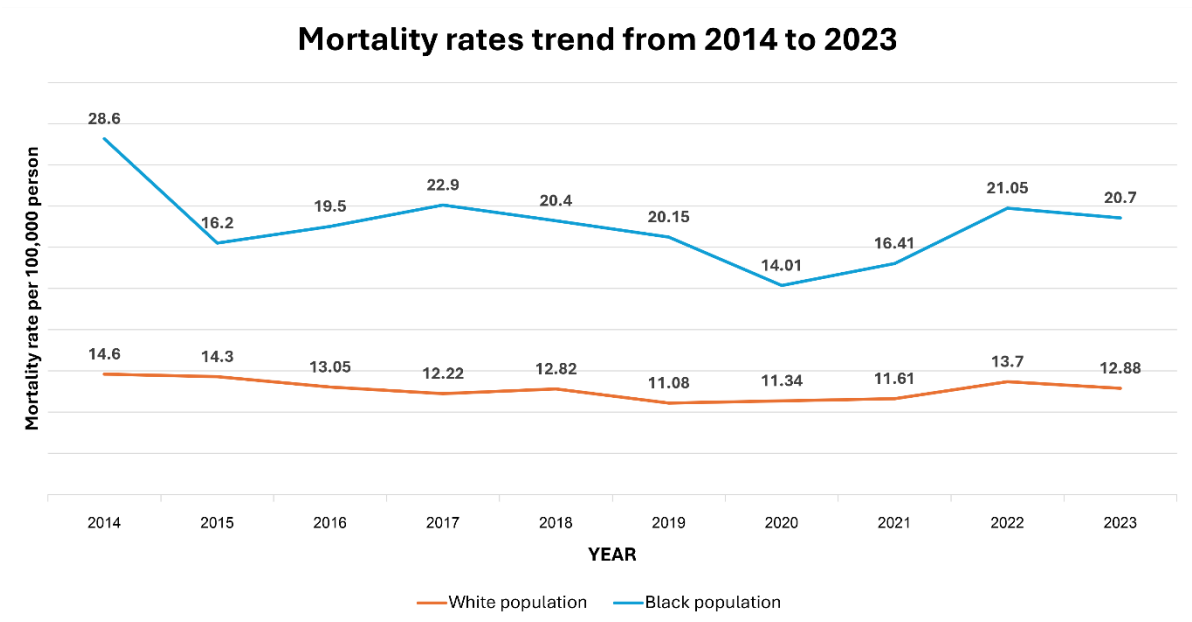


Figure 1: Mortality rate over ten years between the White and Black populations

Clinical Characteristics of Acute Kidney Injury Diagnosed by Decreasing Serum Creatinine Criteria

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Abstract:

Objectives: KDIGO 2012 defines acute kidney injury (AKI) as an increase in serum creatinine or a decrease in urine output, and a decrease in serum creatinine has not been considered as AKI. However, community-acquired AKI or AKIs in resolving process could be presented in the intensive care unit (ICU) with a decreasing trend of serum creatinine. This study aims to show the clinical significance of decreasing serum creatinine defined- AKI in critically ill patients admitted to the ICU.

Materials and Methods: This is a single-center retrospective study based on the consecutively collected data of ICU-admitted patients. AKI was detected by the electronic medical record system using the following criteria; increase in serum creatinine ≥ 0.3 mg/dL within 48 hours (I-Scr), decrease in urine output < 0.5 cc/kg/hr sustained more than 6 hours (Oliguria), or decrease in serum creatinine ≥ 0.3 mg/dL within 48 hours (D-Scr). We grouped patients by the AKI defining criteria (Oliguria, I-Scr, D-Scr, and no AKI).

Results: Between August 2023 and December 2024, 4,553 patients were admitted to the ICU. In all, 27.9% were older than 75 years, 63.9% were male, and 24.9% met AKI during the ICU stay. Among the 1,134 patients with AKI, Oliguria, I-Scr, and D-Scr criteria were used in 193 (17.0%), 314(27.7%), and 627(55.3%) of the patients. D-Scr-defined AKI patients had more comorbidities, higher APACHE II score, and more frequent ventilator, vasopressor, or kidney replacement therapy utilization than no AKI. D-Scr-defined AKI patients required longer ICU or hospital stay, higher death, and AKD progression rate at hospital discharge than patients with no AKI (Table 1). Kaplan-Meier curve showed a clear separation of in-hospital mortality between patients with D-Scr-defined AKI and no AKI (Figure 1).

Discussion and Conclusions: More than half of the AKIs were defined by D-Scr criteria in ICU. D-Scr-defined AKI shares unique characteristics of AKI, requiring special attention at ICU.

Keywords: Acute kidney injury, definition, extended

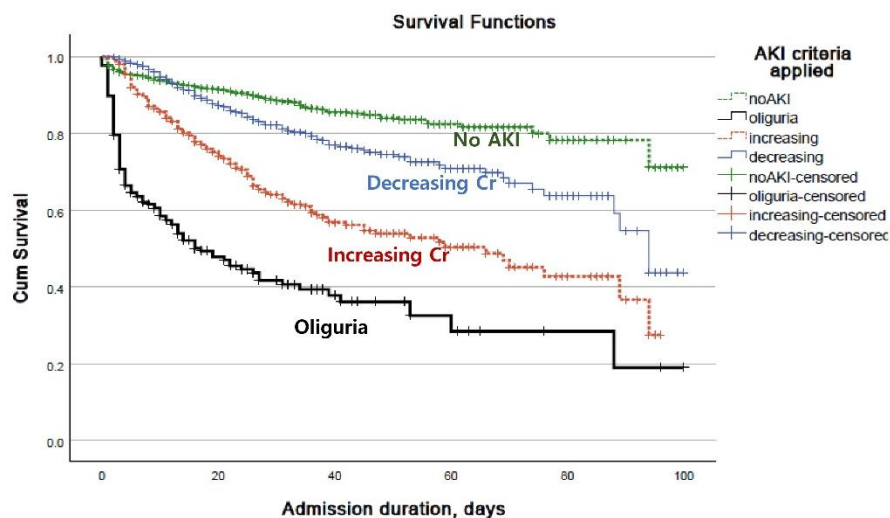


Figure 1. Kaplan-Meier curve for in-hospital mortality by acute kidney injury definition criteria

	AKI Oliguria N=193(4.2)	AKI I-Scr N=314(11.1)	AKI D-Scr N=627(13.8)	No AKI N=3419(75.1)	P-value
Demographics					
Age	62.45±21.83	67.26±15.07	63.63±17.05	63.06±17.05	
≥75 years	65(33.7)	112(35.7)	186(29.7)	906(26.5)	<0.001
Male	130(67.4)	215(68.5)	452(72.1)	2113(61.8)	<0.001
ICU					
Surgical	100(51.8)	208(66.2)	382(60.9)	2386(69.8)	<0.001
Medical	93(48.2)	100(33.8)	245(39.1)	1033(30.2)	
Comorbidities					
DM	82(42.5)	155(49.4)	273(43.5)	1231(36.0)	<0.001
HT	69(35.8)	187(59.6)	320(51.0)	1583(46.3)	<0.001
Pre dialysis CKD	31(16.1)	46(14.6)	45(7.2)	165(4.8)	<0.001
CHF	54(28.0)	105(33.4)	184(29.3)	693(20.3)	<0.001
MI	29(15.0)	57(18.2)	79(12.6)	353(10.3)	<0.001
Lung Disease	33(17.1)	114(36.3)	187(29.8)	1109(32.4)	<0.001
Liver Disease	21(10.9)	26(8.3)	51(8.1)	110(3.2)	<0.001
Stroke	23(11.9)	59(18.8)	85(13.6)	297(8.7)	<0.001
Cancer	25(13.0)	95(30.3)	124(19.8)	1007(29.5)	<0.001
Disease severity at ICU admission					
APACHE II	24.13±8.18	22.91±8.05	18.71±6.52	16.24±6.92	<0.001
Sepsis	109(56.5)	189(60.2)	367(58.5)	1193(34.9)	<0.001
Life supporting device utilization during ICU stay					
Ventilator	90(47.1)	169(55.4)	173(29.3)	502(17.4)	<0.001
Vasopressor	71(37.2)	106(34.8)	104(17.6)	205(7.1)	<0.001
CRRT or HD	62(32.1)	67(21.3)	0	0	<0.001
Patient Outcomes					
LOS at ICU	5.0(2.0-14.5)	10.0(4.0-24.0)	8.0(4.0-20.0)	2.0(1.0-6.0)	<0.001
LOS at hospital	10.0(3.0-25.0)	23.5(11.0-43.5)	26(13.0-49.0)	12.0(6.0-23.0)	<0.001
In-hospital mortality	103(53.4)	135(43.0)	84(13.4)	298(8.7)	<0.001
AKD status at discharge	40(20.7)	96(30.6)	33(5.3)	58(1.7)	<0.001

Table 1. Characteristics of decreasing creatinine criteria defined acute kidney injury

Acute Kidney Injury in Overweight/Obese Children with Dengue Hemorrhagic Fever

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Abstract:

Background: Dengue hemorrhagic fever (DHF) is a severe and potentially life-threatening condition affecting children and young adults in endemic areas. Obesity is known to alter immune and inflammatory responses, potentially worsening the clinical course of dengue infection. This study aims to identify the prevalence and associated factors of acute kidney injury (AKI) in overweight/obese children with DHF.

Methods: A retrospective study was conducted among children aged 5–18 years diagnosed with DHF between 2013 and 2023 at Siriraj Hospital, Bangkok, Thailand. The severity of DHF, overweight/obesity, and AKI were defined according to WHO SEA 2011 guidelines, WHO Child Growth Standards, and KDIGO 2012 criteria, respectively. Clinical and laboratory data were collected and analyzed. Group comparisons were performed to explore factors associated with AKI.

Results: Of 78 overweight/obese children with DHF, 10 patients (12.8%) developed AKI. The mean time of AKI detection was 2.6 ± 2.0 days after fever onset. Compared to those without AKI, children with AKI had a similar BMI Z-score (3.7 vs. 3.7), a similar age (12.0 vs. 11.9, $p = 0.28$), and a greater proportion were male (80.0% vs. 66.7%, $p = 0.43$). However, children with AKI had significantly higher white blood cell counts (7,225 vs. 3,215 cells/mm³, $p = 0.01$), a greater frequency of dengue shock syndrome (DHF grade III-V) (30.0% vs. 7.4%, $p = 0.03$), higher rates of ICU admission (30.0% vs 5.9%, $p=0.01$), and longer hospital stays (4.5 vs. 3.0 days, $p = 0.03$). One patient underwent renal replacement therapy and subsequently died.

Conclusions: The prevalence of AKI in overweight/obese children with DHF was 12.8%. A lack of leukopenia may reflect an increased inflammatory response and could be associated with the development of AKI in this population.

Keywords: Dengue hemorrhagic fever, acute kidney injury, overweight, obesity

Racial Disparities in Mortality Proportion from Acute Renal Failure: A Population-Based Analysis Using U.S. Mortality Data, 2018–2023

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Abstract:

Objectives: Acute renal failure (ARF) remains a significant contributor to mortality in the United States. Racial disparities in outcomes from ARF have not been fully elucidated at the population level. This study aims to quantify and compare the mortality proportions from ARF across three major racial groups: Asian, Black or African American, and White, using U.S. national mortality data.

Materials and Methods: Mortality data from the CDC WONDER database (2018–2023) for adults aged 18 and older were analyzed. Deaths with ICD-10 code N17 were matched to all-cause deaths by age, sex, and race, focusing on Asians, Black or African Americans, and Whites. Unadjusted mortality proportions were calculated as ARF deaths divided by all-cause deaths within each group. Age- and gender-adjusted mortality proportions were obtained via direct standardization using the overall age-sex death distribution as the standard population. Group differences were tested with the z-test. Analyses were performed in RStudio.

Results: A total of 12,944,911 adult deaths were analyzed, including 39,500 deaths from ARF (0.31%). The overall mean age was 66.7 years (SD 14.2), and 57.6% were male. By race, the total population and mortality characteristics were as follows: Asians numbered 329,041 (2.54%) with mean age of 67.2 years (SD 14.2), 57.5% male; Black or African American individuals numbered 1,954,825 (15.10%) with mean age of 62.6 years (SD 15.3), 56.8% male; Whites numbered 10,661,045 (82.36) with mean age of 67.4 years (SD 13.8),



57.8% male. The unadjusted mortality proportion from ARF was 0.17% (95% CI: 0.15 to 0.18) for Asians, 0.34% (95% CI: 0.33 to 0.35) for Black or African American individuals, and 0.30% (95% CI: 0.30 to 0.31) for Whites ($p < 0.01$). After adjusting for age and gender, mortality proportions were 0.16% (95% CI: 0.15 to 0.18) for Asians, 0.37% (95% CI: 0.36 to 0.37) for Black or African Americans, and 0.30% (95% CI: 0.30 to 0.30) for Whites ($p < 0.01$ for all comparisons). Black or African American individuals consistently exhibited the highest mortality proportion from ARF, both before and after adjustment.

Discussion and Conclusions: Significant racial disparities exist in mortality proportions from acute renal failure in the U.S. population. Black or African American individuals have a disproportionately higher risk of death from ARF compared to Asians and Whites, even after adjusting for age and gender.

Keywords: Acute Renal Failure

Silent Kidneys in the Shadow of Immunotherapy: A Case from the Frontlines of HCC Treatment.

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Abstract:

Objectives: In the current era of increasing cancer prevalence and expanding use of immune checkpoint inhibitors, acute kidney injury (AKI) has emerged as a significant adverse effect that warrants careful clinical consideration. Durvalumab, a PD-L1 inhibitor, and tremelimumab, a CTLA-4 blocker, are approved for the treatment of unresectable hepatocellular carcinoma (HCC). In the HIMALAYA trial, which evaluated durvalumab (300 mg once) in combination with tremelimumab (1,500 mg every four weeks), serious AKI was reported in 1.3% of patients. Immune-mediated nephritis represents a known but uncommon complication of checkpoint blockade therapy.

Materials and Methods: We present the case of an 81-year-old male with a history of hepatocellular carcinoma with ascites and osseous metastases, who initiated combination immunotherapy with durvalumab and tremelimumab on January 6, 2025. He subsequently underwent Y90 radioembolization on April 15, 2025. His past medical history includes chronic hepatitis B infection, stage 4 chronic kidney disease of unclear etiology, type 2 diabetes mellitus with retinopathy, hypertension, hyperlipidemia, and remote history of left-sided colon cancer, status post resection and adjuvant chemotherapy, in full remission since 1999.

Results: The patient's serum creatinine rose from a baseline of 2.4 mg/dL on January 31, 2025, to 4.2 mg/dL on June 24, 2025, and subsequently peaked at 9.0 mg/dL on July 21, 2025. During this period, he underwent three large-volume paracenteses due to abdominal discomfort. A renal biopsy was not pursued due to bilaterally small kidneys in the setting of significant ascites. Nephrology was consulted on July 31, 2025, for further evaluation and management.

Discussion and Conclusions: The etiology of AKI in patients with advanced liver disease and malignancy is often multifactorial. Contributing factors in this case likely include intravascular volume shifts following repeated paracentesis, abdominal compartment syndrome, progression of underlying CKD secondary to diabetes and hypertension, and possible immune-mediated nephritis related to checkpoint inhibitor therapy.

In conclusion, AKI in patients with HCC receiving immunotherapy is complex and may arise from overlapping causes. Immune-related nephritis, though rare, should remain a differential consideration. Clinicians are advised to closely monitor renal function and consider holding immunotherapy in the setting of unexplained or worsening kidney injury.

Keywords: AKI, HCC, Immune checkpoint inhibitors, PD-L1 inhibitor, CTLA-4 blocker

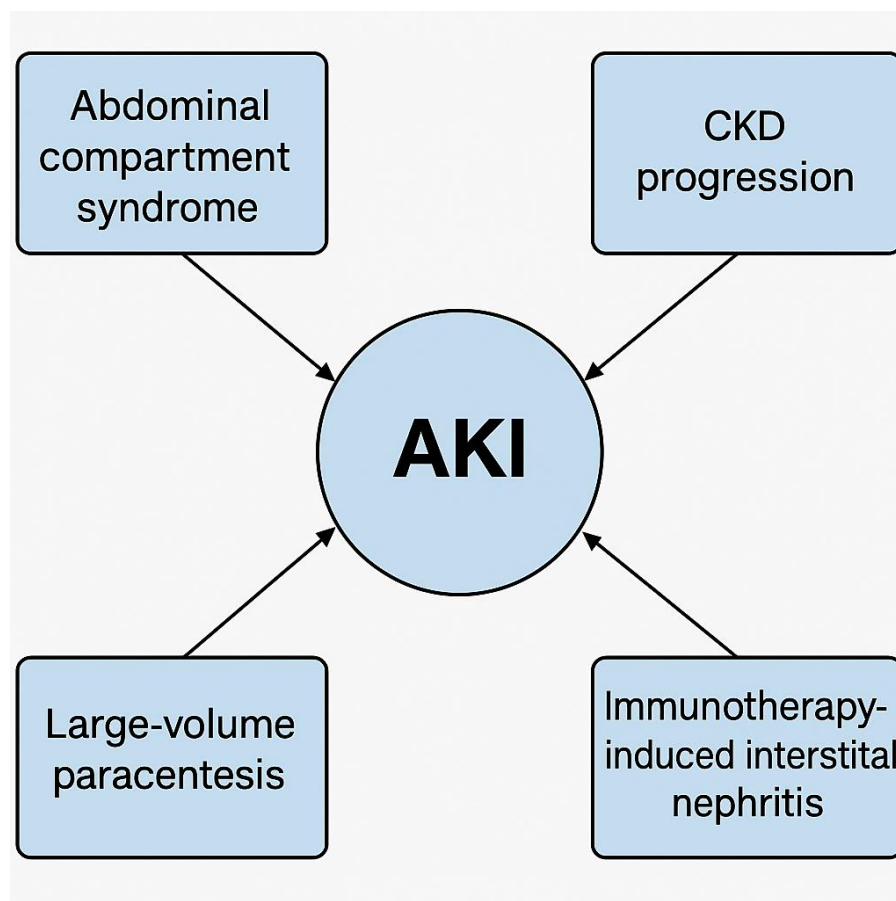


Figure 1. Multifactorial Etiology of Acute Kidney Injury (AKI) in a Patient with HCC on Immunotherapy.

Plasma N-terminal Pro B-type Natriuretic Peptide (NT-proBNP) Levels Predict Kidney Function Decline among Hospitalized Patients at High Cardiovascular Risk

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Abstract:

Objectives: N-terminal pro B-type natriuretic peptide (NT-proBNP) is a biomarker of ventricular wall stress and is widely used to predict cardiovascular (CV) events. This study aimed to evaluate the association between plasma NT-proBNP levels and long-term kidney function decline in hospitalized patients at high cardiovascular risk.

Materials and Methods: This prospective cohort study included hospitalized patients with high cardiovascular risk. Plasma NT-proBNP levels were measured at baseline during hospitalization. Kidney function was estimated using serum creatinine-derived eGFR. Rapid kidney function decline was defined as a $\geq 25\%$ reduction in eGFR per year.

Results: A total of 356 patients were enrolled, with a mean age of 72.6 ± 13.0 years. Of these, 103 patients (28.9%) had ischemic heart disease, and 132 patients (37.1%) had baseline eGFR < 60 mL/min/1.73 m². The median baseline NT-proBNP level was 1,954 pg/mL (IQR: 558–5,402.5). NT-proBNP levels differed significantly across CKD stages ($P < 0.001$). Patients with NT-proBNP levels above the median had a significantly greater decline in kidney function compared with those below the median ($34.2\% \pm 16.8\%$ vs. $14.8\% \pm 12.6\%$, $P < 0.001$). In multivariable logistic regression, NT-proBNP levels $> 1,954$ pg/mL and the presence of albuminuria were independently associated with an increased risk of rapid GFR decline, with adjusted odds ratios of 12.77 (95% CI: 6.92–23.58; $P < 0.001$) and 3.47 (95% CI: 2.16–5.57; $P < 0.001$), respectively.

Discussion and Conclusions: In hospitalized patients at high cardiovascular risk, elevated plasma NT-proBNP levels were significantly associated with accelerated long-term kidney function decline. These findings suggest a potential pathophysiological link between cardiac dysfunction and adverse renal outcomes.

Keywords: NT-proBNP, cardiovascular risk, glomerular filtration rate, kidney function decline

Unexpected Increase in In-Hospital Mortality Among Acute Kidney Injury Patients Receiving Continuous Renal Replacement Therapy: Healthcare Cost and Utilization Project – National Inpatient Sample (HCUP NIS) 2018–2021

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Abstract:

Objectives: Acute kidney injury (AKI) requiring continuous renal replacement therapy (CRRT) is a marker of severe critical illness. While overall critical care outcomes have improved, recent national trends in CRRT-related mortality are unclear. Our research aims to evaluate temporal trends in in-hospital mortality and associate factors among AKI patients receiving CRRT.

Materials and Methods: We performed a cross-sectional study using the 2018–2021 HCUP National Inpatient Sample. Adult hospitalizations with AKI receiving CRRT were identified using ICD-10-CM/PCS codes; end-stage renal disease patients on maintenance dialysis were excluded. Weighted estimates were used to generate national incidence and mortality rates. Trends were analyzed using the Cochran–Armitage test and survey-weighted linear regression. Multivariable survey-weighted logistic regression identified mortality predictors, adjusting for demographics, comorbidities (Deyo–Charlson Index), and hospital factors.

Results: Among 157,880 weighted hospitalizations, the incidence of CRRT for AKI increased from 591 to 1,022 per 100,000 hospitalizations between 2018 and 2021 (P-trend < 0.001). In-hospital mortality also rose significantly, from 45,280 cases (58.8%) in 2018 to

71,930 cases (67.5%) in 2021 (P-trend < 0.001). Independent predictors of higher mortality included male sex (adjusted OR 1.06, 95% CI 1.01–1.12), older age, and non-White race. Mortality was higher in later years and in private investor-owned hospitals, and was strongly associated with sepsis (1.56, 1.47–1.66), liver disease (1.67, 1.58–1.77), vasopressor use (1.44, 1.34–1.54), and palliative care (5.73, 5.32–6.17). Lower mortality was observed in hospitals in the Midwest, South, and West, in private not-for-profit facilities, in large hospitals, and among patients with higher Deyo-Charlson comorbidity scores.

Discussion and Conclusions: From 2018 to 2021, CRRT use for AKI rose sharply, with a surprising increase in mortality despite critical care advances. Mortality was linked to age, sex, race, hospital factors, and illness severity, while higher comorbidity burden paradoxically predicted lower risk, warranting investigation and targeted interventions for high-risk patients.

