Determining Gaps in Care of Acute Kidney Injury (AKI) Survivors

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Welcome

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Disclosures

Employer: Mayo Clinic
Research Funding: NIAID, AHRQ
Honoraria: Vifor Pharma, FAST Biomedical, Wolters-Kluwer
AKINow Recovery Workgroup

Chair: Jorge Cerdá
Steering Committee: Kathleen Liu
Workgroup Chairs: Anitha Vijayan and Erin Barreto
Patient Advocate: Sandy Fahrenkopf
Members: Emaad M. Abdel-Rahman, Leslie Gewin, Samuel Silver, Javier Neyra, and Jia Ng
Agenda

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Erin Barreto, PharmD, MS, FASN

Introductory Remarks
Emaad Abdel-Rahman, MD, PhD, FASN

Patient Testimony
Sandy Fahrenkopf

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Edward D. Siew, MD, MSCI

Breakout Sessions
Erin Barreto, PharmD, MS, FASN

Breakout Session Reports / Panel Discussion
Leslie Gewin, MD

Next Steps: A Call to Action
Leslie Gewin, MD
Housekeeping

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Content may be utilized for upcoming publications or presentations, and/or posted to the ASN website.
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Opening Remarks

EMAAD ABDEL-RAHMAN, MD, PHD, FASN
Disclosures

**Employer:** University of Virginia

**Research Funding:** Covance
AKI is Common

- AKI is common, affecting up to
  - 1% of the general population
  - 8-20% of hospitalized patients
  - complicates 30–50% of critical care admissions
- AKI is associated with short-term risks as well as adverse long-term consequences.
- AKI-D occurs in approximately 1%–2% of hospitalized patients and in 6%–7% of critically ill patients and is on the rise (10% per year).
- 10 - 32% of AKI-D patients will require dialysis at the time of hospital discharge.

AKI in Hospitals is on the Rise

AKI is Associated with Multiple Complications

In-Hospital:
- Mortality, volume overload, Electrolyte abnormalities, acid base imbalance, infections, COST.

Post discharge (Short and Long-Term):
I. Worsening Kidney Function: CKD, Proteinuria, ESKD
II. Increased Mortality
III. MACE: CHF, CAD, CVA
IV. Non Cardiac, Non Renal: catheter-related infection (AKI-D), worse QOL, COST.
Care of AKI Patients

On discharge:
- Med review/ Education
- Stratifying patients/
  Outpatient F/U arrangement.

F/U post discharge:
- When/ Who/ Where/
  What/ For how long

Communication and Patient Continued Care

Medication re-start:
- When and who to start
  RAAS blockers/ SGLT2 i/
  Drugs that are cleared by
  the kidney
Patient Testimony

SANDY FAHRENKOPF
Disclosures

**Employment:** Jeweler in the Albany, NY, area, of 37 years.
No other disclosures reported.
Polling question
Post-AKI Care, and Setting the Stage for Addressing Gaps in Care

EDWARD D. SIEW, MD, MSCI
Post-AKI Care, and Setting the Stage for Addressing Gaps in Care

AKI!Now Focus Group

Eddie Siew, MD, MSCI
Associate Professor of Medicine
Division of Nephrology and Hypertension
Vanderbilt Integrated Program for AKI Research (VIP-AKI)
Vanderbilt Center for Kidney Disease
Tennessee Valley VA Healthcare System, Nashville VA
Disclosures

• **Royalties:** Author for UptoDate
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A prospective cohort study of acute kidney injury and kidney outcomes, cardiovascular events, and death

**CONCLUSION:**
AKI increases risks of kidney complications, heart failure and death. Assessing kidney function and proteinuria 3 months after AKI provides important prognostic information for long-term outcomes.
Potential Intermediate Targets

- AKI Hospitalization
- Discharge
- Months

3  6  9  12

- CKD
- CVD
- Death
- Poor HrQoL

???
KDIGO Clinical Practice Recommendations for AKI

• 2.3.4: Evaluate patients 3 months after AKI for resolution, new onset, or worsening of pre-existing CKD. (Not Graded)

• If patients have CKD, manage these patients as detailed in the KDOQI CKD Guideline (Guidelines 7–15). (Not Graded)

• If patients do not have CKD, consider them to be at increased risk for CKD and care for them as detailed in the KDOQI CKD Guideline 3 for patients at increased risk for CKD. (Not Graded)
# AKI Survivors vs Stable CKD: Apples and ... Pears?

