**Topic:** Chicago KUH FORWARD Meeting hosted by University of Illinois Chicago  
**Time:** April 5, 2021 11:00 AM Central Time (US and Canada)

Join Zoom Meeting:  
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<th>Agenda</th>
<th>Speaker</th>
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<tr>
<td>Welcome and logistics</td>
<td>James Lash, MD</td>
<td>5 min</td>
<td>11:00 – 11:05</td>
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<tr>
<td>Association Between Trajectory</td>
<td>Celestin Missipkode, PhD</td>
<td>15 min</td>
<td>11:05 – 11:20</td>
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<td>of Depressive Symptoms and CKD</td>
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<td>Progression</td>
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<td>Mindfullness-Based Virtual Reality</td>
<td>Rosalba Hernandez, PhD</td>
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<td>11:20 – 11:35</td>
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<td>Intervention in Hemodialysis Patients</td>
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<td>Overview of the Hemodialysis Pain</td>
<td>Michael Fischer, MD</td>
<td>15 min</td>
<td>11:35 – 11:50</td>
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<td>Reduction Effort (HOPE) Trial</td>
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<tr>
<td>Q&amp;A/Whiteboarding Session</td>
<td></td>
<td>10 min</td>
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**Guest Speakers**

**Celestin Missipkode, PhD**  
Postdoctoral Fellow  
UIC College of Medicine

**Bio:** I am a postdoctoral fellow at the University of Illinois at Chicago (UIC). I hold a PhD in Epidemiology from the University of Iowa, where I also earned a graduate certificate in Biostatistics. I obtained an MPH in Epidemiology from the University of Alabama at Birmingham. My major research interests include the application of state-of-the-art statistical methods and machine learning techniques to chronic kidney disease, cardiovascular disease, and diabetes.

**Abstract: Association Between Trajectory of Depressive Symptoms and CKD Progression**

Prior studies have demonstrated an association between depressive symptoms and chronic kidney disease (CKD) progression. There is increasing evidence that patterns of CKD progression are heterogeneous. While some patients with CKD have periods of non-progression, others have linear or non-linear renal function decline. The patterns of CKD progression associated with depressive symptoms are not known. Group-based trajectory modeling was used to evaluate the association between trajectory of depressive symptoms and CKD progression using data from the Chronic Renal Insufficiency Cohort (CRIC) study.
**Rosalba Hernandez, PhD**  
Associate Professor  
UIUC School of Social Work  

**Bio:** As a public health expert and cardiovascular epidemiologist, my research focuses on the following topical areas: 1) Exploration of the association between psychological well-being (e.g., happiness, positive emotion) and cardiovascular health in racial/ethnic minorities and vulnerable populations; 2) Testing strengths-based intervention to improve well-being and reduce psychological distress in Hispanics/Latinos and patients with chronic illness (e.g., hemodialysis, lung cancer); and 3) Development of advanced mixed reality and virtual (VR) software to deliver psychotherapy and behavioral education in the context of the medical setting.  

**Abstract: Mindfulness-Based Virtual Reality Intervention in Hemodialysis Patients**  
Virtual reality (VR) is an evolving technology that is becoming a common treatment for pain management and psychologic phobias. Although nonimmersive devices (e.g., the Nintendo Wii) have been previously tested with patients on hemodialysis, no studies to date have used fully immersive VR as a tool for intervention delivery. This pilot trial tests the initial safety, acceptability, and utility of VR during maintenance hemodialysis treatment sessions—particularly, whether VR triggers motion sickness that mimics or negatively effects treatment-related symptoms (e.g., nausea).  

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**Michael Fischer, MD, MSPH**  
Professor  
UIC Department of Medicine/Nephrology  

**Bio:** I am a board-certified nephrologist at the University of Illinois (UIC) and Jesse Brown Veterans Affairs Medical Center (VAMC) in Chicago. My clinical practice is focused on adults with kidney disease, hypertension, and electrolyte disorders.  

I am also a formally trained epidemiologist and health services researcher, and a research health scientist at the Center of Innovation for Complex Chronic Healthcare at the Edward Hines Jr. VA Hospital. My research program, which to date has received funding from VA, NIH, PCORI, and private foundations, focuses on adults with chronic and end-stage kidney disease with three primary areas of investigation: examining depression and quality of life, evaluating healthcare quality and resource utilization, and delineating racial/ethnic disparities.  