Keywords: acute kidney injury, continuous renal replacement therapy, in-hospital mortality, temporal trends

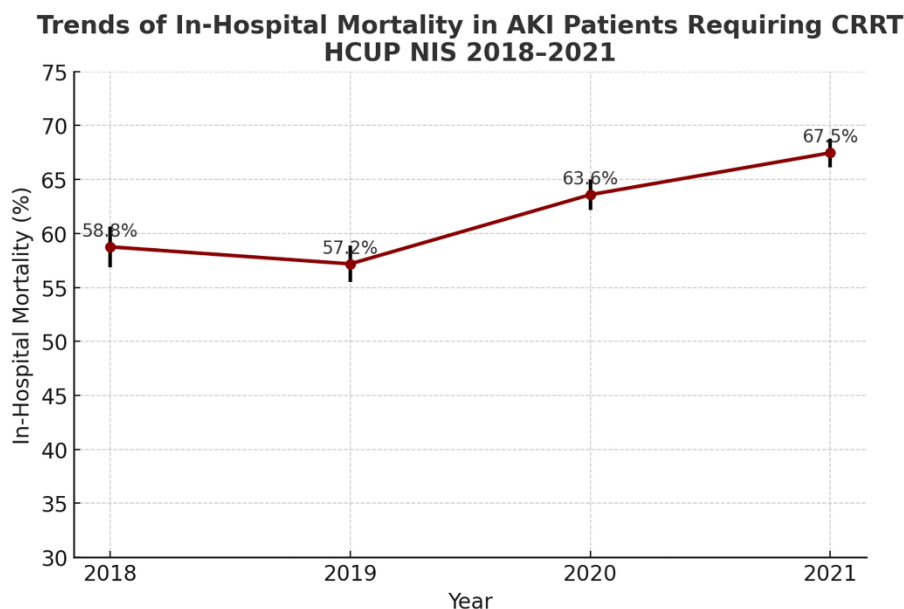


Figure 1. Trends of In-Hospital Mortality in Acute Kidney Injury Patients Requiring Continuous Renal Replacement Therapy: Analysis of the HCUP National Inpatient Sample, 2018–2021

Factors of in-hospital mortality	Multivariable OR	LCI	UCI	P-value
Gender				
Female	reference			
Male	1.06	1.01	1.12	0.027
Age (years),				
18-54	reference			
55-64	1.37	1.29	1.46	<0.001
65-74	1.69	1.57	1.81	<0.001
≥75	1.89	1.69	2.11	<0.001
Race				
White	reference			
Black	1.17	1.09	1.26	<0.001
Hispanic	1.30	1.19	1.43	<0.001
Asian or Pacific Islander	1.55	1.31	1.82	<0.001
Native American	1.38	1.07	1.79	0.012
Other	1.47	1.25	1.71	<0.001
Calendar year				
2018	reference			
2019	0.92	0.83	1.03	0.14
2020	1.22	1.10	1.36	<0.001
2021	1.42	1.28	1.58	<0.001
Hospital region				
North-East	reference			
Mid-West	0.74	0.66	0.82	<0.001
South	0.78	0.70	0.87	<0.001
West	0.73	0.65	0.82	<0.001
Control/ownership of hospital				
Government, nonfederal	reference			
Private, not profit	0.83	0.75	0.92	0.001
Private invest-own	1.29	1.10	1.50	0.001
Location and Teaching Status				
Rural	reference			
Urban, nonteaching	0.98	0.78	1.24	0.869
Urban, teaching	0.85	0.68	1.05	0.135
Hospital Bed Size				
Small	reference			
Medium	1.00	0.89	1.13	0.983
Large	0.86	0.77	0.95	0.003
Deyo-Charlson Comorbidity Index score				
0-3	reference			
4-5	0.84	0.75	0.94	0.003
≥6	0.70	0.63	0.77	<0.001
Sepsis	1.56	1.47	1.65	<0.001
Liver disease	1.67	1.58	1.76	<0.001
Ventilator use	1.06	0.98	1.15	0.125
Vasopressor use	1.44	1.34	1.54	<0.001
Palliative care	5.73	5.30	6.20	<0.001

Table 1. Independent predictors of in-hospital mortality among AKI patients receiving CRRT in the United States.

The Relationship between Renal Resistive Index and Central Venous Pressure with the Incidence of Acute Renal Failure in Critically Ill Patients at Risk with Risk of Acute Renal Failure in ICU

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Abstract:

Objectives: To explore whether RRI and CVP can predict AKI in critically ill patients and to evaluate effectiveness in diagnosing AKI.

Materials and Methods: This was an analytical observational study using a prospective cohort design conducted in January 2025. The study included both primary data and secondary data obtained from medical records of ICU patients. A total of 54 patients who met the inclusion criteria were enrolled, comprising 17 with AKI and 37 without AKI. The main parameters assessed were RRI and CVP, both evaluated for their potential predictive value in the early identification of AKI. In addition, serum urea and creatinine concentrations were measured as standard biochemical indicators of renal function.

Results: A strong correlation was found between RRI and AKI, with RRI values above 0.75 significantly associated with the occurrence of AKI ($p < 0.001$). In contrast, CVP showed no significant correlation with AKI ($p > 0.05$). RRI demonstrated excellent diagnostic accuracy, with an AUC of 0.96, sensitivity of 94.1%, and specificity of 94.6%. Conversely, CVP had limited predictive value, with an AUC of 0.63 ($p = 0.103$). These results indicate that RRI is a more reliable marker for predicting AKI in critically ill patients.

Discussion and Conclusions: The study highlights the RRI as a reliable and accurate predictor for AKI in critically ill patients. RRI values above 0.75 were strongly associated with the occurrence of AKI, demonstrating high sensitivity and specificity. In contrast, CVP showed limited predictive ability for AKI in this patient population. These findings suggest that RRI can serve as an important non-invasive tool for early detection of AKI, enabling timely interventions and improving patient outcomes in the ICU. Further studies are warranted to better understand the role of CVP in AKI prediction and its potential clinical applications.

Keywords: Acute kidney injury, renal resistive index, central venous pressure, ICU.

Cardiac-Associated Acute Kidney Injury in Resource-Limited Settings: A Multicenter Cohort Study of Long-Term Outcomes in Southeast Asia and India

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Abstract:

Introduction: Acute kidney injury (AKI) affects 10–15% of hospitalized patients and over 50% in ICUs, with higher incidence in low- and middle-income countries. Cardiac-associated AKI is common—occurring in 5–43% of cardiac surgery patients and ~33% with heart failure—yet long-term data from resource-limited settings are scarce. We compared epidemiology and outcomes of severe cardiac-associated versus non-cardiac AKI in Southeast Asia and India.

Methods: This post hoc analysis used data from a prospective, multicenter study enrolling adults with KDIGO stage 3 AKI from 24 ICUs in six countries (Apr 2019–Dec 2023). Patients with pre-hospital kidney failure or stage 5 CKD were excluded. The primary outcome was 2-year major adverse kidney events (MAKE: persistent kidney dysfunction, chronic dialysis, transplant, or death). Secondary outcomes included mortality, new CKD, and CKD progression. Multivariable mixed-effects survival models accounted for within-country clustering.

Results: Among 1,145 AKI survivors, 281 (24.5%) had cardiac-associated AKI. They were older (median 65 vs. 58 years), with more hypertension, dyslipidemia, CKD, and ischemic heart disease (all $P < 0.001$). Baseline eGFR was higher, but dialysis dependence at discharge was greater (29.3% vs. 17.7%, $P < 0.001$).

2yr-MAKE occurred in 65.6% of cardiac-AKI vs. 46.5% of non-cardiac AKI ($P < 0.001$). Mortality was 45.8% vs. 32.7% ($P < 0.001$); kidney failure requiring treatment, 23.4% vs. 12.4% ($P < 0.001$); and new CKD, 61.9% vs. 43.9% ($P = 0.001$), respectively. CKD progression rates were similar in both groups.

Independent predictors of 2yr-MAKE included admission to mixed/other ICUs (aHR 5.45), pre-existing CKD (aHR 1.75), ischemic heart disease (aHR 1.44), and failure to recover renal function by 28 days/discharge (aHR 5.56; all $P < 0.05$). Initial RRT type and post-discharge use of ACEI/ARBs or beta-blockers were not associated with risk.



Conclusion: Severe cardiac-associated AKI in resource-limited settings confers markedly worse 2-year kidney and survival outcomes than non-cardiac AKI. Lack of early renal recovery is the strongest predictor of poor prognosis, highlighting the need for targeted monitoring and cardiorenal protection strategies in high-risk patients.

Keywords: Acute kidney injury, Major adverse kidney events, Non-recovery, Long-term outcomes, Cardiac-associated AKI

Machine Learning Model for Predicting Kidney Replacement Therapy Dependence from Acute Kidney Injury Requiring Dialysis in Critically Ill Patients

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Abstract:

Objectives: To develop and validate a prediction model using machine learning and traditional statistics to predict KRT dependence following AKI in critically ill patients.

Materials and Methods: A retrospective cohort study was conducted on critically ill patients diagnosed with AKI requiring KRT at Ramathibodi Hospital between January 2014 and December 2023. Data on demographics, comorbidities, laboratory results, and clinical assessments were collected. The machine learning approach used extreme Gradient Boosting (XGBoost), random forest, and multilayer perceptrons (MLP) to develop the prediction model. In contrast, the traditional statistic approach used multivariate logistic regression analysis. The final model's performance was evaluated with a divided subgroup using ROC curves and confusion matrix approaches to develop and cross-validate prediction models for KRT dependence.

Results: Among 615 patients with AKI-D, the mean age was 68.6 years, 54.3% were men, and 20.8% had chronic kidney disease stage IV. KRT dependence was observed in 14.6% of patients, while 53.6% of patients had died. The model effectively identified patients at risk of KRT dependence within 90 days after initiation. Multivariate analysis demonstrated that CKD stage and preexisting renal disease increased the risk of KRT dependence, whereas metformin and urinary tract infection were protective factors. While machine learning had key predictors included CKD stage, coronary artery disease (CAD), dyslipidemia, calcium channel blocker (CCB) use, antiplatelet use, blood urea nitrogen (BUN), haemoglobin levels, white blood cell count >12,000, abnormal heart rate(>120 or <60), and the presence of proteinuria. The XGBoost model achieved a sensitivity of 52%, a specificity of 84%, and an AUROC of 0.76.

Discussion and Conclusions: The machine learning model approach shows promise in predicting KRT dependence, potentially guiding clinical decisions and improving patient outcomes.

Keywords: Acute kidney injury, Kidney replacement therapy dependent, Machine learning model

Impact of the COVID-19 Era on Acute Kidney Injury Mortality: An Analysis of CDC WONDER Data, 2015-2023

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Abstract:

Objectives: Acute kidney injury (AKI) is a common complication associated with high mortality. The COVID-19 pandemic has been linked to increased incidence and severity of AKI, but its long-term impact on AKI mortality trends at the population level remains unclear.

Materials and Methods: We used U.S. CDC WONDER Multiple Cause of Death data (2015–2023) to identify deaths among adults aged 18–84 years with AKI (ICD-10: N17) as an underlying or contributing cause. Age-adjusted mortality rates (AAMRs) were calculated per 100,000 population for the pre-COVID (2015–2019) and post-COVID (2020–2023) eras. Comparisons were made using t-tests, relative risk (RR) estimates, and interrupted time series (ITS) analysis.

Results: A total of 721,401 AKI-related deaths were recorded (295,627 pre-COVID; 425,774 post-COVID). In the post-COVID era, mean age at death was lower (68.4 vs 70.8 years), and the sex distribution was similar (post-COVID: 51.8% male, 48.2% female; pre-COVID: 51.3% male, 48.7% female). The mean AAMR increased from 27.9 (SD 0.51) pre-COVID to 48.8 (SD 9.08) post-COVID ($p = 0.019$), corresponding to a 44% higher mortality rate (RR 1.44; 95% CI 1.44–1.45; $p < 0.001$). Yearly AAMRs peaked in 2022 (57.2) before declining slightly in 2023 (48.5) but remained above pre-pandemic levels. ITS analysis showed no significant immediate level change ($p = 0.737$) or slope change ($p = 0.281$), suggesting a sustained post-pandemic increase rather than a progressive acceleration.

Influence of Socioeconomic Factors on the Initiation of RRT in Critically Ill Patients

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Abstract:

Objectives: In resource-limited settings, patient and clinician decisions to initiate renal replacement therapy (RRT) in severe acute kidney injury (AKI) may be influenced by economic constraints, resulting in treatment being delayed or withheld. We examined how a patient's income level might influence the likelihood of actually starting RRT once it has been offered.

Materials and Methods: We analyzed data from the InSEARRT registry, which comprises stage 3 AKI from 24 hospitals in Southeast Asia and India. Each patient's self-reported average household income was recorded and stratified into quartiles. "Offer but not start RRT" was defined as at least one ICU day where absolute indications for RRT were present, but treatment was not initiated. Reasons for non-initiation were recorded. Patients who started RRT before being marked as "offered" were excluded from this analysis. We compared RRT discordance rates, reasons, and 28-day mortality across income quartiles.

Results: A total of 1,670 patients with stage 3 AKI were analyzed. Median household income rose from USD 288 (IQR 252–360) in Q1 to USD 5,400 (IQR 4,500–6,000) in Q4. Universal coverage reimbursement predominated in Q1–Q3, whereas Q4 had a higher proportion of government coverage. The proportion "offered but not started RRT" was 23.1% in Q1, 23.5% in Q2, 27.2% in Q3, and 11.3% in Q4. Overall, the leading reason for non-initiation was considered futility by healthcare providers (30.9–44.7%) in most quartiles. Q2 showed the highest rate of pending consent (30.9%), while Q4 had more cases of anticipated renal recovery (21.3%). Potential renal recovery accounted for 8–27% of non-start decisions across quartiles. Patients who were offered but did not start RRT had consistently higher 28-day mortality across all income quartiles, with an overall mortality of 62.3% in the cohort. In those offered and started RRT, RRT modality varied by income. Q1 and Q2 relied heavily on intermittent hemodialysis (49.2% and 65.8%) with fewer CRRT days (27.3% and 10%).

In Q4, CRRT predominated (67.7%), suggesting greater resource availability and potentially different initiation thresholds.

Discussion and Conclusions: Patient income level was associated with differences in RRT initiation when absolute indications were present. These findings underscore the role of socioeconomic factors in critical care decision-making and highlight inequities in access to life-saving therapies.

Keywords: AKI, Socioeconomic, RRT initiation

Quartile of Self-reported average household Income	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Range of quartile (USD)	(29,999, 600.0]	(600.0, 2160.0]	(2160.0, 4392.0]	(4392.0, 10080.0]
N	441	412	401	416
Age (mean, SD)	67.8 (15.5)	57.2 (15.7)	54.6 (15.7)	62.8 (17.1)
Income (median, IQR)	288 (252-360)	1500 (900-1800)	300 (2880-3600)	5400 (4500-6000)
Reimbursement type (%)				
Universal coverage	286 (64.9%)	315 (76.5%)	324 (80.8%)	157 (37.7%)
Social security system	48 (10.9%)	56 (13.6%)	23 (5.7%)	42 (10.1%)
Government / State enterprise	75 (17.0%)	36 (8.7%)	50 (12.5%)	185 (44.5%)
Selfpay / Others	32 (7.3%)	5 (1.2%)	4 (1.0%)	32 (7.7%)
Cause of admit (Top3, %)	Pulmonary 118 (26.5%)	Pulmonary 102 (24.7%)	Pulmonary 101 (25.1%)	Cardiovascular 133 (31.7%)
	Cardiovascular 85 (19.1%)	Gastro-intestinal 72 (17.7%)	Cardiovascular 68 (16.9%)	Pulmonary 72 (17.2%)
	Gastro-intestinal 53 (11.9%)	Cardiovascular 61 (14.7%)	Gastro-intestinal 43 (10.7%)	Systemic infection 56 (13.4%)
Cause of AKI (Top3, %)	Sepsis 181 (40.6%)	Sepsis (33.9%)	Multifactorial 150 (37.3%)	Multifactorial 165 (36.4%)
	Multifactorial 139 (31.2%)	Multifactorial (33.7%)	Sepsis 135 (33.6%)	Pre-renal/Ischemic ATN 153 (36.5%)
	Pre-renal/Ischemic ATN 102 (22.9%)	Pre-renal/Ischemic ATN (21.8%)	Pre-renal/Ischemic ATN (107 (26.6%))	Sepsis 92 (22%)
SOFA (mean, SD)	9.44 (3.76)	9.12 (3.7)	9.96 (3.85)	11.2 (4.2)
APACHE II (mean, SD)	23.19 (8.55)	20.97 (8.05)	22.83 (8.34)	23.18 (8.45)
Offered but not start RRT (%)	102 (26.1%)	97 (22.8%)	109 (26.8%)	47 (11.1%)
Reason not start (Top 3)	Considered futile by healthcare providers 45 (44.1%)	Pending for consent 30 (30.9%)	Considered futile by healthcare providers 43 (39.4%)	Considered futile by healthcare providers 21 (44.7%)
	Pending for consent 18 (17.6%)	Considered futile by healthcare providers 29 (29.9%)	Potential renal recovery 29 (26.6%)	Potential renal recovery 10 (21.3%)
	Potential renal recovery 13 (12.7%)	Potential renal recovery 8 (8.2%)	Pending for consent 9 (8.3%)	Died before dialysis could be initiated 4 (8.5%)
28-day Mortality rate ((%))	69 (67.6%)	57 (58.8%)	64 (58.7%)	31 (66%)
Offer and start RRT (%)	187 (39.3%)	231 (41.3%)	188 (38.8%)	328 (46.7%)
RRT Mode (%)	IHD 92 (49.2%)	IHD 152 (65.8%)	IHD 114 (60.6%)	CRRT 222 (67.7%)
	CRRT 51 (27.3%)	PD 32 (13.9%)	CRRT 40 (21.3%)	SLED 56 (17.1%)
	SLED 26 (13.9%)	SLED 24 (10.4%)	PD 18 (9.6%)	IHD 39 (11.9%)
	PD 18 (9.6%)	CRRT 23 (10%)	SLED 16 (8.5%)	PD 11 (3.6%)
28-day Mortality rate ((%))	93 (49.7%)	99 (42.9%)	93 (49.5%)	168 (51.2%)
Did not offer to start RRT (%)	152 (34.5%)	84 (20.4%)	104 (25.9%)	41 (9.9%)
28-day Mortality rate ((%))	65 (42.76%)	24 (28.6%)	42 (40.4%)	15 (36.6%)

Table 1. Baseline Characteristics, Clinical Parameters, and RRT-Related Outcomes Stratified by Quartiles of Self-Reported Average Household Income

Outcomes and Predictors of Acute Kidney Injury After Contrast-Enhanced CT in a Large Real-World Retrospective Cohort

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Abstract:

Objectives: To determine the incidence and predictors of acute kidney injury (AKI) following contrast-enhanced computed tomography (CT) in real-world hospital practice.

Materials and Methods: We retrospectively analyzed adult patients undergoing contrast-enhanced CT in a tertiary hospital. Patients with end-stage kidney disease or missing post-contrast creatinine data were excluded. AKI was defined by KDIGO serum creatinine criteria within 48–72 hours after contrast exposure. Continuous variables were compared between AKI and non-AKI groups using t-tests, and categorical variables using chi-square tests. Clinically plausible variables were entered into a multivariable logistic regression model.

Results: Of 9,651 patients, 1,427 (14.8%) developed AKI. In baseline comparisons, AKI patients were significantly older ($p < 0.001$), had higher baseline creatinine ($p < 0.001$), and more frequently had CKD ($p < 0.001$), diabetes mellitus ($p = 0.004$), heart failure ($p < 0.001$), ventilator use ($p < 0.001$), diuretic exposure ($p < 0.001$), higher pulse rate ($p < 0.001$), higher systolic BP ($p < 0.001$), and lower diastolic BP ($p = 0.01$). Amphotericin B use was more common among AKI patients ($p = 0.03$). In multivariable analysis, the strongest independent predictors of AKI were higher baseline creatinine (OR 1.39, 95% CI 1.32–1.46), diuretic use (OR 1.72, 95% CI 1.51–1.96), higher pulse rate (OR 1.44, 95% CI 1.36–1.53), heart failure (OR 1.71, 95% CI 1.36–2.14), and older age (OR 1.18, 95% CI 1.10–1.26). The model's AUC was 0.72.

Discussion and Conclusions: AKI after contrast-enhanced CT occurred in nearly one in seven patients and was associated with both baseline vulnerability (higher creatinine, older age, heart failure) and modifiable factors (diuretic use, elevated heart rate).

Prescribing Practices of Sustained Low-Efficiency Dialysis among Physicians in South-East Asia

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Abstract:

Objectives: Sustained low-efficiency dialysis (SLED) is a hybrid of continuous kidney replacement therapy and intermittent hemodialysis, that provides dialysis for an extended period of time. It combines treatment intermittency with reduced ultrafiltration rate and low-efficiency solute removal to reduce hemodynamic instability and dialysis disequilibrium. Although SLED has been described since early 2000s and is widely used, its application remains non-standardized, with practices varying across institutions and countries. In this study, we examined the use and prescribing patterns of SLED in South-East Asian (SEA) countries.

Materials and Methods: This descriptive study was conducted between May and June 2025, using a survey administered to medical professionals who routinely prescribe SLED. We collected data on participants' demographics, indications for SLED, and details of its prescription and monitoring.

Results: Of the 30 survey respondents, 16 (53.3%) were male, 19 (63.3%) received nephrology training, and 27 (90%) were physicians. The majority of participants were from Philippines (n = 10, 33.3%), followed by Malaysia (n = 7, 23.3%), Vietnam (n = 7, 23.3%), and Singapore (n = 5, 16.7%). The most frequently reported indications for SLED prescription were hemodynamic instability (n = 25, 83.3%), acute coronary syndrome (n = 19, 63.3%), stroke (n = 19, 63.3%), and initiation of dialysis in kidney failure (n = 8, 26.7%). More than half of respondents (n = 16, 53.3%) prescribed SLED for durations exceeding six hours. The most commonly selected blood flow rate (Qb) was 150 mL/min (n = 21, 70%), while majority set dialysate flow rate (Qd) at 300 mL/min (n = 24, 80%). Heparin was the predominant anticoagulant of choice (n = 25, 83.3%), followed by no anticoagulation (n = 11, 36.7%) and regional citrate anticoagulation (n = 2, 6.7%). For vascular access, 19 respondents (63.3%) reported using arteriovenous fistula/graft, whereas 23 (76.7%) utilized dialysis catheter. A total of 22 participants (73.3%) reported monitoring the adequacy of SLED, with renal panel testing being the most commonly employed method (n = 15, 50%).

Discussion and Conclusions: There remains a lack of standardization in the prescription and monitoring of SLED across SEA countries. Further research is warranted to evaluate and compare clinical outcomes associated with different prescribing practices.

Keywords: SLED; Dialysis

The Comparison of Circuit Lifespan between Integration and Separation Approach in Extracorporeal Membrane Oxygenation Patient Requiring Continuous Renal Replacement Therapy Support, (E-CRRT Trial)

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Abstract:

Objectives: The estimated incidence of acute kidney injury requiring continuous renal replacement therapy (CRRT) in patients necessitating extracorporeal membrane oxygenation (ECMO) is approximately 50%. Currently, two well-known techniques, integration and separation are utilized for combining CRRT and ECMO circuits, neither of which is considered a standard treatment. This study aimed to compare circuit lifespan of CRRT between these two techniques during ECMO support.

Materials and Methods: A multicentered randomized controlled trial was conducted from May 2021 to March 2025. ECMO patients who required CRRT support were enrolled. Primary outcome was CRRT circuit lifespan.

Results: Eighty patients were recruited, with 40 allocated to the integration group and 40 to the separation group. Median circuit lifespan did not significantly differ between the groups (72 hours [IQR 45–96.5] vs. 71 hours [IQR 45–84]; $p = 0.52$). Twenty-eight-day mortality rates were also comparable (32.5% vs. 35%; $p = 0.81$). No significant differences were observed in the incidence of serious adverse events, including air embolism. Transmembrane pressure and CRRT machine alarm frequencies were similar between groups.

Discussion and Conclusions: Among critically ill ECMO patients with CRRT support, integrated CRRT circuit into ECMO circuit shows no significant difference in efficacy and serious adverse events when compared to separation technique.