<table>
<thead>
<tr>
<th></th>
<th>Recent Hospitalized AKI</th>
<th>Stable CKD</th>
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<tbody>
<tr>
<td>Other Advanced Conditions</td>
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<tr>
<td>Acute Organ Dysfunction</td>
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<td>Inadequate Solute/Fluid Intake</td>
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<td>Risk for ADE/Omissions</td>
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<td>Potential for Recovery</td>
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<tr>
<td>Risk of Re-hospitalizations/</td>
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<tr>
<td>Recurrent AKI</td>
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<tr>
<td>Poor Quality of Life</td>
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<tr>
<td>Risk of Future Mortality</td>
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Implications of Experimental Data

• Functional consequences of AKI extend beyond serum creatinine

• Impaired sodium handling:
  - Worsen blood pressure
  - Volume expansion/retention

• Less renal reserve
  - Hyperfiltration/proteinuria

• Impaired vascular autoregulation
  - Future AKI risk
HYPERTENSION MAY BE A POTENTIAL MEDIATOR OF CV AND KIDNEY OUTCOMES FOLLOWING AKI (N=2451 +AKI/41,160 -AKI)

Adjusted OR for HTN:

1.40 (1.28-1.54)
1.36 (1.25-1.49)
1.27 (1.17-1.39)
1.22 (1.12-1.33)

Adjusted for age at index hospitalization, sex, race, body mass index, last ambulatory systolic and diastolic BP measurements, smoking status, diabetes mellitus, chronic heart failure, coronary heart disease, last ambulatory eGFR, and proteinuria.
**AKI is associated with worsening in proteinuria**

**Cohort**
- 1592 ASSESS-AKI patients
- 456 CRIC KPNC patients
- 4 years of median follow-up (IQR: 2 – 6 years)

**Outcomes: Percent change in proteinuria**
- REF
- +9%

**CONCLUSION:** An episode of hospitalized AKI is associated with a 9% increase in urine PCR.

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Chi-yuan Hsu et al. JASN 2019;30:1271-1281
aHR 1.53 (1.45-1.62) per doubling of ACR
C-Statistic 0.82 (0.70 for non-AKI)
AKI Survivors are at High Risk For Hospitalization and Death (N=11,683)

49% Rehospitalized at least once
23% Died
25% With at least one episode of recurrent AKI
% Survivors Referred at 1 Yr:
19% eGFR<60 ml/min/1.73 m²
31% eGFR<45 ml/min/1.73 m²

N=3929

Exclusions:
Dialysis at discharge
Prior Nephrologist

44% Recovered/Improved
11.5% Died
8.5% Referred
36% None

Siew ED, Ikizler TA, Matheny et al. JASN 2012;23:305-312
Probability of Serum Creatinine and Proteinuria Testing After AKI

Other Modifiable Risk Factors to Prevent Recurrent AKI

- Nephrotoxins
- Poor Solute Intake?
- Diuresis?
- Aggressive Blood Pressure Control?
- RAAS Inhibition?

Abeulo NEJM 2007; 357:797-805
1 in 5 AKI Survivors Regularly Use NSAIDs in the Southern Community Cohort Study (N=826)

Lipworth, L et al. BMC Nephrology 2016, 17(1):189
Reno- and Cardioprotective Meds Are Often Discontinued During AKI

Boulos et al. ESC Heart Failure 2019; 6(1):45-52
To RAAS or not to RAAS?