**Abstract: Overview of the Hemodialysis Pain Reduction Effort (HOPE) Trial**  
The Hemodialysis Pain Reduction Effort (HOPE) is a research study specifically for people being treated with hemodialysis. The main goal of the study is to test interventions designed to reduce the impact that chronic pain has on how people feel and function. The HOPE Trial is part of the National Institutes of Health HEAL Initiative to find scientific solutions to stem the national opioid health crisis. It is funded by the NIDDK.
Association Between Trajectory of Depressive Symptoms and CKD Progression: Findings from the Chronic Renal Insufficiency Cohort (CRIC) Study

Celestin Missikpode, PhD
Postdoctoral Fellow
University of Illinois at Chicago
Email: celesmis@uic.edu
About me

- Born in Benin (West Africa)
About me

Educational background
- Medical school (University of Abomey - Calavi, Benin)
- MPH-Epidemiology (University of Alabama at Birmingham, AL)
- PhD-Epidemiology (University of Iowa)
- Certificate in Biostatistics (University of Iowa)

Research interests
- Research methodology
  - Statistical modeling
  - Machine learning
- Chronic kidney disease
- Cardiovascular disease
- Diabetes
Depression in early-stage CKD

- Growing burden to public health
- Highly prevalent
  - 15% to > 50%
- Symptoms
  - Decreased socioemotional well-being
  - Physical impairment
  - Lower productivity in the workplace

Patterns of depressive symptoms from a population-based study

Patterns of depressive symptoms among individuals with CKD

- Less known
- Understanding of the course of depressive symptoms in CKD
  - Can increase efficiency of targeted interventions

Patterns of CKD progression

- **CKD progression**
  - Intra-patient and interpatient variability
  - Prolonged periods of non-progression
  - Linear renal function decline
  - Nonlinear renal function decline

Association between depressive symptoms and CKD progression

- Prior studies have demonstrated an association between depressive symptoms and CKD progression.

What pattern of CKD progression is associated with depressive symptoms?
Question: How are depressive symptoms associated with patterns of CKD progression?

1. Characterize trajectories of depressive symptoms
2. Describe patterns of CKD progression
3. Examine association between trajectories of depressive symptoms and CKD progression
Study Population

**CRIC study**
- 3939 mild-to-moderate CKD patients enrolled in 7 centers
  - Ann Arbor, Michigan
  - Baltimore, Maryland
  - Chicago, Illinois
  - Cleveland, Ohio
  - New Orleans, Louisiana
  - Philadelphia, Pennsylvania
  - Oakland, California

**Study visits every year**
- Standardized interviews
- Physical examination
- Blood and urine samples
CRIC (2003 – 2011)
n=3939

826 Ineligible
- 746 with only 1 time-point data on BDI
- 80 with only 1 time-point data on eGFR change

Eligible
n= 3113
Study Variables

- eGFR
- Beck Depression Inventory (BDI)
- Covariates (Demographics, clinical factors, medications)
**Statistical methods**

- Group-based trajectory modeling
  - BDI score
  - Change in eGFR

- Multinomial logistic regression model
  - Predictors of BDI group membership
  - Association between BDI trajectories and patterns of eGFR change
Group-based trajectory modeling

What is a trajectory?

- It is “the evolution of an outcome over age or time.” Nagin

What is a group-based trajectory analysis?

- Identify clusters of individuals following similar patterns of a behavior or outcome over age or time.