Keywords: CRRT, ECMO, circuit, combination, integration

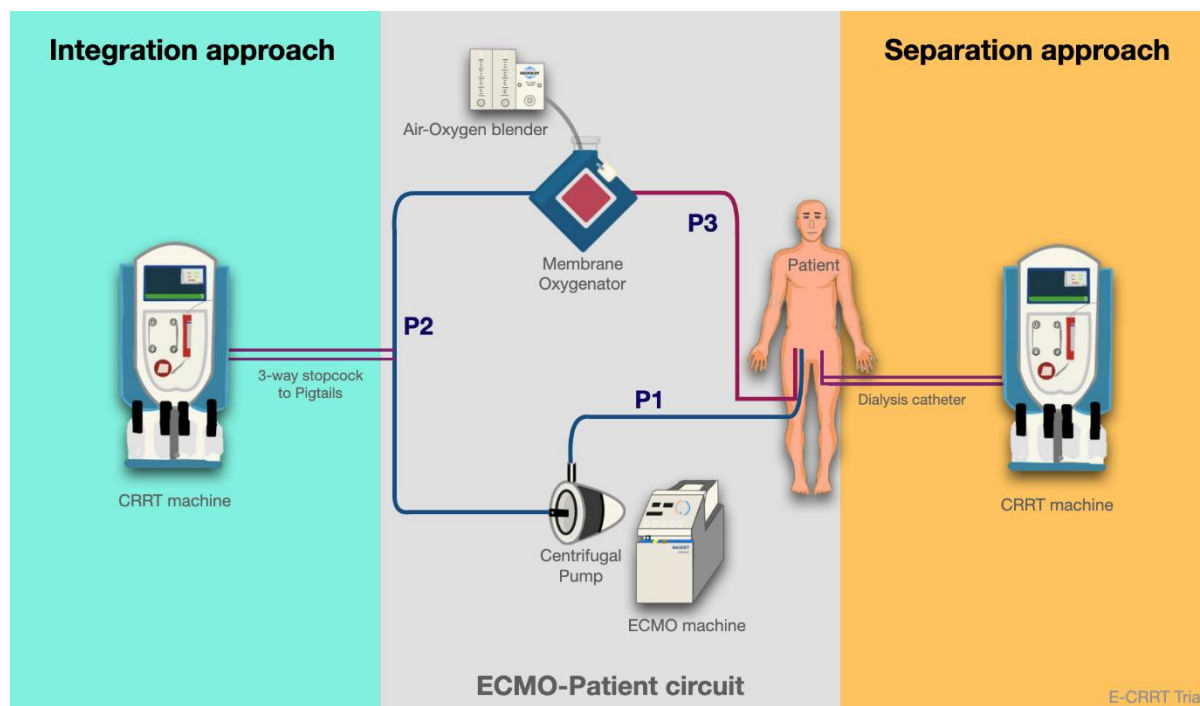


Figure 1: The circuit connection method, with the left side (in green) showing the circuit connected to P2(integration technique), and the right side (in yellow) showing the circuit connected directly to the patient via a hemodialysis catheter (separation technique)

Primary outcome	Integration	Separation	p-value
Intention-to-treat	n=40	n=40	
- Total circuit lifespan (h), Median (IQR)	72 (45-96.5)	71 (45-84)	0.52
- Total circuit lifespan* (h), Median (IQR)	n=29 72 (43-92)	n=31 72 (60-88)	0.65
As-treated	n=48	n=32	
- Total circuit lifespan (h), Median (IQR)	70 (48-97)	70 (44-83)	0.39
- Total circuit lifespan* (h), Median (IQR)	n=38 72 (47-100)	n=22 72 (49-81)	0.89

*Patients who experienced death before the first circuit reached 72 hours, renal recovery leading to CRRT termination, or ECMO discontinuation were excluded. h = hour

Table1: Comparison of median CRRT circuit lifespan between integration and separation techniques

Feasibility of Laboratory Monitoring from Continuous Kidney Replacement Therapy Circuit in The Absence of Conventional Blood Sampling Access: A Case Report

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Abstract:

Background: Continuous kidney replacement therapy (CKRT) requires regular blood monitoring to ensure adequacy and patient safety. Electrolytes are measured every 4 - 6 hours via blood drawn from a central venous catheter (CVC) or intra-arterial (IA) line. Sampling from CKRT circuit lines may yield inaccurate results due to access recirculation and/or replacement fluid infusion. This can prove challenging in patients without CVC or IA lines due to patient refusal or difficult access. We describe a case demonstrating the feasibility of routine blood sampling from the CKRT pre-filter port.

Case Summary A 46-year-male, body weight 127.8 kg, on maintenance hemodialysis presented with septic shock from foot gangrene, limiting fluid removal via intermittent dialysis. He required noradrenaline (0.08mcg/kg/min) and nasal oxygen (2L/min) with marked edema and pulmonary congestion. To enable large-volume fluid removal despite hypotension, CKRT was initiated via an existing right internal jugular tunnelled dialysis catheter, without anticoagulation. Blood samples were obtained via CKRT pre-filter port as patient refused CVC or IA insertion. To negate potential effect of access recirculation, before each draw, dialysate, replacement, and ultrafiltration flows were set to zero for 5 minutes.

Results: Venipuncture and CKRT pre-filter port paired blood sampling showed identical sodium, potassium, and chloride, and <7% differences in urea (peripheral: 17.5 vs CKRT port: 18.4mmol/L), creatinine (333 vs 338 µmol/L), and bicarbonate (23.9 vs 22.4mmol/L).

Discussion: Due to replacement fluid infusion and/or access recirculation, pre-filter CKRT sampling may potentially affect accuracy of measured electrolyte and acid-base. While IA line remains gold standard for blood sampling during CKRT, this may not be feasible in some patients. Previous study suggests stopping CKRT for blood sampling is unnecessary when recirculation is absent. However access recirculation is not regularly assessed and can still occur at higher blood flow rates. The protocol of briefly pausing dialysate and replacement fluid flows before blood sampling from pre-filter port, negated any potential effects of replacement fluid and/or access recirculation, and produced results comparable to venipuncture.



Conclusion Blood sampling from CKRT pre-filter port, by temporarily ceasing dialysate and replacement fluid flow, is a safe and feasible alternative if conventional blood sampling access unavailable.

Keywords: CKRT, Blood Sampling

Clinical Safety Analysis of Incompatible Disposables in Continuous Renal Replacement Therapy

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Abstract:

Objectives: Optimal CRRT delivery relies on an integral system where machines, compatible tubing, filters, and fluids function synergistically for precise pressure monitoring, anticoagulation, and fluid management. Using incompatible disposables (e.g., dialysis filters/tubing not validated for the specific CRRT machine) disrupts this integration. This review analyzes the safety risks associated with incompatible disposables in CRRT.

Materials and Methods: A review was conducted, synthesizing evidence from clinical articles, consensus guidelines, and technical specifications of CRRT systems. Safety risks were categorized based on clinical consequences and underlying mechanisms.

Results: Incompatible disposables significantly compromise CRRT safety and efficacy:

1. **Pressure Monitoring Disruption:** Incompatible tubing/filters cause inaccurate pressure calibration, aberrant pressure drops, and persistent alarms. This delays treatment initiation, increases staff workload, and reduces effective therapy time (Figure 1).
2. **Increased Clotting Risk:** Using conventional hemodialysis dialyzers (designed for high flow HD mode) at typical CRRT flows reduces shear stress, promoting protein deposition and clotting. Incompatible tubing cause inaccurate blood flow rates, disrupting citrate anticoagulation dosing and increasing filter clotting. Consequences include blood loss, reduced filter lifespan, increased costs.
3. **Fluid Management Errors:** Incompatible disposables impair the precise control of pumps, jeopardizing accurate fluid balance. This hinders achieving optimal fluid management goals, increasing risks of volume overload or depletion.
4. **Dose Delivery Failure & Safety Events:** Frequent alarms, clotting, and circuit changes reduce therapy time, leading to significant under-delivery of prescribed dose. Safety risks include delayed air detection and impaired blood leak sensor function, potentially increasing risks of air embolism or undetected blood loss.

Discussion and Conclusions: Incompatible disposables disrupt the CRRT integral system, introducing risks including pressure instability, clotting, fluid imbalance, inadequate dose delivery, and safety hazards. These compromise treatment efficacy, patient safety, and clinical outcomes. CRRT should strictly utilize compatible disposables to ensure precise system function, and achievement of therapeutic goals.

Keywords: acute kidney injury, continuous renal replacement therapy, incompatible disposables, integral system, pressure monitoring

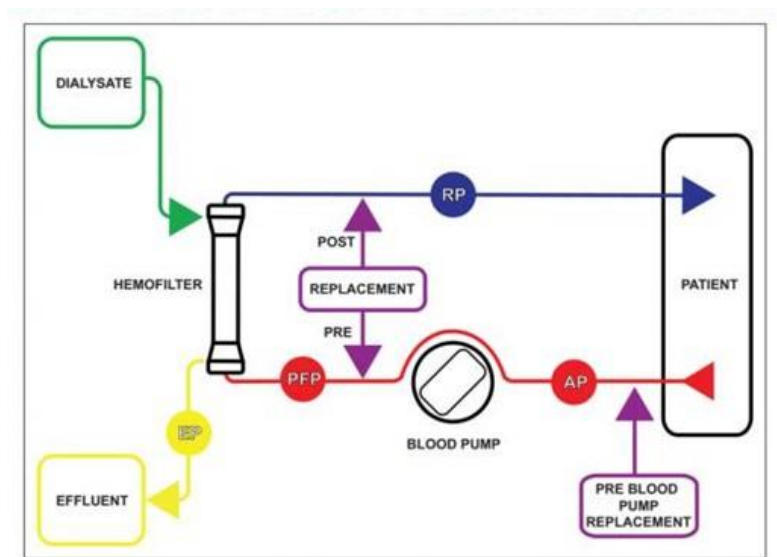


Figure 1: CRRT pressure monitoring schematic

Targeted Versus Fixed Dosing of Nafamostat Mesylate Anticoagulation for Continuous Kidney Replacement Therapy

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Abstract:

Objectives: Nafamostat mesylate (NM) is a widely used method of anticoagulation for continuous kidney replacement (CKRT) in Japan and South Korea. NM is continuously infused to the CKRT circuit via anticoagulant device mounted on the CKRT machine with a usual dose of 10~20 mL/hr, based on the manufacturer's suggestion. As there has been no study for optimal dosing for NM anticoagulation, we designed NM dosing protocol and tested its performance.

Materials and Methods: This is a single center, before-and-after study comparing the performance of NM dosing protocol on CKRT filter life. Before targeted dosing (Oct.2023~April 2024), NM was infused with a fixed dose of 10mL/hr. NM dosing protocol was applied between May 2024 to April 2025; we started NM with the rate of 10 mL/hr then, titrated by 2.5~5mL/hr every 6 hours, targeted to maintain post-filter activated partial thromboplastin time (aPTT) ratio 1.7~2.5, aPTT 46~69 seconds. All the cases were implemented as continuous veno-venous hemodiafiltration (CVVHDF) mode using an AN69ST membrane. Differences in NM infusion rate (mL/hr), NM consumption (bottle count/day), and filter life were compared before and after program.

Results: A total of 151 (before 91, after 60) patients received NM-CKRT anticoagulation; 68.9% were male and the mean ages were 68.2±14.2 years. Patients' demographics and disease severity were not different before and after the program. During the program, 71.8% of the filters reached the target aPTT level, however aPTT levels were not correlated with the NM infusion rate. After the targeted dosing, both NM infusion rate [10 mL/hr to 16.47±4.92mL/hr, p<0.001] and NM consumption [3.0±1.5/day to 5.7±2.0/day, p<0.001] were significantly increased. However, filter life was unchanged before and after the study [before:24.4±14.7, after:24.3±12.8, p=0.968].

Discussion and Conclusions: Postfilter aPTT- based targeted NM dosing program required higher dose than usual nevertheless, it did not increase filter life, in patients undergoing CKRT using AN69ST membrane. Membrane adsorption of NM might have a role, and protocol revision is required.

Keywords: continuous kidney replacement therapy, nafamostat mesylate, anticoagulation, dosing protocol

Clinical Demand-Driven Engineering Disparities Between IHD Dialyzers and CRRT Filters: A Multidimensional Analysis

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Abstract:

Objectives: IHD and CRRT are cornerstone treatments for acute/chronic renal failure. Their core consumables—dialyzers and filters—exhibit fundamental engineering design differences driven by distinct clinical demands. This study aims to systematically analyze disparities in membrane functionalization, treatment mode compatibility, and fluid dynamics between IHD dialyzers and CRRT filters.

Materials and Methods: A comparative analysis was conducted, evaluating: (1) Membrane Functionalization: Surface modification strategies (e.g., heparin grafting, cationic polymers) for enhanced biocompatibility, anticoagulation, and adsorptive clearance of cytokines/endotoxins; (2) Treatment Mode Compatibility: Design adaptations enabling CRRT filters to dynamically support multiple modes and pediatric applications; (3) Hollow Fiber Fluid Dynamics: Geometric parameter optimization balancing solute clearance, hemocompatibility, and pressure profiles under respective operational conditions.

Results:

1. CRRT Filters: Feature larger fiber inner diameter reducing shear stress and protein deposition. Thicker walls enhance pressure resilience for ECMO integration. Surface functionalization enables cytokine/endotoxin adsorption. Multimodal compatibility and low priming volumes support pediatric use and dynamic therapy adjustments.
2. IHD Dialyzers: Optimized for single high-efficiency modes (low/high-flux, MCO, HCO) under high blood flows. Larger membrane areas and lower packing density prioritize diffusion efficiency for adult maintenance dialysis.
3. Fluid Dynamics: CRRT's optimized L/D ratio and high packing density compensate for low-flow limitations, enhancing toxins clearance and stability during continuous therapy. IHD designs are incompatible with CRRT flow rates, increasing thrombosis risk.

Discussion and Conclusions: The engineering disparities between IHD dialyzers and CRRT filters are fundamentally driven by their clinical contexts: IHD prioritizes short-duration, high-efficiency solute removal in stable adults, while CRRT demands long-duration, multimodal adaptability, and adsorptive capacity for critical care. CRRT filter design—characterized by fluid dynamics optimization, surface functionalization, and pediatric



compatibility—expands clinical utility beyond renal support into sepsis/MODS management in critical settings.

Keywords: Intermittent Hemodialysis; Continuous Renal Replacement Therapy; Membrane Surface Functionalization; Shear Stress; Solute Clearance

Efficacy of Convection-based Hemodiafiltration Compare with Diffusion-based Hemodialysis in Sepsis-associated Acute Kidney Injury: A Randomized Controlled Trial

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Abstract:

Objectives: To find the efficacy of convection-based therapy comparing with diffusion-based therapy in acute kidney injury (AKI) patient requiring dialysis

Materials and Methods: Sepsis-associated AKI (SA_AKI) patients were randomized into 2 groups for online hemodiafiltration (OL-HDF) and low-flux intermittent hemodialysis (IHD). Treatment time was 4 hours and the prescription blood flow rate was 200 ml/min for both groups. In the OL-HDF group 40L/session of substitution ultrapure fluid was added in the predilution technique. The primary outcome is a percentage reduction of IL-6 and CRP at 4 hours and 48 hours after the first dialysis session. Thirty-day mortality and kidney recovery are our secondary outcomes.

Results: A total of 14 patients diagnosed with SA-AKI requiring dialysis, female 57.14%, mean age 67.86±16.21 years old, hypertension 64.29%, diabetes 35.71%, mean eGFR 59.91±26.51 ml/min/1.73m². Primary infectious organs are pneumonia 64.29% and urinary tract infection 21.43%. The severity of sepsis was determined by a mean SOFA score of 11.14±3.44 and a mean APACHE-II score of 22.50±3.78. Percent reduction of IL-6 and CRP after dialysis 4 hours was -4.99 vs -3.19, P=0.94 and -7.45 vs -1.71, p=0.83 in the OL-HDF group and low-flux IHD group respectively. Overall 30-day mortality was 42.86%, while in-hospital mortality was 71.43%. Patients discharged with dialysis independent were 28.57% in both groups.

Discussion and Conclusions: Patients diagnosed with SA-AKI who need dialysis have a high mortality rate. In our study, OL-HDF did not show significant efficacy for percent reduction of IL-6 or CRP compared with intermittent low-flux IHD.

Keywords: Sepsis-associated acute kidney injury, Online hemodiafiltration, cytokine reduction

Intermittent Hemodialysis Practices, Albumin Priming Variation, and Outcomes in a Resource-Limited ICU

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Abstract:

Objectives: To describe intermittent hemodialysis (IHD) strategies in a resource-limited ICU, focusing on adequacy, intradialytic hypotension (IDH), albumin priming, and survival. To describe intermittent hemodialysis (IHD) strategies in a resource-limited ICU, focusing on adequacy, intradialytic hypotension (IDH), albumin priming, and survival.

Materials and Methods: Retrospective study of ICU patients receiving IHD (Jan–Mar 2025). Demographics and labs compared between acute kidney injury (AKI) and end-stage kidney disease (ESKD). Treatment-level data: blood/dialysate flow rates (Qb/Qd), prescribed/achieved duration, ultrafiltration (UF) targets, and $\geq 80\%$ target achievement. IDH = intervention for hemodynamic instability or increased vasopressor use. Survival analysis adjusted for age, SOFA > 9 , albumin < 30 g/L, lactate > 2 mmol/L, and ESKD.

Results: Seventy-seven patients (44 AKI, 33 ESKD) underwent 169 IHD sessions. AKI patients had higher SOFA (10.0 vs. 6.0, $p < 0.001$) and lower albumin (18.0 vs. 21.0 g/L, $p = 0.011$). Median Qb 180 mL/min; Qd 300 mL/h. UF $\geq 80\%$ of prescription achieved in 60.5% sessions; $\geq 80\%$ duration in 87.4%. IDH occurred in 15.0% sessions, associated with higher SOFA ($p < 0.001$) but not priming choice ($p = 0.84$). Priming: saline 80.2%, 5% albumin 16.8%, $> 20\%$ albumin 3.0%; low albumin did not predict high-concentration albumin use ($p = 0.14$).

Unadjusted mortality with IDH vs. no IDH: 42.1% vs. 24.5% ($p = 0.238$). Adjusted odds of death with IDH: OR 1.15 (95% CI 0.28–4.65, $p = 0.844$). Lactate > 2 mmol/L independently predicted mortality (OR 5.41, 95% CI 1.33–22.08, $p = 0.019$).

Discussion and Conclusions: In this resource-limited ICU, most intermittent hemodialysis (IHD) sessions met duration goals, but ultrafiltration targets were less often achieved due to hemodynamic instability. Prescriptions commonly reflected a modified sustained low-efficiency dialysis (SLED) approach with lower flow rates, but shorter sessions showed better tolerability. Albumin priming showed no survival or IDH benefit, supporting cost–benefit review. Elevated lactate strongly predicted mortality. IHD, often as modified SLED, remains viable where CKRT is limited, but suboptimal UF and inconsistent priming signal areas for

optimisation. Further studies should define the utility, cost impact, and selection criteria for albumin priming in this setting.

Keywords: intermittent hemodialysis, critically ill patients, SLED, Intradialytic hypotension, albumin priming, ICU

Qb (mls/min)	180 [150.0–180.0]	180 [180.0–190.0]	<0.001
Qd (mls/min)	300 [300.0–300.0]	300 [300.0–500.0]	<0.001
Duration dialysis prescribed (minutes)	240 [240.0–240.0]	240 [240.0–240.0]	0.037
Duration dialysis achieved (minutes)	240 [180.0–240.0]	240 [240.0–240.0]	0.256
Total Ultrafiltration prescribed (L in total hours)	1.0 [0.0–1.5]	1.5 [0.5–2.0]	0.168
Total Ultrafiltration achieved (L in total hours)	0.9 [0.0–1.5]	1.0 [0.5–2.0]	0.109
UF ≥80% of prescribed (sessions)	101/167 (60.5%)		
Duration ≥80% of prescribed (sessions)	146/167 (87.4%)		

Figure 1. Hemodialysis parameters

Variable	AKI (n=44)	ESKD (n=33)	p-value
Age	61.5 [55.0–71.2]	59.0 [43.0–67.0]	0.176
Gender	Male: 30 (68.2%); Female: 14 (31.8%)	Male: 23 (69.7%); Female: 10 (30.3%)	<0.001
Ethnicity			
Malay	23 (52.3%)	20 (60.6%)	
Chinese	9 (20.5%)	5 (15.2%)	
Indian	8 (18.2%)	7 (21.2%)	
Others	3 (6.8%)	1 (3.0%)	
Weight	72.5 [65.8–80.0]	64.3 [52.0–75.0]	0.125
SOFA score	10.0 [8.0–13.0]	6.0 [6.0–9.0]	<0.001
Albumin	18.0 [15.0–20.2]	21.0 [19.0–27.0]	0.011
Lactate	1.2 [0.7–1.9]	0.8 [0.7–1.4]	0.173

Figure 2. Demographic data

CRRT Characteristics and Outcomes in Paraquat Associated AKI- a Study from a Tertiary Care Hospital in India

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Abstract:

Background: Paraquat poisoning is a major health problem worldwide. Paraquat ingestion is mainly suicidal, leading to fulminant organ failure manifesting as pulmonary edema, cardiac, renal and hepatic failure. Due to absence of antidote, there is a high mortality rate. CRRT has largely become the standard of care in many nations for the treatment of acute kidney injury (AKI) in patients with shock, acute brain injury, acute liver failure, and other forms of critical illness. CRRT can be effective in reducing patient fatality rates in Paraquat poisoning, particularly when combined with Hemoperfusion.

Objective: To determine the CRRT characteristics and outcomes in paraquat associated AKI.

Methods: Study Design: Observation study ; Study Population: Patients with paraquat AKI admitted in Gandhi Hospital who underwent CRRT ; Study Duration : July 2022 to July 2025 ;

AKI was diagnosed as per KDIGO 2012 AKI definition. Baseline data included age, gender, quantity of paraquat consumed and organ involvement was recorded. Amount of paraquat is defined as: Mild - <20ml, Moderate - 20-40ml, High - >40ml. Patients who presented within 72 hours were taken up for hemoperfusion. CRRT was done in those who had multi-organ dysfunction for a maximum period of 24 hours. Laboratory parameters at the time of admission, before and after CRRT were recorded. Organ dysfunction assessed using the qSOFA score. CRRT was done using Baxter CRRT Prismaflex system using the Prismaflex 100 CRRT filter funded by the government health scheme. Prescription was individualized as per patient. Anticoagulation used was unfractionated heparin. All patients were followed up until discharge or death. The primary outcome of the study was to measure the mortality. Secondary outcomes were to assess CRRT characteristics. Statistical analysis was performed using SPSS. EXCLUSION CRITERIA: Patient who underwent CRRT for less than 12 hours.

Results:

The mean duration of CRRT was 20.2 +/- 6.1 hours. Mean blood flow was 167 +/- 8 ml/min. Mean urea clearance/session was 88.2 +/- 28.2. Mean creatinine clearance/session was 2.6 +/- 1.2 mg/dl. 19 patients had set clotting during session. Mean ml of Heparin used per hour was 2.2 +/- 0.4.

Conclusions: Paraquat ingestion can lead to rapid multiorgan dysfunction with early onset acute kidney injury. CRRT has been the widely used extracorporeal therapy for paraquat AKI in our hospital. The mortality continues to be high despite appropriate RRT with patients having ARDS progressing to pulmonary fibrosis among the patients recovered from acute kidney injury. Our study showed a very high in-hospital mortality rate of 80.15%. Late presentation, amount of paraquat consumed, higher qSOFA score and hemodynamic instability were factors affecting mortality. There is no significant difference in the CRRT characteristics among survivors and non-survivors.