Patient Selection
US veterans who survived KDIGO stage II-III AKI 2002-2014 N=96,983

RAASi Exposure at Discharge
- 45% Prevalent RAASi Continued
- 37% Prevalent RAASi Discontinued
- 4% RAASi Nonusers Started
- 14% RAASi Nonusers Not Started

Weighted HR (95% CI)*
- Recurrent AKI
- Prevalent RAASi Discontinued
- RAASi Nonusers Started
- RAASi Nonusers Not Started
- Mortality
- Prevalent RAASi Discontinued
- RAASi Nonusers Started
- RAASi Nonusers Not Started

*HR reference group is Prevalent RAASi Continued

CONCLUSION:
Reinitiating or starting RAASi among patients after AKI with strong indications is warranted with careful consideration of risks and adequate monitoring.
Awareness of AKI and its Risk Factors is Low Among AKI Survivors – an opportunity for education? (20% Aware of AKI Status)
Adverse Drug Events in Older U.S. Adults, 2007–2009

Risk of Hypoglycemia Among AKI Survivors
N=65,206 AKI, N=65,206 w/o AKI

adjusted HR 1.26, 95% CI: 1.21-1.32

Health Utilities Index Scores are Low Among 60-day Survivors of the ATN Study (N=414)

Mean Age 58±15
Mean Score 0.4±0.37
Mean Population Score for Aged 75-89 = 0.75
Mean Score for Incident (3 mo) dialysis = 0.73
Conceptual Scheme of Potential Post-AKI Interventions and Targets

**Potential Interventions**
- Improve assessment and interval change in renal/cardiovascular risk
- Strategic initiation/re-initiation of reno-/cardioprotective medication
- Detect and reduce recurrent AKI risk
- Nephrotoxin avoidance/medication reconciliation
- ? Antifibrotic therapy
- Improve follow-up, coordination of care (e.g. patient navigators) and dissemination of care/knowledge (e.g. telehealth, digital mobile apps, point of care self-monitoring)
- Physical/Psychological Rehabilitation
- Symptom Management

**Intermediate Clinical Outcomes**
- Worsening Proteinuria
- Hypertension
- Volume Overload
- Recurrent AKI
- Rehospitalizations
- Adverse Drug Events

**Long-Term Clinical Outcomes**
- Incident/Progressive CKD
- Cardiovascular Events (e.g. Heart Failure)
- Death

**Patient-Centered Outcomes**
- Symptom Burden (fatigue, weakness, swelling, anorexia)
- Psychological Burden (anxiety, depression, isolation)
- Health-related Quality of Life
- Frailty

Summary

• The association between AKI and some long-term outcomes (CKD, CVD) are biologically plausible

• AKI Survivors experience fragmented care with little nephrology-based input

• Plausible intermediate targets that confer increased risk (worsening of BP/proteinuria/recurrent AKI) for long-term outcomes may not be recognized in a timely fashion or treated optimally after AKI
Summary

• There are also other clinical outcomes (e.g. recurrent hospitalizations, adverse drug events, transition to ESRD care) that patients with AKI are at higher risk for than non-AKI patients

• Several patient centered outcomes (HrQOL, frailty, symptom burden) are overlooked but critically important to patients.

• Further studies to determine the optimal strategies to reduce these risks are needed and ongoing.
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- Vanderbilt O’Brien Kidney Center P30-DK114809
Breakout Sessions

ERIN BARRETO, PharmD, MS, FASN
Polling questions
Breakout Session Moderators

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Scientific Advisor or Membership: International Society Nephrology AKI Committee and CoChair, 0by25 Initiative; American Society of Nephrology: Chair, AKI!Now Initiative; International Society of Nephrology Co-Chair, Advisory Committee
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Employer: Queen’s University
Honoraria: Sanofi, Baxter
Scientific Advisor or Membership: Editorial Board Canadian Journal of Kidney Health and Disease
Discussion topics

1. Early discharge planning: transition from hospital to outpatient care
2. Interventions to impact post-AKI care (medications, education, comorbidity)
3. Challenges and opportunities in the care of AKI survivors
4. Continuing care once patient is more stable
Discussion strategies

• Each breakout group will be assigned a primary question.
• Consensus is not necessary.
• Please make specific recommendations.
• Leaders will report group conclusions and recommendations to the full group following the breakout sessions.
Zoom logistics

When the breakout sessions begin, participants will see this prompt:

Please share your webcam and unmute your line as soon as you enter the breakout room.

When the breakout sessions are concluding, participants will see this prompt, and will then be returned to the main room:
Breakout Session Reports

Moderator: LESLIE GEWIN, MD
Employer: Washington University in St. Louis
Consultancy Agreements: Surrozen
Research Funding: Morphic, NIH, VA
Next Steps: A Call to Action

Leslie Gewin, MD
Thank you!