RESULTS
BDI trajectories

- Persistently High BDI Score (8.3%)
- Persistently Moderate BDI Score (31.5%)
- Persistently Low BDI Score (60.2%)

Beck Depression Inventory Score

Time elapsed since enrollment, years
## Predictors of BDI trajectories

<table>
<thead>
<tr>
<th>Socio-demographics</th>
<th>Persistently Low BDI scores</th>
<th>Persistently Moderate BDI scores</th>
<th>Persistently High BDI scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than high school</td>
<td>1.00 [Reference]</td>
<td>1.49 (1.13, 1.97)</td>
<td>1.68 (1.06, 2.67)</td>
</tr>
<tr>
<td>No health insurance</td>
<td>1.00 [Reference]</td>
<td>1.46 (0.99, 2.16)</td>
<td>1.84 (0.98, 3.45)</td>
</tr>
</tbody>
</table>

- Adjusted for clinical center, age, sex, race, educational attainment, health insurance status, smoking, alcohol use, physical activity, diabetes, hypertension, cardiovascular disease, anemia, obesity, quality of life, eGFR, 24-hour urine protein, antidepressants, and ACEI/ARB.
Predictors of BDI trajectories

<table>
<thead>
<tr>
<th>Lifestyle factors</th>
<th>Persistently Low BDI scores</th>
<th>Persistently Moderate BDI scores</th>
<th>Persistently High BDI scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>1.00 [Reference]</td>
<td>1.48 (1.08, 2.01)</td>
<td>2.20 (1.33, 3.64)</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>1.00 [Reference]</td>
<td>1.40 (1.09, 1.79)</td>
<td>1.32 (0.78, 2.23)</td>
</tr>
</tbody>
</table>

Adjusted for clinical center, age, sex, race, educational attainment, health insurance status, smoking, alcohol use, physical activity, diabetes, hypertension, cardiovascular disease, anemia, obesity, quality of life, eGFR, 24-hour urine protein, antidepressants, and ACEI/ARB.
Predictors of BDI trajectories

<table>
<thead>
<tr>
<th>Quality of life/ Medications</th>
<th>Persistently Low BDI scores</th>
<th>Persistently Moderate BDI scores</th>
<th>Persistently High BDI scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of life- Physical Composite</td>
<td>1.00 [Reference]</td>
<td>0.94 (0.93, 0.95)</td>
<td>0.90 (0.88, 0.92)</td>
</tr>
<tr>
<td>Quality of life- Mental Composite</td>
<td>1.00 [Reference]</td>
<td>0.89 (0.88, 0.91)</td>
<td>0.80 (0.79, 0.82)</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>1.00 [Reference]</td>
<td>1.73 (1.33, 2.23)</td>
<td>2.68 (1.78, 4.03)</td>
</tr>
</tbody>
</table>

- Adjusted for clinical center, age, sex, race, educational attainment, health insurance status, smoking, alcohol use, physical activity, diabetes, hypertension, cardiovascular disease, anemia, obesity, quality of life, eGFR, 24-hour urine protein, antidepressants, and ACEI/ARB.
Patterns of CKD progression

- **Stable eGFR (25.5%)**
- **Linear eGFR decline (52.6%)**
- **Non-linear eGFR decline (21.9%)**
Question: How are depressive symptoms associated with patterns of CKD progression?

<table>
<thead>
<tr>
<th>BDI trajectory group</th>
<th>Stable eGFR</th>
<th>Linear eGFR decline</th>
<th>Non-linear eGFR decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistently low BDI score</td>
<td>1.00 [Reference]</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Persistently moderate BDI score</td>
<td>1.00 [Reference]</td>
<td>1.07 (0.84, 1.35)</td>
<td><strong>1.51 (1.11, 2.06)</strong></td>
</tr>
<tr>
<td>Persistently high BDI score</td>
<td>1.00 [Reference]</td>
<td>1.20 (0.78, 1.86)</td>
<td><strong>1.75 (0.99, 3.07)</strong></td>
</tr>
</tbody>
</table>

- Adjusted for clinical center, age, sex, race, educational attainment, health insurance status, smoking, alcohol use, physical activity, diabetes, hypertension, cardiovascular disease, anemia, obesity, quality of life, eGFR, 24-hour urine protein, antidepressants, and ACEI/ARB.
Conclusions

- Depressive symptoms are associated with non-linear and rapid eGFR progression.

- Promoting positive lifestyle factors, monitoring and treatment of depressive symptoms may be needed to improve CKD outcomes.
Acknowledgments

Mentors

- Dr. James Lash
- Dr. Ana Ricardo
- Dr. Ramon Durazo-Arvizu
- Dr. Martha Daviglus

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THANKS!

Any questions?
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