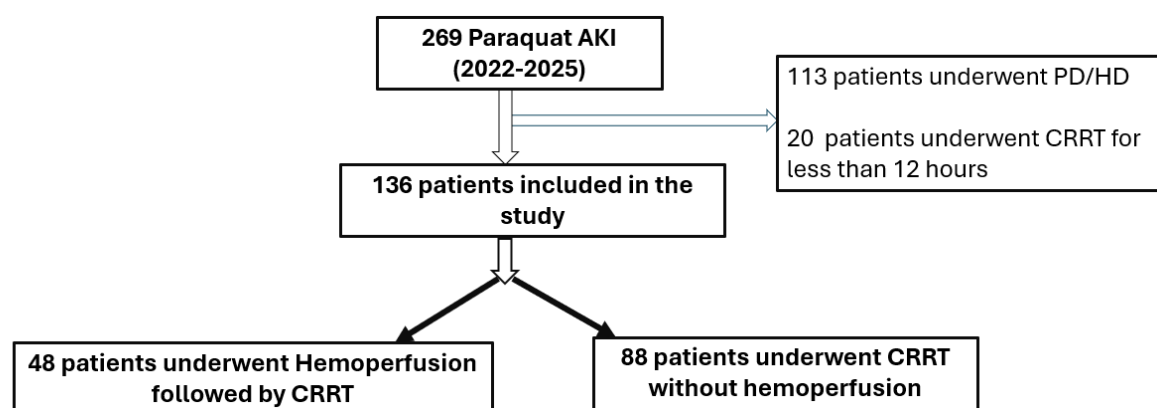


Table 1: General Characteristics of the study population:

Baseline Characteristic	N (%) (N=136)
Age	23 +/- 4 years
Gender	
Male	109 (80.15%)
Female	27 (19.85%)
Reason for consumption	
Suicide	125 (91.91%)
Unintentional	11 (8.09 %)
Mean quantity of Paraquat consumed (ml)	22.6 ± 13.7 (N=85)
Quantity of paraquat consumption	
Mild	43 (31.62%)
Moderate	71 (52.2%)
Severe	22 (16.18%)
Mean time of presentation after consumption (hours)	34.2 ± 19.9
Symptoms at presentation	
Vomitings	97 (71.32%)
Oral ulcers	71 (52.2%)
Dysphagia	59 (43.38%)
Oliguria	43 (31.62%)
Jaundice	67 (49.26%)
Shortness of breath	39 (28.68 %)
Organ involvement	
Kidney	136 (100%)
Lung	92 (67.65%)
Liver	76 (55.88%)
Heart	24 (17.64%)
Mean time to initiation of CRRT after consumption (hours)	58.2 ± 24.2
Mean duration of hospital stay (days)	5.4 +/- 3.9
Mean <u>qSOFA</u> at presentation	2.1 +/- 0.3
Laboratory Profile at presentation	
Hemoglobin (g/dL)	12.2+/-2.08
WBC (cells/mm3)	15866+/-9680
Platelets (cells/mm3)	140702+/-88220
SGOT (IU/ml)	101+/-53
SGPT (IU/ml)	95+/-49
T. Bilirubin (mg/dL)	3.9+/-2.6
S. Urea (mg/dL)	94.6+/-49.5
S. Creatinine (mg/dL)	3.82+/-3.1
S Uric Acid (mg/dL)	10.9 +/-3.1
S. Albumin (g/dL)	2.6 +/-0.9

Table 2: CRRT outcomes

CRRT OUTCOME	Value
Mean duration (in hours)	20.2 +/- 6.1
Mean blood flow (ml/min)	167 +/- 8
Mean dialysate (ml/hr)	821 +/- 84
Mean urea clearance/session (in mg/dL)	88.2 +/-28.2
Mean creatinine clearance/session	2.6 +/- 1.2
Set clotting during session	19
Mean ml of Heparin used/hr (1 ml=1000 IU)	2.2 +/- 0.4
Heparin free sessions	32

Table 3: Complications of CRRT:

Complication of CRRT	Frequency N (%)
Hypokalemia	10 (7.35%)
Hypothermia	4 (2.9%)
Intra dialytic Hypotension	5 (3.68%)
Cardiac arrest	9 (6.62%)
Access complications-bleeding	7 (5.15%)

Table 4: Outcomes in the study population

Patient Outcomes	N= 136
Survivors	27 (19.85%)
Non-Survivors	109 (80.15%)
Renal outcomes among survivors at discharge	N= 27
Complete Recovery	25 (92.59%)
Partial Recovery	2 (7.41%)
Dependent on RRT	0 (0%)

Table 5: Factors affecting mortality:

Baseline Characteristic	Survivors (N=27)	Non-Survivors (N=109)	P value
Age in years	22+/-2	21+/-3	0.216
Gender			
Male	10 (37.04%)	99 (90.82%)	
Female	17 (62.96%)	10 (9.18%)	0.531
Mean quantity of Paraquat consumed (ml)	10.21 +/- 6.5	29.32 +/-9.23	0.023*
Mean time of presentation after consumption (hours)	18.56 ± 10.7	39.7 ± 12.9	0.005*
Mean time to initiation of CRRT after consumption (hours)	48.2 ± 24.2	59.6 ± 28.3	0.671
Mean duration of hospital stay (days)	15.9 +/- 6.9	5.6 +/- 3.5	<0.001*
qSOFA at presentation	1.5 +/- 0.4	2.4 +/- 0.2	0.004*
Systolic BP (mm of Hg)	116 +/- 6	96+/- 8	0.021*
Mean duration (in hours)	23.2 +/- 3.2	21.5 +/- 6.1	0.624
Mean blood flow (ml/min)	185 +/- 9	157 +/- 4	0.231
Mean dialysate (ml/hr)	832 +/- 74	811 +/- 80	0.234
Mean urea clearance/session (in mg/dL)	80.2 +/-23.2	89.1 +/-24.3	0.089
Mean creatinine clearance/session	2.56 +/- 1.2	2.12 +/- 3.2	0.132
Mean ml of Heparin used/hr (1ml=1000 IU)	2.1 +/- 0.5	2.3 +/- 0.6	0.192

Early-Start vs. Conventional-start Peritoneal Dialysis in AKI from Cardiorenal Syndrome Type 1, A Randomized Controlled Trial (STARRT-PD)

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Abstract:

Objectives: To compare the 30-day mortality of early-start and conventional-start peritoneal dialysis (PD) in patients with acute kidney injury (AKI) from cardiorenal syndrome type 1 (CRS1).

Materials and Methods: In a cardiac care unit of a tertiary hospital in Thailand, CRS1 patients who had AKI stage II between October 2020 and September 2021 were enrolled in a randomized, open-label controlled study. Patients were randomized into two groups: early-start PD strategy (starting PD within 24 hours after AKI stage II) and conventional-start PD strategy (starting PD at 72 hours if reach AKI stage III or with indication). The primary outcome was 90-day mortality. Secondary outcomes included fluid balance, sodium removal during the first 5 days, and PD safety.

Results: Seventy-seven CRS1 patients were enrolled, and 53 eligible participants were included in modified intention-to-treat analysis (26 in early-start group and 27 in conventional-start group). Dialysis was initiated in 26 patients (100%) in early-start group and 11 patients (40%) in conventional-start group. The 30-day mortality was 65% (17 patients) in early-start group and 40% (11 patients) in conventional-start group (relative risk 1.68; 95% confidence interval 0.92 to 3.07; $p=0.07$). The first 5-day fluid balance and sodium removal were comparable between the two groups. PD-related complications occurred in 6 events (early-start) and 3 events (conventional-start).

Discussion and Conclusions: Among CRS1 patients with AKI, early-start and conventional-start PD showed comparable 30-day mortality risk (Thai Clinical Trial Registry number, TCTR20200928003).

Keywords: Peritoneal dialysis, cardiorenal syndrome, AKI, dialysis

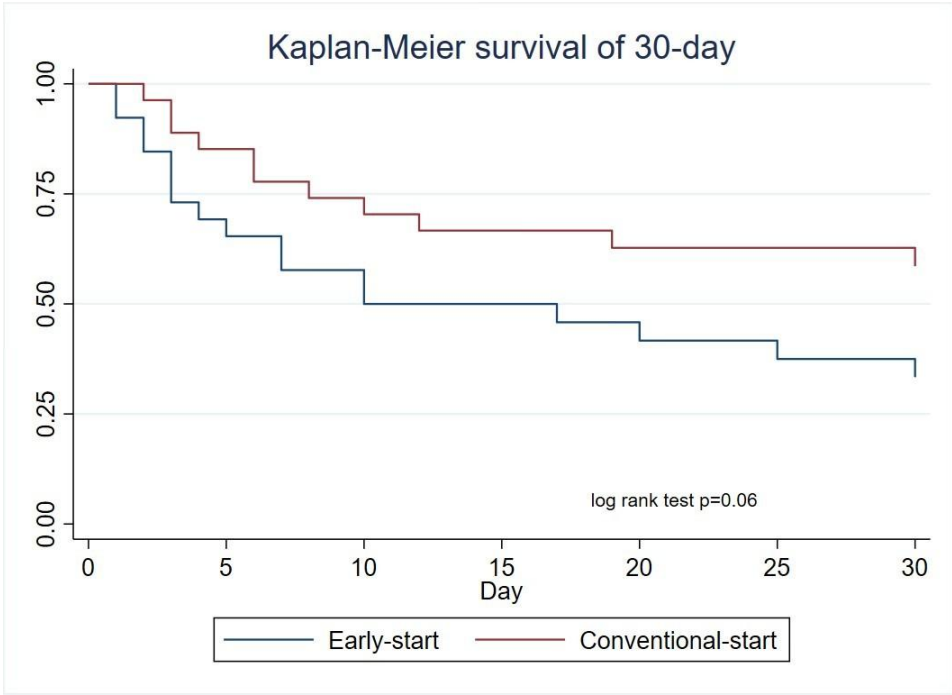


Figure1. 30-day mortality

	Early-start (n=26)	Conventional-start (n= 27)	P value
Age, year	70.8 ± 10.7	65.3 ± 10.9	0.07
Male	18 (69.2%)	19 (70.3%)	0.92
Weight, kg	64.4 ± 14.5	69.8 ± 16.7	0.26
BMI	24.8 ± 3.8	24.5 ± 4.0	0.82
DM	17 (65.3%)	12 (44.4%)	0.12
HT	22 (84.6%)	17 (62.9%)	0.07
Unstable hemodynamic	23 (88.4%)	20 (74%)	0.1
Cardiac arrest	13 (50%)	11 (40.7%)	0.49
Cardiac condition			
STEMI	19 (73%)	16 (59.2%)	0.28
Grace score	192.6 ± 43	222 ± 68.4	0.47
PCI	21 (80.7%)	21 (77.7%)	0.78
IABP	16 (61.5%)	11 (40.7%)	0.13
LVEF	34.6 (15.6)	37.5 (15.9)	0.62
SBP, mmHg	113.3 ± 16.3	117.8 ± 24.7	0.43
DBP, mmHg	68.0 ± 10.7	70.3 ± 15.6	0.53
MAP, mmHg	82.9 ± 10.5	85.6 ± 17.7	0.5
Fluid status			
Urine output, ml/kg/hour	0.31 (0.17,0.7)	0.67 (0.32,1.5)	
Cumulative fluid balance, ml	415 (-730,1260)	-70 (-1280,-700)	
Total furosemide dosage, mg	80 (40,260)	80 (0,200)	
Biochemistry			
Hemoglobin, g/dL	11.1 ± 2.3	11.4 ± 2.6	0.73
BUN, mg/dL	52.1 ± 20.3	41.6 ± 23.9	0.09
Creatinine, mg/dL	3.2 ± 1.2	2.7 ± 0.8	0.002
Na, mmol/L	136.6 ± 4.4	137.1 ± 6.4	0.73
K, mmol/L	4.2 ± 0.68	4.1 ± 0.54	0.54
HCO3, mmol/L	17.8 ± 5	18.2 ± 4.9	0.77
Alb, g/dL	3.3 ± 0.5	3.2 ± 0.49	0.46

Table 1. Baseline characteristic of early-start and conventional-start PD at randomization

The Neutrophil-to-Lymphocyte Ratio as a Predictive Marker for Acute Kidney Injury in Hospitalized Sepsis Patients.

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Abstract:

Background: Sepsis-associated acute kidney injury (SA-AKI) remains a critical complication contributing to increased morbidity and mortality. A cost-effective, rapidly accessible biomarker for early AKI detection is urgently needed, particularly in resource-limited settings.

Objective: To evaluate the diagnostic accuracy of the neutrophil-to-lymphocyte ratio (NLR) for predicting AKI in hospitalized patients with sepsis.

Materials and Methods: We conducted a prospective observational study of 112 sepsis patients admitted to a tertiary care hospital between July 2024 and February 2025. NLR was measured upon admission. AKI was diagnosed within seven days using KDIGO criteria based on serum creatinine. ROC curve analysis was performed to determine the predictive value of NLR.

Results: AKI developed in 29% of patients, with most cases classified as AKIN stage 1. Patients who developed AKI had significantly higher median NLR levels [20.2 vs. 9.1; $P < 0.001$]. An NLR cutoff of 12.8 predicted AKI with an area under the ROC curve (AUC) of 0.78, yielding 75% sensitivity and 72% specificity. In multivariate analysis, NLR remained an independent predictor of AKI (RR 5.01, $P = 0.003$). The predictive accuracy improved when combined with serum albumin <2.9 g/dL (AUC 0.83; specificity 89%).

Discussion and Conclusions: NLR is a practical and inexpensive tool for early AKI prediction in sepsis, demonstrating comparable performance to NGAL but at a fraction of the cost. These findings support its integration into early triage protocols, especially in settings with limited access to advanced biomarkers.

Keywords: Acute kidney injury, Neutrophil-to-lymphocyte ratio, Sepsis

A Pilot Study Protocol Evaluating the Feasibility and Safety of Empagliflozin in Acute Kidney Injury with Residual Renal Function

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Abstract:

Objectives: SGLT2 inhibitors such as empagliflozin offer cardio-renal benefits in CKD, even in reduced eGFR. In addition to glucose-lowering effects, they exert pleiotropic actions—anti-inflammatory, anti-fibrotic, hemodynamic modulation, and mitochondrial protection—potentially beneficial in AKI. However, their role in AKI remains unclear. This pilot study evaluates the feasibility and safety of empagliflozin in hospitalized patients with stage 2–3 AKI and residual eGFR 10–25 mL/min/1.73 m².

Materials and Methods: This is a single-center, open-label, randomized pilot trial enrolling adults (≥18 years) with KDIGO stage 2–3 acute kidney injury (AKI) and an eGFR between 10 and 25 mL/min/1.73m² within 48 hours of diagnosis. Key exclusion criteria include (1) type 1 diabetes, (2) diabetic ketoacidosis (DKA) or a history of euglycemic DKA, (3) ongoing dialysis, (4) vasopressor-dependent hypotension, (5) terminal illness, (6) anuria, (7) inability to take oral medications, (8) severe metabolic acidosis, defined as serum bicarbonate ≤15 mmol/L or pH ≤7.20. Eligible patients will be randomized 1:1 to receive empagliflozin 10 mg once daily or standard care for up to 14 days. The primary endpoint is feasibility, defined as successful initiation and maintenance of empagliflozin in ≥80% of eligible patients. Secondary endpoints include (1) renal recovery, defined as a ≥30% reduction in peak serum creatinine by day 14, (2) time to renal recovery, (3) in-hospital initiation of dialysis, (4) length of ICU and hospital stay, (5) in-hospital mortality, (6) adverse events e.g., hypotension, acidosis, hypoglycemia. Daily monitoring will include serum creatinine, electrolytes, acid-base status, urine output, and vital signs. Predefined stopping rules will be applied in the event of clinical deterioration, >20% eGFR decline, or serious adverse events. Empagliflozin will only be administered to those with baseline eGFR ≥20 mL/min/1.73m², per safety guidance.

Results: This abstract describes the protocol of an ongoing pilot trial. Enrollment will begin in late 2025; 40 patients (20 per arm). Study rationale will be presented; preliminary data may be available.

Discussion and Conclusions: This study investigates a novel off-label use of empagliflozin in AKI patients with significantly impaired renal function. If feasible and safe, it may support future trials of SGLT2 inhibitors for renal recovery in high-risk AKI.

Keywords: Acute kidney injury; SGLT2 inhibitor; Residual renal function; Feasibility study; Pilot trial

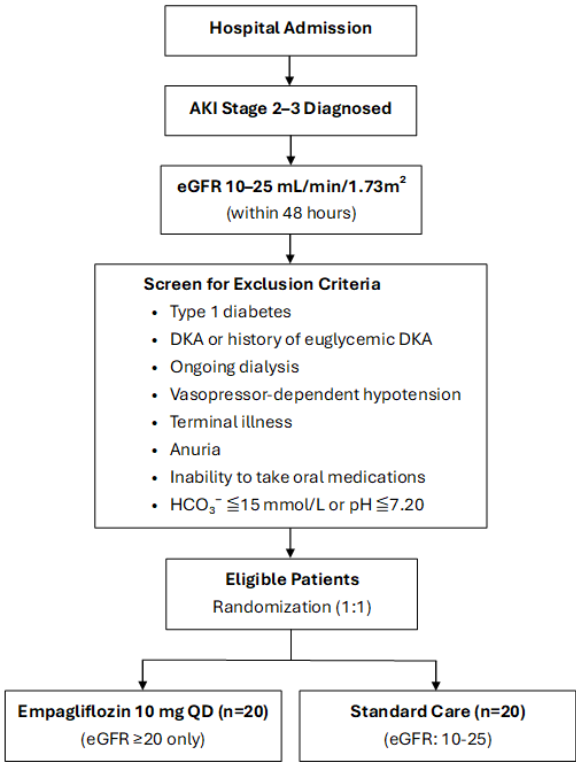


Figure 1. Flowchart of patient enrollment, exclusion, and randomization in the empagliflozin AKI pilot trial.

Monitoring Parameter	Frequency	Purpose
BUN, Serum Cr, eGFR	Baseline, BIW and PRN	To monitor renal function and detect progression or recovery of AKI
Urinalysis and sediment	Baseline and PRN	To assess urinary abnormalities suggestive of intrinsic kidney injury
Urine output	Q8H (per shift)	To track real-time kidney function and fluid balance
Intake and output	Q8H (per shift)	To evaluate net fluid balance and guide volume management
Body weight	QD	To assess volume status and detect fluid retention or loss
Vital signs (BP, PR, RR, BT)	QID and PRN	To monitor hemodynamic stability and detect signs of infection or instability
Fingerstick blood glucose	BIDAC and PRN	To ensure glycemic control and detect hypoglycemia
Na, K	Baseline, BIW and PRN	To monitor for electrolyte disturbances associated with AKI or therapy
Serum ketone (β-OHB)	Baseline, QW and PRN	To screen for ketoacidosis, particularly euglycemic DKA
Blood gas (incl. HCO ₃ ⁻)	Baseline, QW and PRN	To assess acid-base status and detect metabolic acidosis

Abbreviations: BUN: blood urea nitrogen; Cr: creatinine; eGFR: estimated glomerular filtration rate; BIW: twice weekly; PRN: as needed; AKI: acute kidney injury; Q8H: every 8 hours; QD: once daily; BP: blood pressure; PR: pulse rate; RR: respiratory rate; BT: body temperature; QID: four times daily; BIDAC: twice daily before meals; Na: sodium; K: potassium; β-OHB: β-hydroxybutyrate; QW: once weekly; DKA: diabetic ketoacidosis; incl.: include; HCO₃⁻: bicarbonate

Table 1. Clinical Monitoring Parameters During the Empagliflozin AKI Pilot Trial

Acute Kidney and Liver Injury Following Cyprinid Fish Gallbladder Ingestion: A Case Series from Thailand

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Abstract:

Objectives: Cyprinid fish gallbladders contain 5 α -cyprinol sulphate, a natural toxin known to cause renal tubular epithelial and hepatocellular injury. In Thailand, these gallbladders are occasionally ingested as a traditional delicacy. We report a case series of acute kidney injury (AKI) and/or liver injury following the consumption of cyprinid fish gallbladders.

Materials and Methods: We retrospectively reviewed 9 patients at Khon Kaen Hospital, Thailand, who developed AKI and/or liver injury after ingestion of cyprinid fish gallbladders between July 2022 and June 2025.

Results: Of the nine patients, six were male, with a median age of 38 years (range, 30–69 years). All presented with gastrointestinal symptoms, including nausea, vomiting, abdominal pain, and diarrhea; two experienced seizures. *Barbonymus gonionotus* was the most frequently ingested species. AKI occurred in all patients; eight had KDIGO stage 3 and one had stage 1, predominantly non-oliguric. Kidney replacement therapy (KRT) was initiated in five patients, one of whom also received hemoabsorption. All patients exhibited liver injury, characterized by hyperbilirubinemia and markedly elevated aminotransferases. Median peak of creatinine was 9.1 mg/dL, AST 1,063 U/L, and ALT 1,096 U/L. Three patients died from multiorgan failure, and one, despite initial recovery of renal and hepatic function, later died of hospital-acquired pneumonia. Among the five survivors, one developed non-proteinuric chronic kidney disease. Kidney biopsy in one patient revealed extensive acute tubular injury without glomerular abnormalities. Clinical characteristics are summarized in Table 1.

Discussion and Conclusions: To our knowledge, this is the first reported case series in Thailand describing cyprinid fish gallbladder ingestion causing severe AKI and liver dysfunction. Most patients developed severe, non-oliguric AKI requiring KRT, accompanied by hepatocellular-pattern hepatitis in all cases, and had a high mortality rate. While some

survivors recovered, others progressed to chronic kidney disease. These findings highlight the need for public health measures to discourage this harmful traditional practice.

Keywords: fish gallbladder, carp raw bile, cyprinid fish, cyprinol sulphate, acute kidney injury

Patient No.	Sex/Age	Fish Species ¹	Gallbladders Ingested	Peak AST (U/L)	Peak ALT (U/L)	Peak Total Bilirubin (mg/dL)	Peak Direct Bilirubin (mg/dL)	Peak Creatinine (mg/dL)	Treatment ²	Outcome
1	M/60	<i>P. jullieni</i> , <i>L. rohita</i>	4	1,218	2,573	4.0	3.6	9.1	None	Survived, full recovery
2	M/58	<i>B. gonionotus</i>	4	2,168	3,485	23.6	18.8	15.1	NAC, HD (1)	Survived, CKD stage 3b
3	M/36	<i>B. gonionotus</i>	5	249	67	28.0	18.0	6.2	NAC, CKRT	Died (MOF)
4	M/31	<i>B. gonionotus</i>	4	5,308	2,173	4.3	2.2	1.4	NAC	Survived, full recovery
5	F/69	<i>B. gonionotus</i>	NA	395	1,096	10.3	6.4	9.7	None	Died (non-renal cause)
6	F/38	<i>B. gonionotus</i>	1	1,063	2,778	22.0	16.2	15.2	HD (5)	Survived, full recovery
7	F/61	<i>Henicorhynchus sp.</i>	3	434	104	2.1	0.9	4.4	CKRT	Died (MOF)
8	M/30	<i>B. gonionotus</i>	2	196	115	7.6	3.9	3.9	None	Survived, full recovery
9	M/32	<i>B. gonionotus</i>	NA	1,220	95	21.8	18.2	12.6	NAC, CKRT, HA	Died (MOF)
Median	-	-	-	1,063	1,096	10.3	6.4	9.1	-	-
Range	-	-	1 - 5	196 - 5,308	67 - 3,485	2.1 - 28.0	0.9 - 18.8	1.4 - 15.2	-	-

¹Species abbreviations: *B. gonionotus* = *Barbonymus gonionotus*; *P. jullieni* = *Probarbus jullieni*; *L. rohita* = *Labeo rohita*.
²Treatment abbreviations: NAC = N-acetylcysteine; HD = Hemodialysis (sessions); CKRT = Continuous kidney replacement therapy; HA = Hemoadsorption; MOF = Multi-organ failure.

Table 1 Clinical characteristics of patients with acute kidney and liver injury following cyprinid fish gallbladder ingestion

Incidence of Acute Kidney Injury Following Initiation of SGLT2 Inhibitor in Acute Heart Failure: A Randomized Controlled Trial

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Abstract:

Objectives: Sodium-glucose co-transporter 2 (SGLT2) inhibitors improve cardiovascular outcomes in acute heart failure (AHF) but associated with transient rise in serum creatinine. The aim of this study was to assess the incidence of acute kidney injury (AKI) following initiation of SGLT2 inhibitor in patients hospitalized with acute AHF.

Materials and Methods: An open labelled, randomized, controlled trial enrolled patients who hospitalized for AHF at Bhumibol Adulyadej Hospital. Patients who hospitalized for AHF were randomized to dapagliflozin added to standard of care or control group for 28 days. The primary outcome was the incidence of AKI by KDIGO criteria. The secondary outcome was the AKI predicted by urinary [TIMP-2] x [IGFBP-7] criteria, change from baseline eGFR, and adverse events.

Results: A total of 32 patients were enrolled. dapagliflozin group has demonstrated a trend towards decrease in AKI events compared with standard therapy (33.3% vs 46.2%; P = 0.513). In terms of AKI biomarkers, we conducted additional analysis using urinary [TIMP-2] x [IGFBP-7] at a threshold of 0.3 (ng/ml)²/1000. We also observed a trend where the number of patients with urinary [TIMP-2] x [IGFBP-7] levels exceeding 0.3 was lower in the dapagliflozin group (25.0% vs 53.8%, P = 0.288). The change from baseline eGFR (figure 1), and adverse events showed no differences in both groups.

Discussion and Conclusions: In patients hospitalized for acute heart failure, SGLT2 inhibitor add on to standard therapy does not increase the incidence of AKI and appears to have a potential preventive effect on tubular injury.

Keywords: acute heart failure, acute kidney injury, urinary [TIMP-2] x [IGFBP7], SGLT2 inhibitor

High Concordance of ABG and Central Laboratory Electrolytes Enables Rapid ICU Decision-making in AKI

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Abstract:

Objectives: To assess the degree of agreement between arterial blood gas (ABG) analyzers and central laboratory auto-analyzers (CLA) for electrolytes in critically ill patients with acute kidney injury (AKI), highlighting areas of close concordance and practical applicability.

Materials and Methods: We conducted a retrospective cohort study of adult ICU patients with AKI (KDIGO criteria) who had paired ABG–CLA measurements for sodium (Na), potassium (K), and bicarbonate/total CO₂ (HCO₃⁻/TCO₂) within 15 minutes. Agreement was evaluated using Bland–Altman (BA) plots, Passing–Bablok (PB) regression, and Pearson correlation.

Results: Paired data included HCO₃⁻/TCO₂ n=7,141, K n=6,697, and Na n=6,616. Strong correlations were observed: r=0.706 for HCO₃⁻/TCO₂, 0.642 for K, and 0.736 for Na (all p<0.001). Mean differences were modest for K (-0.17 mmol/L) and Na (-0.68 mmol/L), while HCO₃⁻/TCO₂ showed a consistent positive offset (+2.56 mmol/L). BA plots demonstrated that most paired results fell within clinically acceptable limits, and PB regression confirmed high linear concordance: slopes 0.96 (HCO₃⁻/TCO₂), 1.10 (K), and 1.02 (Na).

Discussion and Conclusions: The findings demonstrate that ABG analyzers provide electrolyte results that closely align with CLA values for Na, K, and HCO₃⁻/TCO₂ in ICU AKI patients, enabling timely decision-making at the bedside. Minor, predictable biases were identified, which can be easily accounted for in clinical interpretation. The strong correlations and consistent slopes support the use of ABG measurements for rapid assessment, particularly when immediate results are needed for critical interventions.

ABG analyzers show strong agreement with CLA for Na, K, and $\text{HCO}_3^-/\text{TCO}_2$ in critically ill AKI patients. With awareness of small, predictable differences, ABG results can be confidently integrated into urgent clinical decision-making, improving the speed and efficiency of electrolyte management in the ICU.

Keywords: Acute kidney injury, Arterial blood gas analyzer, Central laboratory, Electrolyte measurement, Point-of-care testing

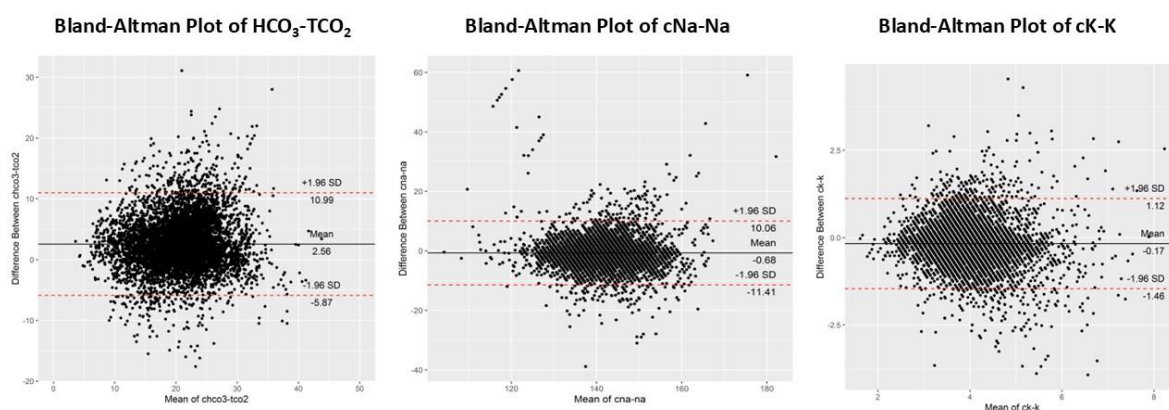


Figure 1. Bland–Altman Plots Showing Agreement Between ABG and Central Laboratory Measurements for $\text{HCO}_3^-/\text{TCO}_2$, Sodium, and Potassium

The Effect of Intravenous Thiamine Supplementation on AKI Outcomes in Sepsis Patients: A Randomized Controlled Trial

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Abstract:

Background: Acute kidney injury (AKI) complicates up to 50% of sepsis cases and is associated with increased mortality. Mitochondrial dysfunction, driven in part by thiamine deficiency, contributes to the pathogenesis of sepsis-associated AKI. While thiamine has been proposed as a renoprotective agent, no previous randomized controlled trial (RCT) has prospectively evaluated its effect on AKI as a primary outcome in early sepsis.

Objectives: To determine whether intravenous thiamine supplementation reduces the incidence of AKI and improves clinical outcomes in adult patients with early sepsis and preserved baseline renal function.

Materials and Methods: This single-center, open-label, randomized controlled pilot trial enrolled 100 sepsis patients without pre-existing AKI or advanced CKD. Patients were randomized 1:1 to receive thiamine 200 mg IV every 12 hours for 7 days or standard care. The primary outcome was AKI incidence within 7 days (KDIGO criteria). Secondary outcomes included in-hospital mortality, renal replacement therapy (RRT), and major adverse kidney events (MAKE) within 7 days.

Results: AKI incidence was numerically lower in the thiamine group (22%) than control (40%), reflecting a non-significant trend ($p=0.052$). Thiamine was associated with significantly lower in-hospital mortality (4% vs. 16%, $p=0.046$). MAKE at 7 days occurred in 30% of the thiamine group versus 48% in controls ($p=0.065$). Thiamine was well tolerated without adverse events.

Discussion and Conclusions: Thiamine supplementation demonstrated a favorable trend toward reduced AKI incidence and significantly reduced mortality in early sepsis. Given its safety and biological plausibility, thiamine warrants further investigation in larger, blinded trials.

Keywords: Acute Kidney Injury, Sepsis, Thiamine Supplementation, Renal Replacement Therapy, Critical Care, Major Adverse Kidney Events

Sustained Impact of Electronic AKI Alert System: A Decade-Long Analysis

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Abstract:

Objectives: Despite widespread adoption of electronic acute kidney injury (AKI) alert systems, their sustained effectiveness over extended periods remains unclear. We evaluated the long-term effectiveness of an automated AKI alert system on clinical outcomes over a decade of implementation in a tertiary hospital setting.

Materials and Methods: We conducted a retrospective cohort study involving 13,301 adult patients with AKI identified from 246,650 admissions (2013–2023) at Seoul National University Bundang Hospital. The study period was categorized into pre-alert (2013.1–2014.5), implementation (2014.6–2019.12), and pandemic (2020.1–2023.12) phases. Primary outcomes included 14-day AKI recovery, early nephrology consultation, and overlooked AKI (no creatinine monitoring within 14 days). Interrupted time series analysis with segmented regression was used to assess immediate and sustained effects, adjusting for demographic, clinical, and temporal covariates.

Results: AKI recovery increased from 40.2% (pre-alert) to 66.5% and 67.3% in the implementation and pandemic phases (adjusted OR 2.40 [95% CI: 2.16–2.66] and 2.19 [1.94–2.47]). Early nephrology consultation improved from 6.1% to 19.4% and 17.2% (aOR 3.33 [2.81–3.95] and 2.65 [2.20–3.19]), and overlooked AKI cases decreased from 22.2% to 8.9% and 7.4% (aOR 0.49 [0.43–0.55] and 0.43 [0.36–0.51]). Interrupted time series analysis showed significant immediate improvements in AKI recovery (+15.0 percentage points, $p=0.002$) and consultation rates (+14.0 percentage points, $p<0.001$). Long-term renal outcomes also improved, with a reduced risk of $\geq 35\%$ eGFR decline (aOR 0.86 [0.76–0.99]). These trends persisted during the COVID-19 pandemic.

Discussion and Conclusions: This decade-long analysis demonstrates sustained effectiveness of electronic AKI alert systems in improving clinical outcomes. The system achieved durable improvements in AKI recovery, specialist consultation, and monitoring despite changing patient populations and healthcare environments. Results support continued implementation of automated AKI detection in acute care settings and provide evidence for long-term healthcare technology investments.

Keywords: Acute Kidney Injury; Electronic Health Records; Alert Systems; Time Series Analysis; Quality Improvement

Clinician-Centered Digital Medical Education: Bridging Evidence into Practice for AKI-CRRT Management

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Abstract:

Background and Objective: Acute kidney injury (AKI) affects 2.9 million hospitalized patients annually in China, necessitating standardized continuous renal replacement therapy (CRRT). Despite international guidelines favoring premixed replacement fluids, 70% of Chinese healthcare facilities rely on error-prone manual formulations, highlighting critical knowledge-practice gaps. This study evaluates the Vantive Medical Channel (VMC), a clinician-centered digital education platform, in addressing these challenges during the new launch of a premixed ready-to-use (RTU) CRRT solution.

Methods: A mixed-methods approach integrated:

1. Stakeholder collaboration with KOLs to establish China's first CRRT Replacement Fluid Classification Criteria (manual/semi-manufactured/RTU);
2. Interactive digital content (expert webinars, H5-based clinical simulations, AI-driven debates);
3. Real-time analytics via WeChat and Ding Xiang Doctor ecosystems, using Tableau AI for precision targeting of nephrologists/intensivists.

Results: The campaign achieved 100,000+ annual content views, with post-engagement surveys showing an 85% HCP understanding of RTU value (vs. 55% pre-campaign). Key outcomes included:

- 75% endorsement of premixed fluids through gamified debates.
- 30% improvement in HCPs' perceived value of RTU safety and ease of use.
- Sentiment analysis (100+ comments) identified "infection control" (40% citations) and "protocol standardization" (35%) as adoption drivers.

A citrate-focused review, cited in 15% of engagements, resolved anticoagulation knowledge gaps, directly supporting guideline adherence.

Conclusions: The VMC demonstrates how clinician-centric digital education bridges evidence-practice gaps in AKI-CRRT management. By aligning content with lifecycle needs (from foundational theory to advanced protocols) and leveraging real-time feedback, medical teams can standardize care, enhance engagement, and accelerate therapeutic adoption. Future integration of AI-driven personalization and VR simulations may further optimize procedural competency, offering scalable solutions for resource-limited settings.

Keywords: Digital medical education, acute kidney injury, continuous renal replacement therapy, healthcare provider engagement, Vantive Medical Channel

A Tiered Digital Education Model for AKI/CRRT Training in China: Bridging the Gap in Underserved Settings

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Abstract:

Objectives: Acute kidney injury (AKI) significantly contributes to preventable mortality in China. The rapid post-pandemic deployment of Continuous Renal Replacement Therapy (CRRT) in primary-level hospitals has outpaced clinician training, fostering unsafe practices and hindering the International Society of Nephrology's (ISN) 0by25 initiative (eliminating preventable AKI deaths by 2025). This study developed and evaluated a tiered digital education program developed by VMC(vantive medical channel) to standardize AKI/CRRT knowledge and practice among clinicians in these settings.

Materials and Methods: A three-tier (Foundational, Advanced, Mastery) competency framework was co-designed with leading Chinese Intensive Care Units and nephrology centers. Content covered AKI pathophysiology, CRRT fundamentals, clinical applications via scenario-based training, procedural videos, interactive simulations, and evidence-based updates like citrate protocols. The program was disseminated via VMC's WeChat, Ding Xiang Doctor, and institutional partnerships, utilizing AI-driven analytics for targeted delivery to underserved regions and real-time feedback for iterative optimization.

Results: From June 2020 to June 2023, the program achieved >100,000 content views and >150,000 learning minutes; 60% of users were from Tier-3 hospitals and rural clinics, many lacking prior CRRT training. Among surveyed primary-level clinicians, 85% reported improved CRRT competency, alongside a 35% increase in guideline-compliant fluid selection and a 40% reduction in anticoagulation-related complications post-training. Mobile access was predominant (90%). The program was integrated into the Guangdong CRRT Clinical Training Program, reaching >5,200 clinicians annually with 90% satisfaction. Qualitative feedback highlighted "scenario-based videos" (63%) and "simplified citrate guides" (58%) as crucial for translating theory to practice.

Discussion and Conclusions: This tiered, mobile-first digital education program effectively addresses China's AKI/CRRT training gap in underserved regions, supporting the ISN's 0by25 initiative by standardizing care and contributing to reduced preventable mortality. Its success, rooted in stakeholder collaboration, competency-driven design, and adaptability, demonstrates its scalability for other developing health systems. Future integration of AI-personalized learning and low-bandwidth tools could further democratize expertise.

Keywords: digital education, AKI, CRRT

Impact of Normal Saline Flush Volume and Patient Factors on Clotting During Hemodialysis

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Abstract:

Objectives: Clotting in the extracorporeal circuit is a common complication during hemodialysis (HD), particularly in patients with acute kidney injury (AKI) or end-stage kidney disease (ESKD). This study evaluated the effect of normal saline solution (NSS) flush volume on clotting risk and identified patient-related predictors.

Materials and Methods: A total of 309 HD sessions were prospectively analyzed in patients with AKI (52.6%) and ESKD (47.4%). NSS flushes were administered as either 100 mL every hour or 200 mL every two hours. The primary outcome was the incidence of extracorporeal circuit clotting. Secondary analyses assessed associations with sex, kidney disease type, and vascular access. Incidence rate ratios (IRRs) with 95% confidence intervals (CIs) were calculated using multivariable, multilevel mixed-effects Poisson regression.

Results: The overall clotting rate was 5.18 events per 100 sessions. Clotting occurred at rates of 6.1 and 4.4 per 100 sessions in the 100 mL and 200 mL groups, respectively, with no significant difference (adjusted IRR 0.87; 95% CI: 0.27–2.77). Male sex (adjusted IRR 0.16; 95% CI: 0.03–0.74), ESKD versus AKI (adjusted IRR 0.03; 95% CI: 0.01–0.12), and use of arteriovenous fistulas (vs. grafts or catheters; $p < 0.01$) were significantly associated with lower clotting risk.

Discussion and Conclusions: Increasing NSS flush volume from 100 mL to 200 mL does not significantly reduce circuit clotting during HD. Patient-specific factors, particularly vascular access type, have a greater impact and should inform preventive strategies.

Keywords: Hemodialysis, Clotting, Normal Saline Flush, Vascular Access, End-Stage Kidney Disease (ESKD)

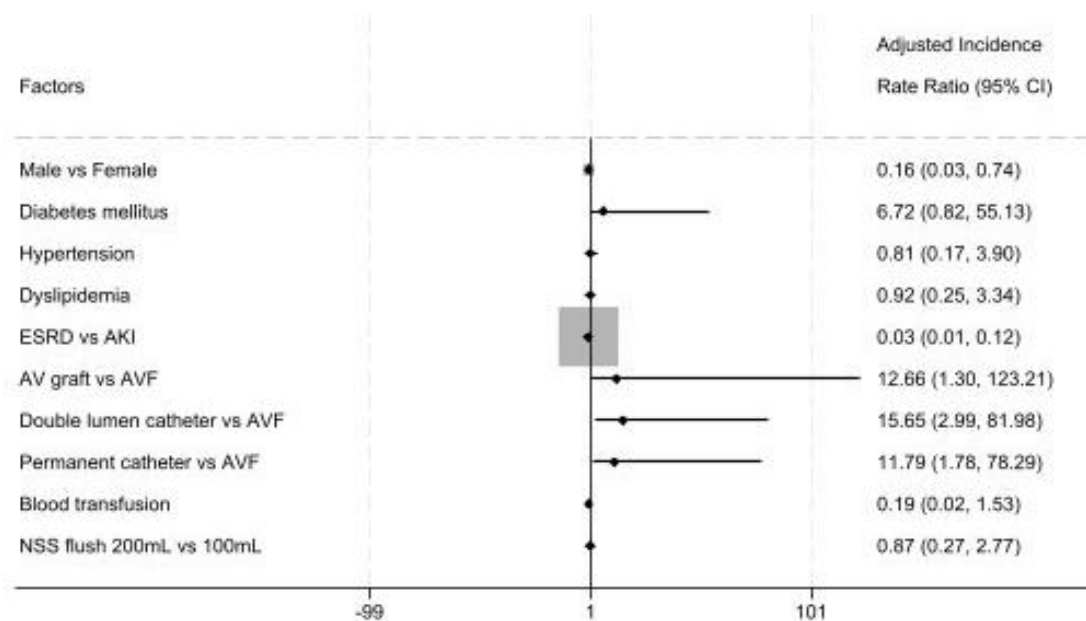


Table 1 Baseline Characteristics

Characteristics	Total
N	38
Gender	
Male	23 (60.5)
Female	15 (39.5)
Comorbid diseases	
Diabetes mellitus	12 (31.6)
Hypertension	27 (71.0)
Dyslipidemia	15 (39.5)
Indication of dialysis	
Acute kidney injury	20 (52.6)
End stage kidney disease	18 (47.4)
Vascular access type	
AV fistula	13 (34.2)
AV graft	4 (10.5)
Double lumen catheter	13 (34.2)
Permanent catheter	8 (21.1)
Treatment	
Blood transfusion	8 (21.1)
NSS flush	
100mL	23 (60.5)
200mL	15 (39.5)
Median follow up (session), IQR, min-max	5.5 (3, 8), 1-10

*IQR; interquartile range, AV; arterio-venous.

Table 2 Factors associated with circuit clot formation during hemodialysis, analyses using multivariable, multilevel, mixed-effect, Poisson regression analysis

Characteristics	Total Events	Patient-sessions	Incidence (100 patient-sessions)	Univariable analysis		Multivariable analysis	
				Crude IRR (95%CI)	p-value	Adjusted IRR (95%CI)	p-value
Gender							
Female	9	79.0	11.4	1 (reference)		1 (reference)	
Male	7	230.0	3.0	0.06 (0.01-0.48)	0.007	0.16 (0.03-0.74)	0.019
Comorbid diseases							
Diabetes mellitus	3	50.0	6.0	1.09 (0.09-13.15)	0.945	6.72 (0.82-55.13)	0.076
Hypertension	11	186.0	5.9	2.66 (0.24-29.29)	0.424	0.81 (0.17-3.90)	0.797
Dyslipidemia	7	118.0	5.9	0.75 (0.08-6.56)	0.791	0.92 (0.25-3.34)	0.893
Indication of dialysis							
Acute kidney injury	10	68.0	14.7	1 (reference)		1 (reference)	
End stage kidney disease	6	241.0	2.5	0.04 (0.01-0.31)	0.002	0.03 (0.01-0.12)	<0.001
Vascular access type							
AV fistula	3	8.0	37.5	1 (reference)		1 (reference)	
AV graft	2	2.0	100.0	18.68 (0.85-412.11)	0.064	12.66 (1.30-123.21)	0.029
Double lumen catheter	9	18.0	50.0	5.70 (0.41-79.38)	0.196	15.65 (2.99-81.98)	0.001
Permanent catheter	2	3.0	66.7	4.50 (0.18-111.96)	0.359	11.79 (1.78-78.29)	0.011
Treatment							
Blood transfusion	1	53.0	1.9	0.20 (0.02-1.90)	0.161	0.19 (0.02-1.53)	0.118
NSS flush							
100mL	9	148.0	6.1	1 (reference)		1 (reference)	
200mL	7	161.0	4.4	0.42 (0.13-1.39)	0.158	0.87 (0.27-2.77)	0.808

*IRR; incidence rate ratios, AV; arterio-venous.

Clinical Outcomes of RRT Initiation in Critically Ill Patients During In-Hours Versus Off-Hours

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Abstract:

Background: In a critically ill patient with acute kidney injury who needs renal replacement therapy (RRT), the prompt initiation of RRT may influence patient outcomes. However, in resource-limited settings, lack of manpower, insufficient intensive care unit capacity, and workload may delay RRT initiation.

Objective: To compare the clinical outcomes of patients who initiated CRRT during in-hours versus off-hours in an intensive care setting.

Methods: We conducted a retrospective analysis of 550 patients who underwent RRT between December 2022 and January 2025. Patients were categorized into two groups based on the time of RRT initiation: In-hours group (06:00–16:00) and Off-hours group (16:00–06:00).

The following data were collected and compared between groups: demographic characteristics, illness severity scores, day of RRT initiation, ICU length of stay, hospital length of stay, 28-day mortality, in-hospital mortality, and dialysis dependency at discharge.

Results: There were 326 patients who initiated RRT in-hours group compared to 224 patients in the off-hours group. The 28-day mortality rate was significantly lower in the in-hours group (35.3%) compared to the off-hours group (51.8%, $p < 0.001$). Patients in the in-hours group also had significantly lower illness severity scores. The mean SOFA score was 9.99 in the in-hours group versus 12.04 in the off-hours group ($p < 0.001$), and the mean APACHE II score was 17.9 versus 20.8, respectively ($p < 0.001$). In-hospital mortality was also lower in the in-hours group (48.2%) compared to the off-hours group (59.8%), with a borderline statistical significance ($p = 0.051$).

Conclusions: Initiating CRRT during in-hours was associated with significantly lower 28-day mortality and in-hospital mortality, as well as lower severity scores. These findings suggest that earlier and well-resourced CRRT initiation during regular working hours may lead to better clinical outcomes.

Keywords: Clinical outcome, Renal Replacement Therapy

Workflow Analysis for Vancomycin Dosing and Monitoring

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Abstract:

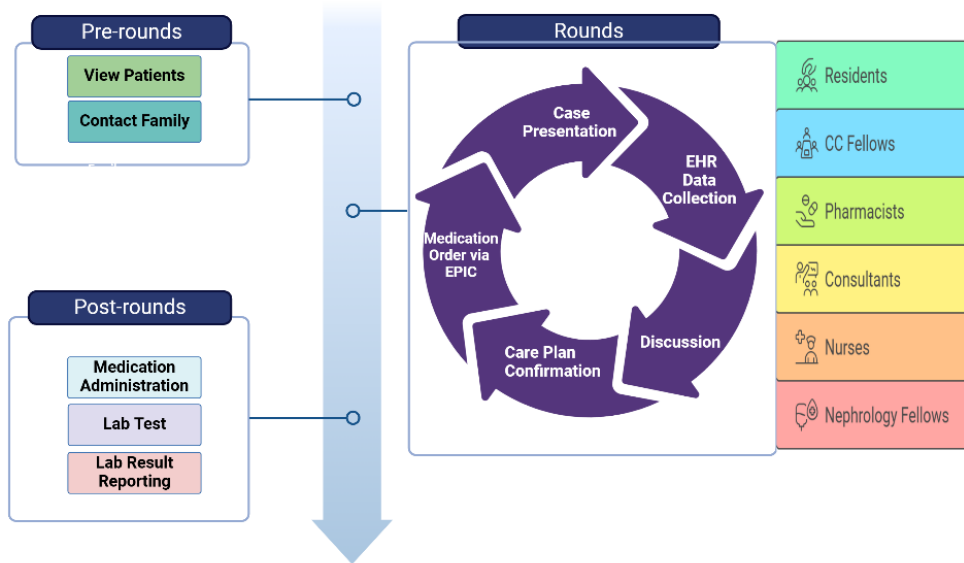
Objectives: To evaluate the vancomycin management workflow in ICUs and quantify the time clinical pharmacists spend on vancomycin-related tasks during daily rounds.

Materials and Methods: We conducted a prospective time-motion study at Mayo Clinic from June 2023 to February 2025, involving 52 ICU patient observations and 10 pharmacists. Pharmacist tasks related to vancomycin were documented using REDCap. Data included dosing, therapeutic drug monitoring (TDM), timing metrics, and task frequency. Descriptive statistics summarized findings.

Results: Among 52 ICU patients, 42% started vancomycin in the ICU; 58% were already on it. Vancomycin levels were measured in 38% of patients. Median vancomycin level on observation day was 15.25 mcg/dL; median serum creatinine was 1.01 mg/dL. Pharmacists spent a median of 11 minutes (IQR 6.8–15.0) per round on vancomycin-related activities. Key workflow metrics: median time from ICU admission to vancomycin order was 29.1 hours; order-to-administration time was 1.0 hour; administration-to-level-order was 29.8 hours; and lab result turnaround time was 13.0 hours. Most common pharmacist tasks included EHR review (88.5%), care plan discussions (82.6%), vancomycin indication review (80%), dosing finalization (71%), and eGFR calculation (69.2%).

Discussion and Conclusions: Pharmacists dedicate substantial time to managing vancomycin in the ICU, particularly in EHR-based activities. This structured workflow analysis identifies opportunities to improve efficiency through embedded decision support tools and standardized communication strategies. Optimizing pharmacist workflow may enhance antimicrobial stewardship and patient outcomes in critical care.

Keywords: Vancomycin, ICU, pharmacist, time-motion study, workflow, antimicrobial stewardship



Metrics	Median	IQR
Vancomycin level on the Day of Observation, mcg/dL	15.25	12.95-19.55
Serum Creatinine on the Day of Observation, mg/dL	1.01	0.67-1.93
Observation Duration, minutes	11.0	6.8-15.0
ICU Admission to Vancomycin First Order, hours	29.1	2.7-156.9
Vancomycin Order to Observation, hour	23.8	9.2-64.0
Vancomycin Order to Administration, hours	1.0	0.5-2.0
Administration to Vancomycin Lab Order, hours	29.8	20.5-49.2
Vancomycin Lab Order to Result, hours	13.0	7.4-14.5

Table 1. Lab Values and Timing Metrics

Population Pharmacokinetics of Vancomycin in Critically ill Patients Undergoing Continuous Renal Replacement Therapy

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Abstract:

Objectives: Vancomycin is commonly used to treat gram-positive bacterial infections, particularly those caused by Methicillin-resistant Staphylococcus aureus (MRSA). In critically ill patients on continuous renal replacement therapy (CRRT), pharmacokinetics can be altered, especially when using novel adsorptive membranes. This study aimed to develop a population pharmacokinetic (PopPK) model of vancomycin in CRRT patients, incorporating the impact of adsorptive membrane use.

Materials and Methods: This retrospective study included adult patients (≥ 18 years) with acute kidney injury (AKI) who received CRRT and had at least two measured vancomycin concentrations during CRRT. Data were collected from a tertiary care hospital in Thailand between 2014 and 2024. A PopPK model was developed using Monolix software (version 2024), based on total vancomycin concentrations and a one-compartment structural model. Covariates evaluated for their influence on vancomycin pharmacokinetics included age, sex, body weight, serum creatinine, SOFA score, CRRT effluent flow rate and modality, residual urine volume, ECMO use, albumin, AST, ALT, and the use of adsorptive membranes (oXiris or CytoSorb). Covariate selection was performed using a stepwise approach with forward selection and backward elimination. Model performance and predictive accuracy were assessed using goodness-of-fit (GOF) plots and visual predictive checks (VPC).

Results: A total of 116 vancomycin concentrations from 51 critically ill patients were included in the PopPK model development. The mean patient age was 66.3 ± 16.2 years, and the mean body weight was 64.0 ± 17.2 kg. The final model estimated a volume of distribution (Vd) of 0.47 L/kg (RSE 5.57%) and a clearance (CL) of 0.079 L/kg/hr (RSE 22.2%). Interindividual variability (%CV) was 15.58% for Vd and 24.32% for CL. Adsorptive membrane use was a significant covariate influencing both Vd and CL. Additionally, body weight and age were significant covariates affecting CL. The final model demonstrated good predictive performance based on VPC and GOF plots (Figure 1).

Discussion and Conclusions: This is the first study to demonstrate that using adsorptive membranes can significantly impact the pharmacokinetic parameters of vancomycin in critically ill patients undergoing CRRT. Individualized vancomycin dosing in this population should consider membrane type, along with patient-specific factors such as body weight and age, to optimize therapeutic outcomes.

Keywords: Vancomycin, Population Pharmacokinetics, Continuous Renal Replacement Therapy

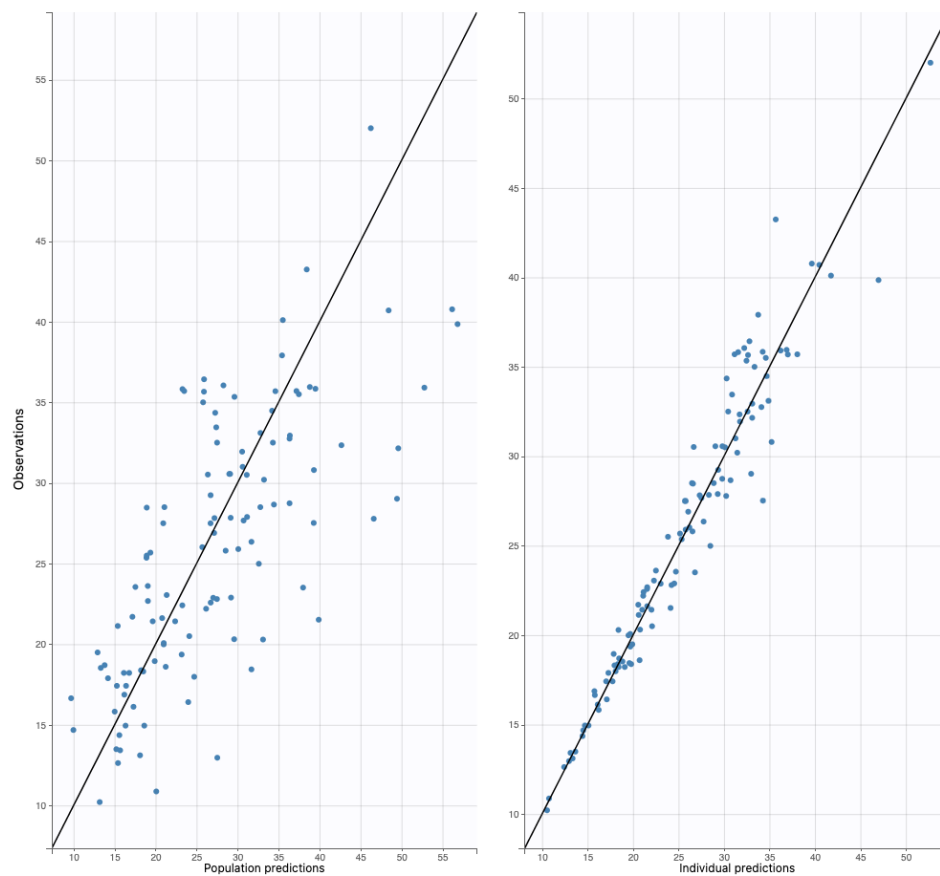


Figure 1. Goodness-of-fit plot from the final PopPK model.

Evaluating the Role of Lower Extremity Elastic Bandage in Patients with Diuretic-Resistant Heart Failure

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Abstract:

Objectives: Inadequate response to diuretics is associated with high morbidity and mortality during acute decompensation of heart failure (ADHF). Lower extremity compression therapy has been proposed as an adjunct to mitigate diuretic resistance. We evaluated the effect of lower leg compression with elastic bandages on diuretic efficiency in patients with diuretic-resistant ADHF.

Materials and Methods: Historical cohort study enrolling adult cardiac ICU admissions with ADHF who used elastic bandages (EB) at Mayo Clinic Rochester from 2007 to 2017. The diuretic efficiency, total urine output (mL) per diuretic dose, standardized to a 40-mg furosemide equivalent, before and after applying EB, was the primary outcome.

Results: A total of 176 heart failure patients receiving elastic bandages were included. The in-hospital mortality rate, the median hospital length of stay, and 30-day hospital readmission were 9.7%, 11.4 days (IQR 7.1–19.0), and 11%, respectively. When EB was applied, the average daily loop diuretic dosage was decreased by a mean difference of 1.19 mg per 40 mg furosemide equivalent (95% CI: 0.22 to 2.2; $p=0.016$). The average post-EB diuretic efficiency was 1,355 mL per 40-mg furosemide equivalent (IQR 1119, 1590), which was significantly higher than before EB application with the mean difference of 340 mL per 40-mg furosemide equivalent (95% CI: -554, -125; $p=0.002$). As a result of higher diuretic efficiency and lowered doses of diuretics, average daily urine output before and after EB application was not different (2,642 pre-EB vs. 2,792 post-EB mL/day; 95% CI: -455 to 154; $p = 0.33$).

Discussion and Conclusions: Leg compression therapy using EB enhances urine output and reduces diuretic requirements, resulting in improved diuretic efficiency during ADHF with diuretic resistance. Further studies are needed to determine the potential clinical benefits and risks of applying EB compression treatment in ADHF.

Keywords: leg compression, elastic bandage compression, diuretic efficiency, heart failure, diuretic resistance.

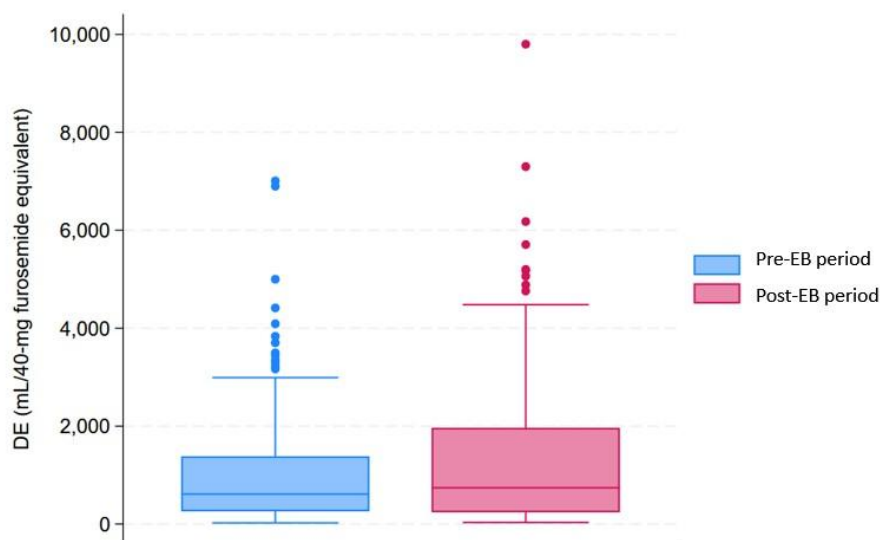


Figure 1. Diuretic efficiency (ml of urine generated for each 40 mg of furosemide or its equivalent) before and after application of lower extremity elastic bandage

Characteristic (total population 176)	All EB participants, n (%)
Age, years, median, IQR	69.4 (57, 80)
Male, n (%)	108 (61.4)
White Race, n (%)	156 (88.6)
BMI at ICU admission, kg/m2, mean, SD	32.5±9.0
Comorbidities, n (%)	
Diabetes Mellitus	65 (37.1)
Myocardial infarction	30 (7)
Chronic kidney disease	74 (41.5)
Cirrhosis/Liver disease	6 (3.4)
Cerebral Vascular Accident	15 (8.5)
Malignancy	38 (21.5)
Clinical Scoring, mean, SD	
Charlson Comorbidity Index	6.8±3.5

Apache III score at ICU	69.5± 19.1
1 st Braden score	16.3±3.0
Diagnosis ICD 9,10, n (%)	
Acute coronary syndrome	35 (19.9)
-STEMI	11 (6.25)
-NSTEMI	24 (13.6)
Coronary artery disease	98 (55.7)
Mod-severe RV dysfunction	77 (47.8)
Mod-severe LV dysfunction	87 (54.7)
Biventricular failure	51 (32)
Atrial fibrillation	56 (41.2)
Sepsis	32 (11.2)
Shock	40 (22.7)
-Cardiogenic shock	35 (19.9)
-Septic shock	19 (10.8)
Respiratory failure	90 (51.1)
Multiple organ failure	83 (47.2)
Cardiac arrest	25 (14.2)
Acute Kidney Injury	62 (35.2)
-AKI stage 1	50 (80.6)
-AKI stage 2	9 (14.5)
-AKI stage 3	3 (4.8)
Medication, n (%)	
Loop diuretic	
-Torsemide	11 (6.3)
-Bumetanide	24 (13.6)
-Furosemide	170 (96.6)
Non-loop diuretic	92 (52.3)
Thiazide	64 (36.4)
Spironolactone	46 (26.1)
Acetazolamide	10 (5.7)
Vasopressor use	75 (42.6)

Inotropes	58 (32.9)
Vasoactive	97 (55.1)
Laboratory, median (IQR)	
Baseline Creatinine, mg/dL	1.3 (1.0, 1.9)
Baseline eGFR, ml/min/1.73m ²	55 (36, 73)
BUN, mg/dL	36.5 (22,57)
Serum Na, mg/dL	137 (133, 141)
Serum K, mg/dL	4.2 (3.9, 4.8)
Serum Chloride, mg/dL	98 (94,102)
Serum HCO ₃ , mg/dL	25 (22,30)
Hemoglobin	10.6 (9.5, 12.3)
Platelet x 10 ⁶	195 (157,254)
Creatinine at CICU	1.40 (1.0, 2.15)
eGFR at ICU	47.9 (32.5, 70.7)
Peak Creatinine at ICU	1.40 (1.0, 2.0)
eGFR lowest at CICU	48.3 (30.5, 67.9)
Baseline LVEF, %	40±20, 39 (21, 60)
Treatment Intervention	
Mechanical ventilator used, n (%)	46 (26.1)
Mechanical ventilator, days,	2.0 (0.8, 3.1)
CKRT	10 (5.7)
IABP	11 (9.7)
Clinical Outcomes, n (%)	
In-hospital mortality	17 (9.7)
ICU mortality	12 (6.8)
1-year mortality	72 (41)
Readmission within 30 days	13 (11)
ICU LOS, days (IQR)	4.3 (2.9, 7.8)
Hospital LOS, days (IQR)	11.4 (7.1, 19.0)

Table 1. Baseline characteristics of heart failure patients with diuretic resistance

	Mean difference (95% CI)	P-value
Diuretic Efficiency		
Diuretic Efficiency (mL/40mg furosemide equivalent)	-339.6 (-554.5 to -124.7)	0.002
Loop diuretic dosage		
Loop diuretic dose 1-day prior-after (mg, 40-mg furosemide equivalent)	0.75 (-0.02 to 1.53)	0.056
Average daily loop diuretic dose (mg, 40-mg furosemide equivalent)	1.19 (0.22 to 2.2)	0.016
Adjusted diuretic dose (40-mg furosemide equivalent/min/1.73 m ²)	0.02 (-0.01 to -0.05)	0.18
Net fluid balance		
Net fluid balance (ml)	221 (-58 to 499)	0.12
Average net fluid balance (ml/day)	-73 (-334.0 to 188.0)	0.58
Weight-adjusted net fluid 1-day prior-after (ml/kg/day)	2.8 (-0.6 to 6.1)	0.11
Weight-adjusted average net fluid (ml/kg/day)	-1.1 (-4.2 to 2.0)	0.48
Urine output		
Average daily urine output (ml/day)	-150 (-455 to 154)	0.33
Urine output (m/day)	-87 (-358 to 182)	0.52
Weight-adjusted urine output (ml/kg)	-1.3 (-4.6 to 2.0)	0.43

Table 2. The outcomes prior to and after applying Elastic Bandage for lower extremity compression.

Combined Use of Oxiris and HA-330 in an Elderly Patient with Biliary Sepsis: A Case of Successful Cytokine Storm Control

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Abstract:

Objectives: Controlling excessive systemic inflammation during septic shock, which can lead to multiple organ dysfunction, remains a major therapeutic challenge. Currently, there are only limited reports demonstrating the potential role of combining two hemoadsorptive cartridges to enhance adsorption capacity and improve clinical outcomes. Our objective is to describe the clinical course of an 80-year-old patient with cytokine storm due to septic shock, successfully treated with combined hemoadsorption therapy using oXiris and HA-330 during continuous kidney replacement therapy (CKRT).

Materials and Methods: An 80-year-old Thai male presented with fever and right upper quadrant pain, accompanied by septic shock (BP 70/40 mmHg, HR 110 bpm). He was lethargic and oliguric, requiring vasopressor support. Laboratory tests revealed WBC 11,100/ μ L (neutrophil predominant), BUN 28 mg/dL, creatinine 1.58 mg/dL, and lipase 2,647 U/L. He developed clinical anuria and severe metabolic acidosis (bicarbonate 13.6 mmol/L, base excess -12.8, lactate 10.1 mmol/L). Liver function tests showed a cholestatic pattern with total bilirubin 5.95 mg/dL. IL-6 was markedly elevated at >50,000 pg/mL. Imaging confirmed toxic cholangitis and severe gallstone pancreatitis (BISAP score = 2). Blood and bile cultures grew *E. coli* resistant to penicillin, prompting escalation to meropenem. After family discussion, percutaneous transhepatic biliary drainage (PTBD) was performed. CKRT with oXiris and HA-330 was initiated for cytokine removal.

Results: Following initiation of combined hemoadsorption therapy, the patient's fever resolved and vasopressors were weaned. IL-6 levels declined from 46,890 pg/mL at 5 hours to 36,480 at 10 hours, 11,060 at 24 hours, 3,411 at 36 hours, and 2,121 at 68 hours (Figure 1). Although the HA-330 cartridge is typically recommended for 24-hour use, no rebound in IL-6 levels or clinical signs of saturation were observed, allowing safe continuation until circuit expiration on day 5. The patient was extubated on ICU day 5. Renal function recovered, CKRT was discontinued, and he was transferred to the general ward for rehabilitation.

Discussion and Conclusions: This case highlights the potential benefit and safety of prolonged combined hemoadsorption therapy in mitigation cytokine storm during septic shock. Sustained IL-6 clearance might associated with improvement of clinical outcome.

Keywords: Cytokine storm, Hemoadsorption therapy, Septic shock

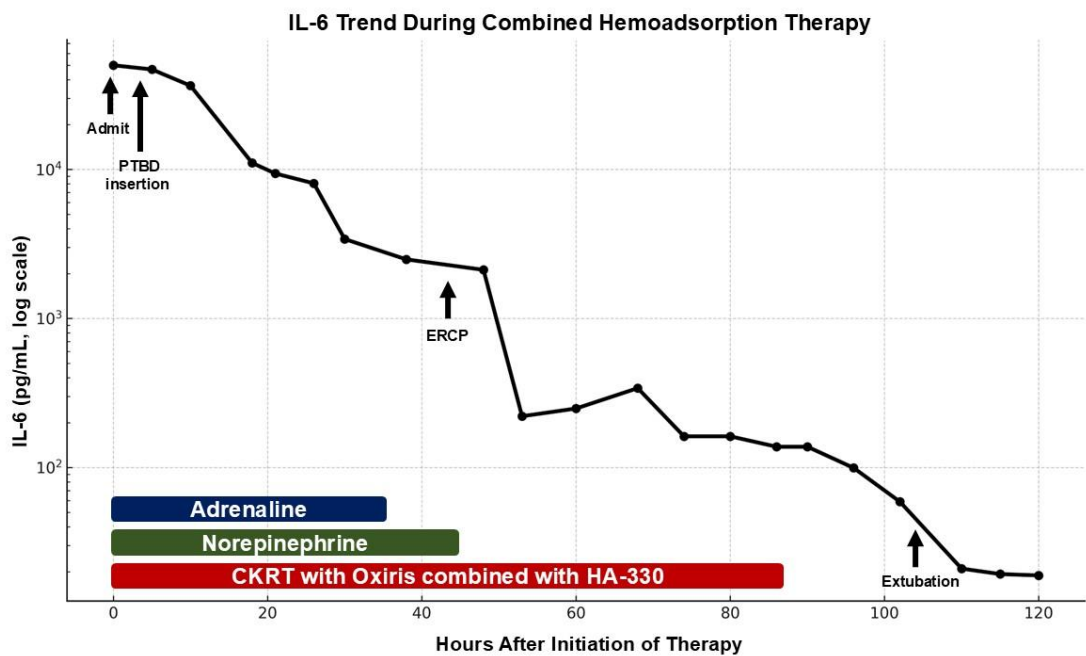


Figure 1. Trend of serum IL-6 levels during combined hemoadsorption therapy with Oxiris and HA-330 in an 80-year-old patient with septic shock due to toxic cholangitis and severe gallstone pancreatitis.

Membranous Therapeutic Plasma Exchange Utilising Prismaflex® in Drug-intolerant Thyroid Storm

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Abstract:

Objectives: Describe a case of thyroid storm with contraindications to conventional medical management treated with membranous therapeutic plasma exchange (mTPE). Compare mTPE versus centrifugal therapeutic plasma exchange (cTPE) and choice of replacement fluid in mTPE.

Materials and Methods:

A PubMed database literature review was conducted for plasma exchange in thyrotoxicosis. Comparison was made to our case.

Results: A 43-year-old lady with Grave's disease presented with influenza A pneumonia. She acutely worsened with features of thyroid storm including hyperthermia, hypercarbia, supraventricular arrhythmias and cardiogenic shock. Anti-thyroid drugs (ATD), hydrocortisone, Lugol's iodine and vasopressors were commenced. Beta-blockade was omitted due to severe left ventricular impairment.

Severe transaminitis necessitated cessation of ATD on day 3. mTPE was performed using the Prismaflex® system daily for 3 days with intention to bridge to thyroidectomy. The first two cycles used fresh frozen plasma (FFP) and albumin replacement fluid, both of which provide thyroid binding proteins. The last used albumin and crystalloid. Despite initial clinical and biochemical improvement, acute worsening of cardiogenic shock on day 8 required veno-arterial extracorporeal membrane oxygenation (ECMO). She later died on high-flow ECMO configuration.

Our case demonstrated decremental ft4 levels with sequential mTPE: 16.0%, 24.6%, 11.6% reduction with each cycle. This was consistent with reported literature showing average ft4 reduction of 12.3% and 22.4% for mTPE and cTPE respectively.

Our literature review found mTPE less frequently reported than cTPE as a modality for thyrotoxicosis (25 vs 146 patients). mTPE was as effective as cTPE in average percentage ft3 removed per cycle (20.9% vs 31.9%, $p=0.12$). mTPE was less efficacious than cTPE for ft4 removal (12.3% vs 22.4%, $p=0.03$). However, reported ranges of ft3 and ft4 removal were wide. Clinicians prescribing mTPE used mainly albumin and crystalloid replacement fluids. FFP versus albumin and crystalloid use in cTPE had no significant effect on ft3 removal (39.7% vs 45.1%, $p=0.84$) or ft4 (23.3% vs 18.7%, $p=0.41$).



Discussion and Conclusions: In the setting of thyroid hormone removal, mTPE utilising the Prismaflex® system in our case had efficacy comparable to reported literature for both mTPE and cTPE. mTPE may be an efficacious alternative to cTPE in thyrotoxicosis. Albumin and crystalloid remain suitable replacement fluids for thyroid hormone removal.

Keywords: plasma exchange, membranous, centrifugal, Prismaflex®, thyrotoxicosis, thyroid storm

Extracorporeal Blood Purification With the oXiris Filter for Patients with Sepsis and Hyperinflammatory Conditions: The Asia-Pacific oXiris Expert Meeting 2024 Consensus Statements

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Abstract:

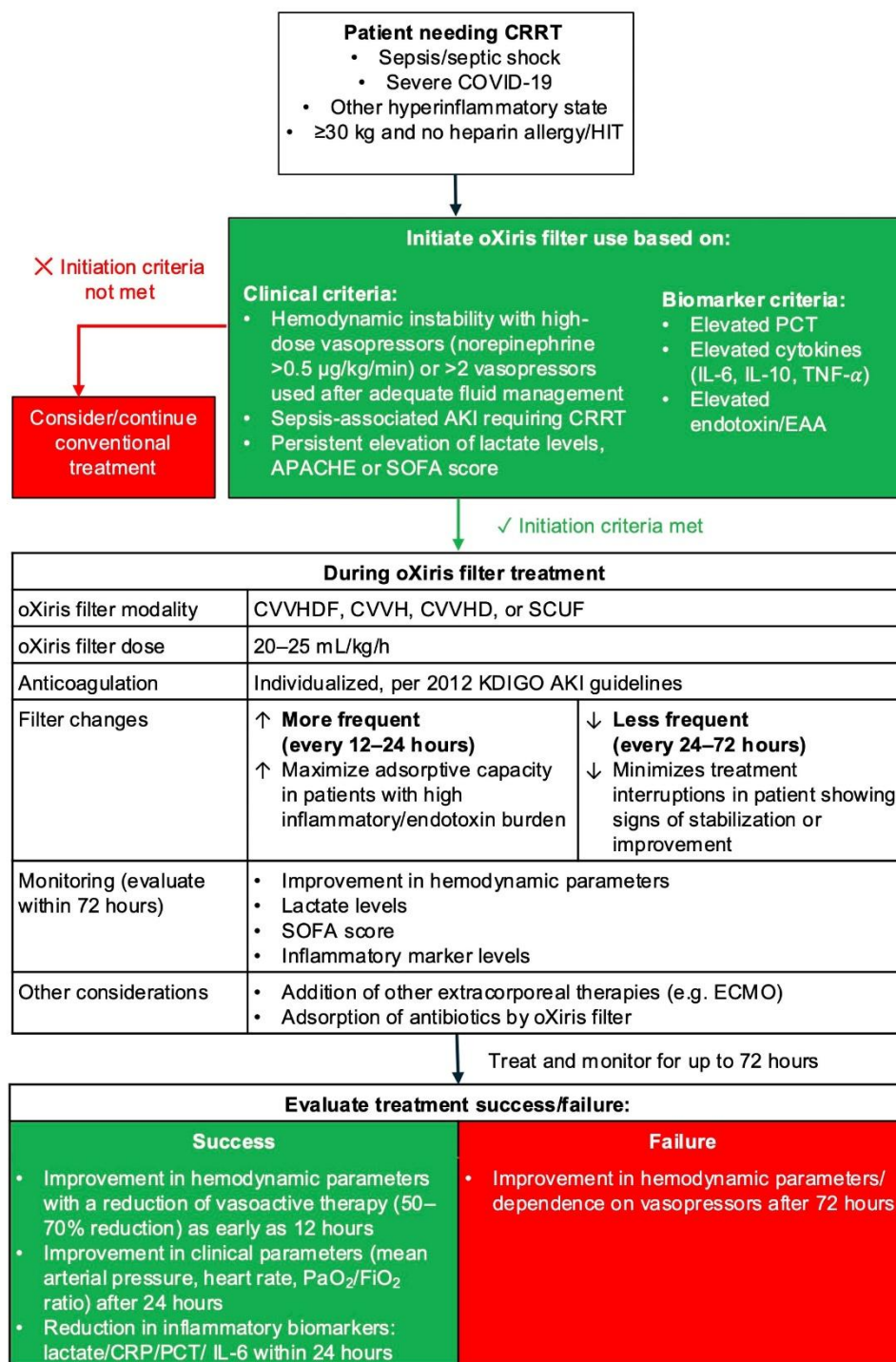
Objectives: The oXiris filter integrates endotoxin and cytokine adsorption with continuous renal replacement therapy (CRRT) and antithrombosis features. It is used in critically ill patients with sepsis or hyperinflammatory states requiring CRRT to modulate the immune response. This expert consensus aimed to provide updated clinical guidance based on current evidence.

Materials and Methods: The Asia-Pacific oXiris Expert Group, comprising intensivists and critical care nephrologists from nine territories, conducted a literature review using a population, intervention, comparator, outcome framework. Relevant studies were summarized to support the development of consensus statements, which were finalized via a modified Delphi process during an in-person meeting in September 2024.

Results: Based on 100 eligible studies, 17 consensus statements were formulated – 3 as formal recommendations and 14 as practice points. These address initiation, monitoring, and evaluation of oXiris treatment in sepsis, septic shock, severe COVID-19, and other hyperinflammatory conditions. A treatment algorithm was also developed from selected statements and practice points (Figure). The group additionally supports oXiris use in cardiac surgery patients undergoing cardiopulmonary bypass at risk of acute kidney injury.

Discussion and Conclusions: These consensus statements serve as a practical guide for oXiris filter use in critically ill patients requiring CRRT. Clinical judgment remains essential, and further randomized trials are needed to strengthen the evidence base.

Keywords: Blood purification, consensus



Combined Blood Purification Therapy Two-Step Approach for Management of Hypertriglyceridemia Induced Acute Severe Necrotizing Pancreatitis

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Abstract:

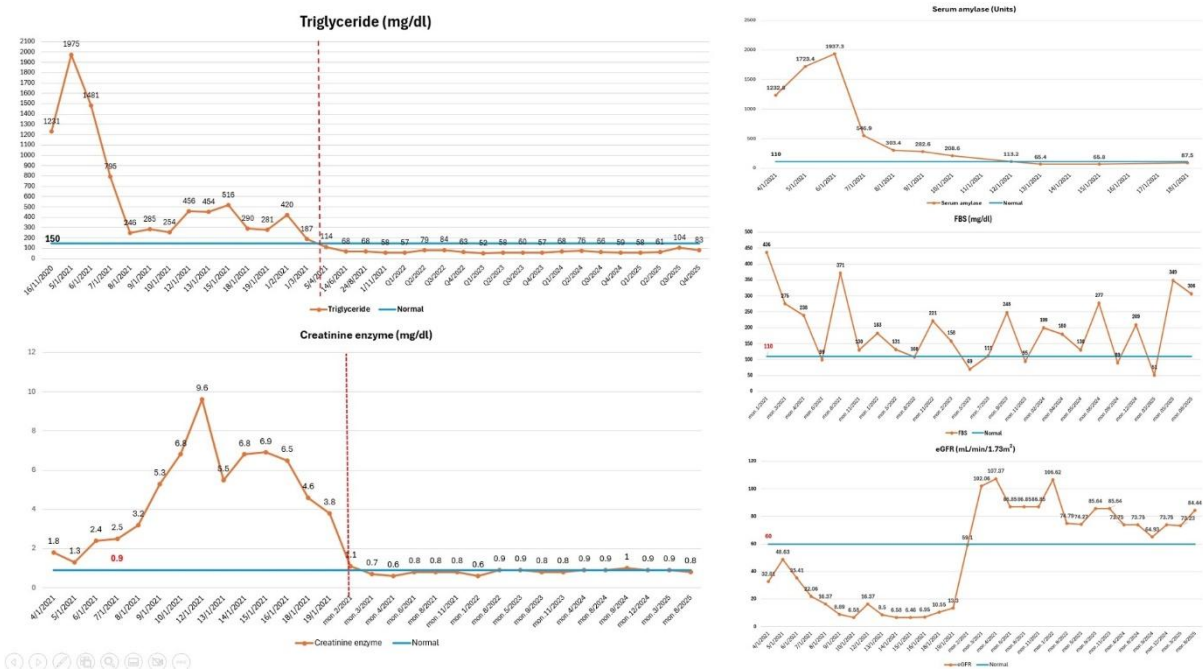
Objectives: Displays early 36-48 hours to initial combined blood purification therapy (CBPT) is a two-step approach for management of hypertriglyceridemia induced acute severe necrotizing pancreatitis (HTG-AP) by coupled plasmapheresis and Sustained Low-Efficacy Dialysis (SLED) with cytokines removal 2 sessions can utilizes appropriate treatment plan to achieve goals directed control systemic renal hemodynamic restoration leading to significant decrease morbidity and mortality in this case.

Materials and Methods: A 48- year old female patient known case Type2 Diabetes with pure hypertriglyceridemia. She was on Humulin 70/30 twice daily SC injection and Gemfibrozil (600) 1 tab po ac BID. She had refer back to district hospital and miscommunication discontinued Gemfibrozil prescription then presented with clinical and laboratory diagnosis acute severe pancreatitis with diabetic ketoacidosis and multiple organ failure and circulatory shock imaging CT severity index (Balthazar score): Grade E(multiple peripancreatic fluid collections) and pancreatic necrosis about 30% = 6 points. Necrotizing pancreatitis, combine type-parenchyma and peripancreatic necrosis, according revised Atlanta classification. Therefore, therapeutic strategies are considered plan urgent early start intervention 36-48 hours of setting to CBPT involved plasmapheresis coupled with SLED mode add on cytokines removal dialyzers used 2 sessions.

Results: Post mediated two- step CBPT in patient with severe HTG-AP (Marshall Criteria > 2, Serum TG > 1000) is treated with plasma exchange initially with goal TGs < 500 followed by SLED mode and cytokines dialyzer used 2 sessions for renal support of acute kidney disease. Acute tubular necrosis (ATN) with intermittent hemodialysis by clinical indications until resolution of symptoms Marshall score < 2 in two weeks recovery. Furthermore, initiate oral Anti-TG agents as soon as patient can tolerate. Then monitor complications Hepato cellular injury CPK and Serum creatinine rosing accordingly.

Discussion and Conclusions: Severe HTG-AP should be treated more aggressively. In this case report CBPT be able to potential role and efficiencies therapeutic methods in early plan of appropriate management with better design are required before any strong recommendation can be made possible mortality benefit. The lowering treatment should be continued until TGs < 500 mg/dl. Fib rates are first-line recommended therapy.

Keywords: Severe necrotizing HTG -AP CBPT potential role treatment



Successful Treatment of Acute Paraquat Poisoning with Continuous Venovenous Hemofiltration and Repeated Hemoadsorption: A Case Report without Long-Term Sequelae

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Abstract:

Objectives: Paraquat (PQ) is a widely used herbicide and a common cause of fatal poisoning, leading to severe respiratory injury, including lung fibrosis, and multiorgan failure. Mortality is high due to rapid tissue distribution, oxidative damage, and redistribution from tissue stores. We report a case of severe PQ poisoning successfully treated with early continuous venovenous hemofiltration (CVVH) and repeated hemoadsorption (HA), alongside anti-inflammatory and anti-oxidative therapy, without long-term lung or kidney sequelae.

Materials and Methods: A 45-year-old woman with major depressive disorder ingested 200 mL of PQ (27.6% weight/volume [w/v] soluble liquid [SL] formulation; 1,1'-dimethyl-4,4'-bipyridinium dichloride), estimated paraquat ion dose 55.2 g, in a suicide attempt. She presented to a local hospital within 30 minutes and received gastric lavage and activated charcoal before transfer. On arrival, she had oral mucosal erosions; kidney and liver function tests and chest radiograph were normal. Urine dithionite test at 3 hours was positive with dark purple-to-black discoloration, indicating significant intoxication and poor prognosis. CVVH was initiated 6 hours post-ingestion at 30 mL/kg/hour, combined with repeated integrated HA (HA-230 column) for 3 days (two sessions day 1, one each on days 2 and 3) to address possible PQ rebound from tissues. Heparin was used for anticoagulation. Adjunctive therapy included cyclophosphamide, N-acetylcysteine, ascorbic acid, vitamin E, and dexamethasone (Figure 1). Psychiatric consultation was performed. Esophagogastrosocopy later showed erosive esophagitis and gastritis.

Results: She developed mild hypoxemia (PaO₂ 50.5 mmHg on room air) and transient acute kidney injury on day 2, both resolving with supportive care. She was discharged on day 10 with normal chest radiography, PaO₂, and serum creatinine (0.78 mg/dL). At 1 month, she remained stable without pulmonary fibrosis or chronic kidney disease.

Discussion and Conclusions: Early CVVH with repeated HA to counter paraquat redistribution, plus anti-inflammatory and anti-oxidative agents, may enhance PQ clearance and reduce oxidative injury, potentially preventing long-term lung and kidney complications. This case underscores the importance of rapid diagnosis, early intensified extracorporeal therapy, and multimodal treatment in PQ poisoning.

Keywords: paraquat, hemoadsorption, extracorporeal treatment

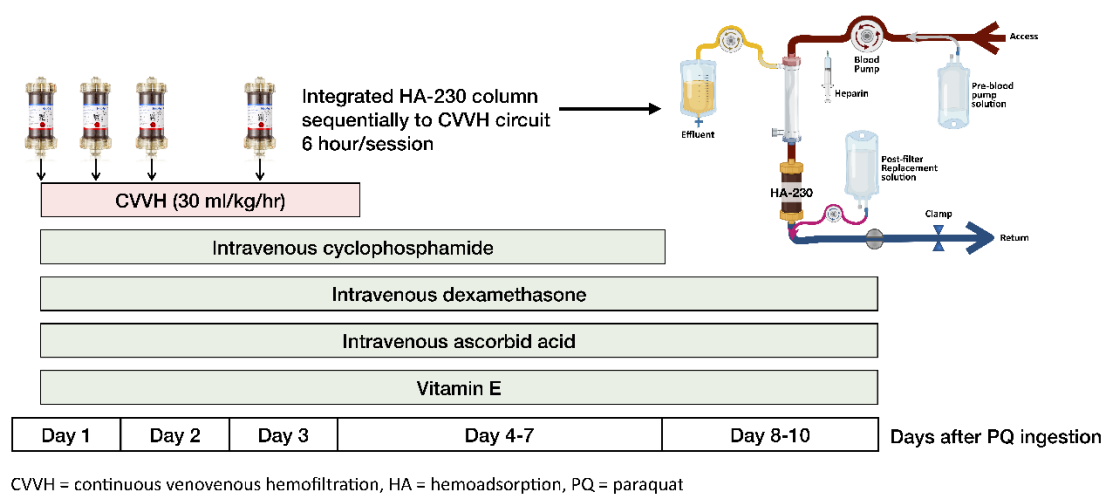


Figure 1. Details of extracorporeal treatment and adjunctive therapies for the management of acute paraquat poisoning in this case

Acute Kidney Injury and Renal Replacement Therapy in China: Current Trends and Practices from a National Clinical Survey

Tong shuang, Wei Yifan, Wang Minmin*

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Abstract:

Objectives: Acute kidney injury (AKI) poses a significant clinical challenge in China. Continuous renal replacement therapy (CRRT) is the primary treatment modality, but its application varies widely. This national study aimed to investigate current CRRT practices among nephrologists and intensive care unit (ICU) physicians across China to identify trends, variations, and areas for improvement.

Materials and Methods: A cross-sectional, web-based survey was conducted between January and April 2025 via the Dingxiangyuan platform. The survey recruited 300 physicians specializing in nephrology or critical care medicine from Level II and III hospitals. Data on demographics, AKI management strategies, and detailed CRRT prescription practices were collected using a 38-item structured questionnaire. Descriptive statistics were employed to analyze practice patterns and discrepancies.

Results: Monthly AKI incidence: 19% in hospitalized, 21% in critically ill. 51% of AKI patients needed RRT; 15% didn't (mostly financial). CRRT (75% of RRT) was used more in ICUs (86%) than nephrology (63%). CRRT triggers: electrolyte imbalance, fluid overload, high creatinine. Prescriptions: femoral vein access, pre-dilution, 20–25 mL/kg/h (both departments). Filter lifespan: 12–24 hours (33%). Key challenge: 85% used manual/semi-manufactured replacement fluids; 1% pre-mixed. Anticoagulants: ICUs preferred citrate; nephrology used low-molecular-weight heparin. Regional differences: Tier I cities had higher AKI incidence, more CRRT use; pre-mixed fluids mostly in Tier I vs. II/III.

Discussion and Conclusions: This survey reveals significant variability in CRRT application across specialties and regions in China. Key areas for improvement include standardizing treatment protocols, optimizing anticoagulation strategies, and promoting the adoption of pre-mixed ready-to-use replacement fluids to enhance safety and efficiency. Policy-level reforms and institutional investment in training and resources are essential to reduce practice disparities and improve clinical outcomes for AKI patients.

Keywords: Acute kidney injury; continuous renal replacement therapy; clinical practice survey; intensive care unit

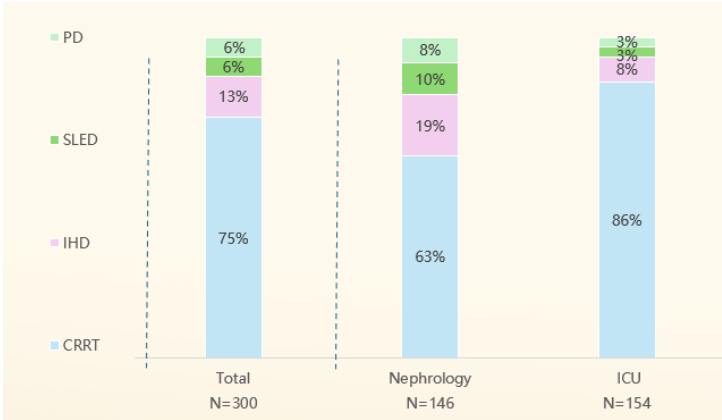


Figure 1. distribution of RRT modalities in Nephrology and Intensive Care Unit (ICU)

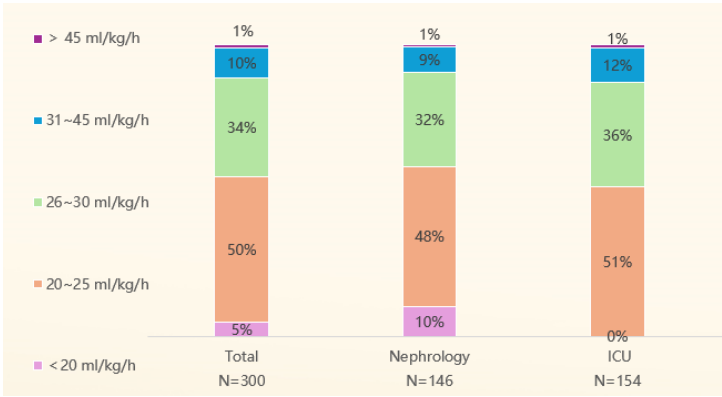


Figure 2. prescription of CRRT doses in Nephrology and Intensive Care Unit (ICU)

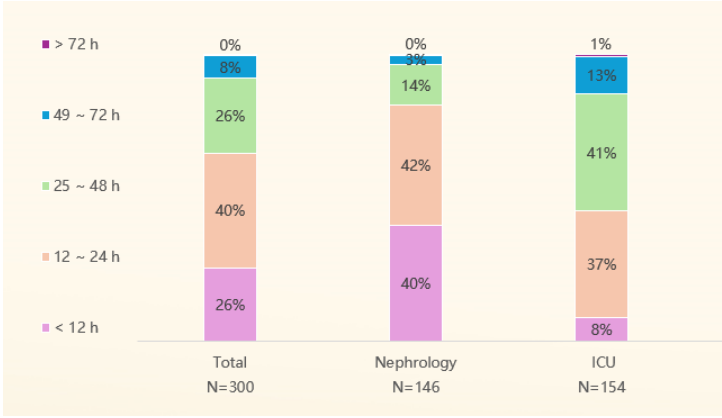


Figure 3. CRRT filter life (hours) in Nephrology and Intensive Care Unit (ICU)

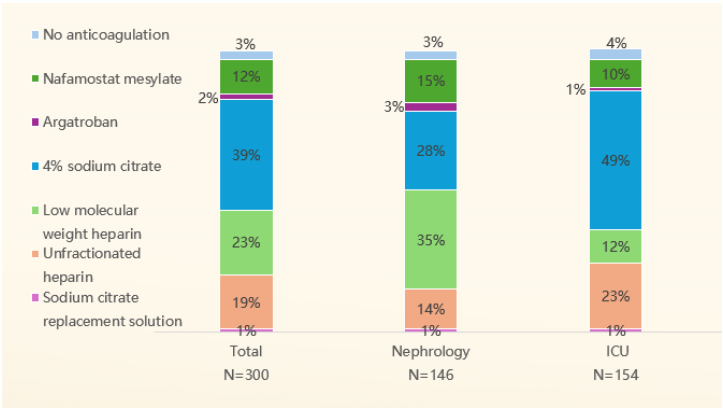


Figure 4. distribution of primary anticoagulation methods in Nephrology and Intensive Care Unit (ICU)

Toluene-Related AKI: Single-Session Dialysis as an Effective Rescue Strategy

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Abstract:

Objectives: To present a case highlighting the potential role of HD in managing severe metabolic complications of toluene intoxication with concurrent acute kidney injury (AKI).

Materials and Methods: Toluene intoxication can lead to renal complications such as acidosis and various electrolyte disturbances. Treatment is usually supportive, and hemodialysis (HD) is not routinely indicated due to poor dialyzability of toluene and its metabolite, hippuric acid.

While there is no specific antidote for toluene toxicity, toluene is metabolized to hippuric acid, which is mainly excreted by the kidneys. Restoring renal function can enhance toxin clearance. In this case, HD was used not for toxin removal, but as supportive therapy to correct metabolic acidosis and promote renal recovery.

Results: A 45-year-old male presented with acute dyspnea after prolonged exposure to paint fumes in a poorly ventilated space. On arrival, he was agitated, but alert and oriented. Vital signs were stable, with a respiratory rate of 28/min and SpO₂ of 98%. Physical examination revealed Kussmaul respirations, clear lung fields, and no focal neurological deficits.

Initial laboratory investigations (Table 1) demonstrated AKI and a mixed high- and normal-anion gap metabolic acidosis. Serum ketones and lactate were within normal limits. Based on clinical history and laboratory findings, hippurate toxicity and a distal acidification defect mimicking RTA were suspected. Urinalysis showed an elevated urine osmolal gap, consistent with the presence of unmeasured urinary solutes. Supportive care was initiated.



Despite improvement in renal markers (serum creatinine declined from 1.48 to 1.1 mg/dL and urine output reached 0.7 mL/kg/h), the patient had persistent symptoms and refractory acidosis (Table 2). Consequently, HD was initiated approximately 12 hours after presentation. A single 4-hour HD session without ultrafiltration resulted in marked clinical and biochemical improvement. Urine output increased to 0.9 mL/kg/h, and urine analysis later confirmed the presence of hippuric acid. No further dialysis was needed, and the patient was discharged on hospital day 5 with complete symptom resolution.

Discussion and Conclusions: Although not routinely used for toluene removal, HD can be considered a supportive intervention in cases of toluene-induced AKI with refractory metabolic acidosis. It may help restore renal function and facilitate toxin excretion. Further studies and case series are needed to clarify its therapeutic role.

Keywords: Toluene, Hippuric acid, Acute kidney injury (AKI), Hemodialysis (HD), metabolic acidosis

Serum parameter	Results	Reference Range
BUN	26	6 - 20 mg/dL
Creatinine	1.48	0.51-0.95 mg/dL
Sodium	135	135 - 145 mmol/L
Potassium	4.2	3.5 - 5.1 mmol/L
Chloride	108	98-107 mmol/L
Bicarbonate	4	22-29 mmol/L
Albumin	4.6	3.5-5.5 g/dL
Calcium	9.3	8.4-10.2 mg/dL
Phosphorus	4.4	2.5 - 4.5 mg/dL
Serum osmolarity	311	275-295 mOsm/kg
Ketone	0.9	0-0.6 mmol/L
Lactate	0.8	0.5-2.2 mmol/L
Blood glucose	116	70-110 mg/dL
Serum Osmolal gap	17.5	mOsm/kg
Serum methanol	9.9	mg/dL (toxic level > 20 mg/dL)
VBG		
pH	7.07	
CO ₂	13	32-46 mmHg
HCO ₃ ⁻	3.8	mmol/L

Urine parameter	Results	Reference Range
Specific gravity	1.030	1.003-1.030
pH	5.5	5-8
Protein	1+	Negative
Blood	3+	Negative
WBC	3-5	0-5/HPF
RBC	50-100	0-2/HPF
Squamous epi.	0-1	0-10/HPF
Spot urine sodium	91	mmol/L
Spot urine K	97.8	mmol/L
Spot urine chloride	88	mmol/L
Urine Osmolarity	880	mOsm/kg
Spot urine urea	834	mg/dL
Spot urine glucose	<2	mg/dL
Spot urine calcium	20	mg/dL
Spot urine P	139.6	mg/dL
Urine hippurate	13.07	0-1.6 g/g creatinine
Urine Osmolol gap	204.5	mOsm/kg

Table 1. Laboratory data on admission

	BUN	Cr	Na	K	Cl	HCO3	AG	pH	PaCO ₂	Lactate	Ketone	
ER	26	1.48	135	4.2	108	4	23	7.07	13	0.8	0.9	UAG 100.8 Uosm gap 204.5
4 hr			134	4.5	110	6	18	7.04	21			
12 hr	20	1.10	133	4.2	110	7	16	7.07	23			Hemodialysis
After HD			138	2.7	105	20	13	7.26	34			
Day 2	15	0.86	139	3.4	109	20	10	7.25	39			
Day3	18	0.84	142	3.0	106	26	10					
Day4	19	0.77	144	2.9	107	26	11					
Day5	16	0.66	142	3.3	103	30	9					

Table 2. Laboratory data on admission

Acute Kidney Injury in Extracorporeal Membrane Oxygenation (ECMO) Patients: A Single-Center Retrospective Study

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Abstract:

Objectives: Extracorporeal membrane oxygenation (ECMO) provides life-saving support for patients with severe cardiac and/or respiratory failure. Acute kidney injury (AKI) is a common complication in this population and often necessitates continuous kidney replacement therapy (CKRT). This study aims to determine the incidence of AKI and its associated clinical outcomes in patients receiving ECMO therapy at Hospital Sultan Idris Shah, Serdang.

Materials and Methods: We conducted a retrospective study of all patients treated with ECMO between January 2019 and December 2024. Demographic, clinical, and laboratory data were extracted from medical records. AKI was defined using Kidney Disease: Improving Global Outcomes (KDIGO) 2012 criteria.

Results: Twenty patients received ECMO during the study period, with 19 on veno-arterial (VA) ECMO and 1 on veno-venous (VV) ECMO. The mean age was 34.4 ± 14.9 years. Of the patents, 70% were male, 65% Malay, and 90% non-diabetic. Most patients (85%) underwent open cardiac surgery for coronary artery disease, aortic dissection, structural heart disease, or pulmonary embolism, of which 58.8% were emergency procedures. The mean Sequential Organ Failure Assessment (SOFA) score was 14.55 ± 2.28 , and ECMO duration ranged from 2–20 days (mean 8.7 ± 5.5). AKI occurred in 85% of patients, with 58.8% developing it after ECMO initiation. Baseline serum creatinine was 105.0 ± 31.9 $\mu\text{mol/L}$, increasing to 288.9 ± 103.9 $\mu\text{mol/L}$ at CKRT initiation. All AKI patients required CKRT, with 64.7% starting within 24 hours of ECMO commencement. In-hospital mortality was 90.0% overall (94.1% in AKI vs. 66.7% in non-AKI). The sole AKI survivor achieved full kidney recovery. The SOFA scores were significantly higher in AKI patients (mean difference 3.0, 95% CI 0.30–5.70, $p = 0.032$).

Discussion and Conclusions: AKI is highly prevalent among ECMO patients in our center, often requiring early CKRT. It is associated with very high mortality, reflecting the severity of illness and ECMO's role as salvage therapy. Higher SOFA scores are linked with AKI development. No mortality predictors were identified due to the small sample size. Larger multicenter studies are needed to refine risk stratification and improve outcomes in this critically ill population.

Keywords: ECMO, AKI, CKRT

Extracorporeal Blood Purification in Heatstroke

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Abstract:

Objectives: To describe extracorporeal support in patients with heatstroke.

Materials and Methods: We obtained data of a case with heatstroke treated with CVVHDF and hemoadsorption for cytokines removal.

Results: Heatstroke caused by body overheating due to strenuous physical activity in a hot environment, which produces systemic inflammation damaging multiple organs. A Thai 25-year-old male presented with a history of fever and loss of consciousness while training in a military program. His core temperature reached 41 degrees Celsius with a Glasgow Coma Scale of 6/15. The patient was intubated at the scene and received multiple cooling procedures. His blood pressure dropped despite aggressive volume resuscitation and the vasopressor had to be added, norepinephrine dosage of 0.15 mcg per kilograms per minute was required. His laboratory revealed severe rhabdomyolysis and acute kidney injury AKIN stage 3. Creatinine kinase level peaked at 77,006 U/L with multiple electrolyte abnormalities. After that he needed support with Continuous Veno-Venous Hemodiafiltration (CVVHDF) starting from day 2 of admission. The HA330, a hemoperfusion adsorbent, was added for 6 hours per day during day 2-6 of admission. Vasopressor was tapered off after 72 hours but the CRRT continued for 15 days due to hyperkalemia and volume adjustment. The patient then switched to intermittent hemodialysis and weaned off from dialysis support on day 26 of admission. His renal function was fully recovered and his creatinine level had reached its baseline at day 34 of admission. He was extubated on day 37 of admission and was discharged from hospital on day 79 after receiving rehabilitation.

Discussion and Conclusions: The pathophysiology of heatstroke relies on failure of thermoregulatory response. Hyperthermia triggers a stress response involving the release of pro-inflammatory cytokines, leading to excessive activation of leukocytes and endothelial cells. The heatstroke also reduces intestinal blood flow resulting in the damage of cell membrane, allowing endotoxins and pathogens leaking into systemic circulation. The standard treatment consists of effective cooling methods and supportive of internal organ injury. As mentioned, the process of heat stroke involves cytokines and endotoxin, causing rhabdomyolysis and acute kidney injury requiring dialysis. Therefore Hemodiafiltration and hemoadsorption may effectively improve the clinical outcome in heatstroke patients.

Keywords: Heatstroke, CRRT, CVVHDF, Hemoadsorption, Adsorption, HA330

	22/4/68	23/4/68	24/4/68	25/4/68	26/4/68	27/4/68	28/4/68
BUN	49	33	30	26	32	35	65
Cr	4.01	3.79	3.83	3.79	4.29	4.27	6.51
Na	142	139	141	138	136	133	130
K	3.4	4.0	4.1	4.6	4.5	4.0	5.1
CO2	13	20	22	23	24	23	21
CPK	70728	77006	30930	18674	9518	15857	13114
CRP	2.8	14	13.7	15.6	37.2	32.9	-
Lactate	5.1	2.0	2.2	1.2	1.3	1.4	1.1
Ca/P	7.2/1.5	8.5/3.3	8.3/3.2	9.0/3.7	8.6/2.9	8.6/2.8	8.0/5.2
alb	3.1	2.8	2.6	3.1	2.8	3.0	3.2
Ph/PCO2	7.33/30	7.42/32	7.49/22	7.29/49	7.40/38	7.43/35	7.29/44

CRRT HA 330 22,23,24,25,26/4/68
CRRT 22-6/5/68 then IHD 7/5, 15/5, 16/5/68 then off HD

Seronegative Immune-Mediated Necrotizing Myopathy with Rhabdomyolysis-Induced Acute Kidney Injury: The Role of Medium Cut-Off Membrane Dialysis

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Abstract:

Objectives: We highlight the key contributing factors and the role of medium cut-off (MCO) membrane hemodialysis treatment in seronegative immune-mediated necrotizing myopathy (IMNM) with severe rhabdomyolysis and oliguric acute kidney injury (AKI).

Materials and Methods: A 79-year-old woman with a history of hypertension and type 2 diabetes mellitus with diabetic kidney disease (DKD) presented with 5 days of acutely progressive painful bilateral proximal limb weakness and oliguria. Vital signs: BP 120/65 mmHg, HR 85 bpm, RR 22, Temp 37°C. Neurological findings showed drowsiness and proximal muscle weakness, graded as MRC scale 2. There were no rashes or joint inflammation.

Initial laboratory results revealed a creatine kinase (CK) level of 30,169 IU/L, serum Cr 7.96 mg/dL, and BUN 124 mg/dL (Table 1). Myositis-specific antibodies, including anti-SRP and anti-HMG-CoA reductase, were negative. An electromyography (EMG) indicated diffuse and active irritable myopathy. Muscle biopsy showed multiple pale necrotic fibers with lymphocytic and macrophage infiltration, along with diffuse p62 positivity.

The diagnosis was seronegative IMNM, with rhabdomyolysis-induced AKI.

Acute intermittent hemodialysis (IHD) was initiated due to uremia and specific treatment with intravenous methylprednisolone (IVMP) and immunoglobulin (IVIG) for five consecutive days. After complete treatment with intravenous methylprednisolone for 5 days and the 3rd day of IVIG treatment, CK levels were still rising, and no renal recovery. We applied a medium cut-off dialyzer (Theranova Ò) for myoglobin removal in a total of 6 hemodialysis sessions.

Results: Patient muscle weakness gradually improved, and CK levels dramatically reduced within two weeks (Table 1). Additionally, there was an increase in urine output, renal function was recovered, and hemodialysis was discontinued within three months of follow-up.

Discussion and Conclusions: Immune-mediated necrotizing myopathy (IMNM) is a rare, severe form of inflammatory myopathy characterized by prominent myofiber necrosis, progressive proximal muscle weakness, and markedly elevated creatine kinase (CK) levels. Rhabdomyolysis is one of the most important complications of the disease. Extracorporeal removal of myoglobin was not routine treatment in rhabdomyolysis-induced AKI. However, our case highlights the effective treatment with the MCO membrane for myoglobin removal and complete renal recovery.

Keywords: Rhabdomyolysis, Immune-mediated Necrotizing Myopathy, Acute Kidney Injury, Medium Cut-off Membrane Hemodialysis

Date of admission	Day 1	Day 3	Day 5	Day 9	Day 11	Day 16	After discharge 12 weeks
BP (mmHg)	120/65	111/60	137/58	131/64	148/73	147/65	106/61
Urine I/O (ml)	1,050/75	1,050/134	250/35	900/134	750/210	878/160	1,000/1,000
BUN (mg/dL)	124	134	92	92	74	73	31
Creatinine (mg/dL) Cr at baseline 1.78	7.96	9.41	7.08	3.98	2.71	3.27	1.24
CK level (IU/L)	30,169	27,014	24,940	32,062	41,202	912	16
Motor power at MRC grading	Proximal gr II Distal gr IV	Proximal gr II Distal gr IV	Proximal gr II Distal gr IV	Proximal gr II Distal gr IV	Proximal gr II Distal gr IV	Proximal gr II Distal gr IV	Proximal gr IV Distal gr IV
Management	Crystalloids resuscitation	Initiate hemodialysis	Start IVMP1 g for 5 days	Complete IVMP for 5 days	Start IVIG 2 g/kg/5 days	Start oral prednisolone 30 mg/day	Continue mycophenolate 1 g/day and prednisolone 10 mg/day
Dialyzer type	ELISIO 15L			Theranova ®			

BP = Blood pressure, BUN = blood urea nitrogen, CK = Creatine kinase (CK), Urine I/O = urine input and output
 IVMP = Intravenous methylprednisolone, IVIG = Intravenous Immunoglobulin

Table 1. Clinical Characteristics and Laboratory Investigation

Effect of Continuous Renal Replacement Therapy (CRRT) on Sepsis Induced Acute Kidney Injury (S-AKI) in Intensive Care Unit (ICU) Patients at Rumah Sakit Umum Pusat Haji Adam Malik Medan

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Abstract:

Objectives: Sepsis AKI is associated with a higher risk of death and in-hospital mortality. This study aimed to prove that Continuous Renal Replacement Therapy (CRRT) is the right choice in Sepsis AKI patients with hemodynamic instability, fluid overload.

Materials and Methods: This study used a descriptive method from 2020 to 2022 which was taken from the medical records of Rumah Sakit Umum Pusat Haji Adam Malik Medan. This study used a total sampling technique to recruit Sepsis AKI patients who were given CRRT according to inclusion and exclusion. This descriptive analysis was used to determine the characteristics of the sample, namely age, sex, urea change value, creatinine change value, NLR value, length of stay and mortality.

Results: There were 28 research samples consisting of 17 (60.7%) men and 11 (39.3%), urea levels before CRRT 173.21 ± 66.47 and after CRRT 117.28 ± 50.51 with a value $p = 0.00$. Creatinine levels before CRRT and after CRRT obtained creatinine levels before CRRT 6.21 ± 4.73 and after CRRT 3.2 ± 2.11 with an p value of 0.00 . The average NLR value before the CRRT was 34.93 ± 30.49 and after the CRRT was 33.22 ± 14.74 with an p value of 0.754 .

Discussion and Conclusions: There is an effect of CRRT on Sepsis AKI patients where there is a decrease in creatinine and urea levels which were carried out in the RSUP Haji Adam Malik.

Keywords: CRRT, Sepsis AKI, Urea, Creatinine, NLR

Impact of Early vs. Late Initiation of Continuous Renal Replacement Therapy on Composite Outcomes Including AKD and Mortality: A Multicenter retrospective Cohort Study (LINKA cohort)

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Abstract:

Objectives: The optimal timing for initiation of continuous renal replacement therapy (CRRT) in patients with acute kidney injury (AKI) remains controversial, especially when assessing long-term kidney outcomes and mortality. This study aims to evaluate the impact of early versus late CRRT initiation on composite outcomes of acute kidney disease (AKD) or death.

Materials and Methods: This retrospective multicenter cohort study included 852 patients with baseline creatinine ≤ 4 mg/dL who received CRRT across eight tertiary hospitals. Early initiation was defined as CRRT initiation before reaching KDIGO stage 3 or severe oliguria (urine output < 0.3 mL/kg/hr over 24 hours). Patients were categorized into early and late initiation groups. Propensity score matching (1:1 nearest-neighbor without caliper) was conducted using demographic, clinical, and laboratory covariates. The primary outcome was a composite of AKD (defined as serum creatinine increase $\geq 50\%$ from baseline at 3 months) or death before 3-month follow-up. Multivariable logistic regression analysis was performed to adjust for residual confounding. Stratified analyses were also conducted according to baseline creatinine level (low vs. high, based on median value).

Results: After matching, 746 patients (373 early, 373 late) were included. The incidence of the composite outcome was significantly lower in the early CRRT group (OR 0.40, 95% CI 0.28–0.57; $p < 0.001$). In stratified analysis, the protective effect of early CRRT remained significant in the low baseline creatinine subgroup (OR 0.46, 95% CI 0.29–0.72), as well as in the high creatinine group (OR 0.38, 95% CI 0.21–0.68). Interaction analysis demonstrated a significant interaction between early CRRT and baseline creatinine levels (p for interaction = 0.044), suggesting enhanced benefit in patients with lower baseline kidney function. Otherwise, early CRRT was not significantly associated with reduced 90-day mortality alone (adjusted OR 0.69, $p = 0.27$).

Discussion and Conclusions: Early initiation of CRRT was associated with a significantly reduced risk of composite adverse outcomes including AKD and mortality. The benefit was more pronounced among patients with lower baseline serum creatinine, highlighting the importance of individualized timing strategies in CRRT initiation.

Keywords: Acute kidney injury, Continuous renal replacement therapy, Acute kidney disease, Renal recovery, Baseline creatinine, Timing of dialysis

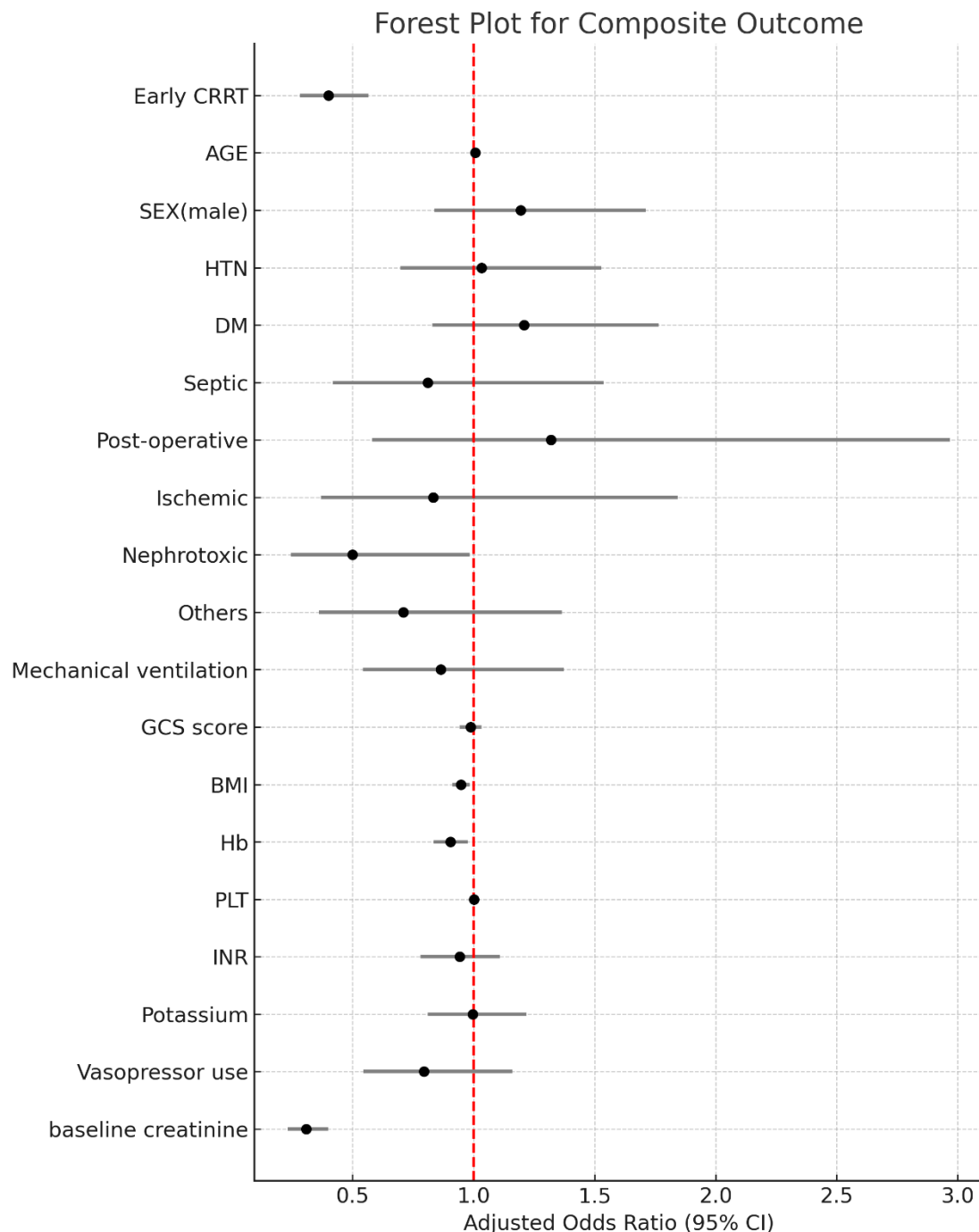


Figure 1. Forest plot showing adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for predictors of the composite outcome (AKD or death within 90 days) in the multivariable logistic regression model.

Variable	Early initiation(n=373)	Late initiation(n=373)
Age	63.06 ± 15.60	62.46 ± 16.08
SEX (Male)	218 (58.4%)	213 (57.1%)
BMI	24.12 ± 4.34	23.83 ± 4.87
DM	170 (45.6%)	164 (44.0%)
HTN	212 (56.8%)	206 (55.2%)
Baseline creatinine(mg/dL)	1.43 ± 0.87	1.35 ± 1.02
AKI etiology		
Septic	89 (23.9%)	111 (29.8%)
Post operative	105 (28.2%)	96 (25.7%)
Ischemic	32 (8.6%)	35 (9.4%)
Nephrotoxic	53 (14.2%)	49 (13.1%)
Others	118 (31.6%)	118 (31.6%)
Clinical condition		
GCS score	9.19 ± 5.01	9.73 ± 4.82
Mechanical ventilation	223 (59.8%)	206 (55.2%)
Vasoactive support	234 (62.7%)	207 (55.5%)
Hb(g/dL)	10.15 ± 2.50	9.91 ± 2.46
Platelet(*10 ³ /uL)	138.66 ± 98.79	135.21 ± 94.41
PT, INR	1.69 ± 1.18	1.64 ± 1.10
Serum potassium(mmol/L)	4.33 ± 1.04	4.45 ± 0.85
Death within 3 months	18(4.8%)	25(6.7%)

Figure 2. This table presents the clinical and demographic characteristics of patients in the early and late CRRT initiation groups after 1:1 propensity score matching (n = 746).

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