Neighborhood Disadvantage and Transitional Care for Persons with Dementia

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Overarching Goal

- Develop practical approaches towards the elimination of AD health disparities across all vulnerable populations nationally
  - “Big Data” - geo-linked sets of >59 million subjects; large computing capacity
  - Policy
  - Program targeting
- Engineer sustainable, feasible and effective models of care adaptable to low-resource settings

Improving Health

Socioeconomic Disadvantage

- The state of being challenged by low income, limited education, and substandard living conditions for both the person and his or her social network*

Financial Disclosures

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Funding:
NIH/National Institutes on Aging
NIH/National Institutes on Minority Health and Health Disparities
US Department of Veterans Affairs
US Centers for Medicare and Medicaid Services
Multiple non-profit foundations
Consultant, State of Maryland
UK Alzheimer's Society

How Can We Meaningfully Improve Health in Disadvantaged Contexts?

(Credit: AP/Robert F. Bukaty)
Neighborhood Socioeconomic Disadvantage Impacts Health

- Associated with behaviors*, access to food**, safety†
- Linked to outcomes like mortality††, development of diabetes***, birth weight‡
- Health indicators improve with moving persons to areas of less concentrated poverty‡‡


Moving to Opportunity Study

- Sponsored by the US Dept of Housing and Urban Development (HUD)
- Random lottery (1994-1998) offered some public housing families, but not others, the chance to move into a less distressed (lower-poverty) neighborhood (N=4,604 families)
- Five cities: Baltimore, Boston, Chicago, Los Angeles, New York
- Data collected for 10-15 years post-randomization
  - Included measures on racial segregation of neighborhoods

Results

"Moving from a high-poverty to lower-poverty neighborhood leads to long-term improvements in adult physical and mental health and subjective well-being, despite not affecting economic self-sufficiency."

Ludwig et al, Science, 2012

Neighborhood Disadvantage

- Linked to health behavior promotion, access to food, toxic exposures and personal safety

Neighborhood Socioeconomic Disadvantage Increases Rehospitalization Risk

Living in a disadvantaged neighborhood is equivalent to having emphysema in terms of one’s rehospitalization risk.
Dementia and Disadvantage

- Dementia due to Alzheimer’s Disease (AD) disproportionately impacts racial/ethnic minorities and the socioeconomically disadvantaged—populations often exposed to US socioeconomic contextual disadvantage (“neighborhood disadvantage”)

- Neighborhood disadvantage is modifiable

- The impact of neighborhood disadvantage on the development of dementia remains unknown

Objective

- To examine the association between neighborhood disadvantage, baseline cognition, and CSF biomarkers of AD

Methods

- Created, validated neighborhood-level quantifications of socioeconomic contextual disadvantage for the full US—over 50 million Zip+4 codes—employing latest American Community Survey and Census data

- This metric—the Area Deprivation Index (ADI)—incorporates poverty, education, housing and employment indicators; predicts disparity-related health outcomes; and is employed by Maryland and Medicare through our provision

- The ADI provides a novel, nationally-generalizable way to study impacts of exposure to neighborhood disadvantage, while simultaneously offering a practical option for resource and outreach targeting

Wisconsin Registry for Alzheimer’s Prevention (WRAP) Study

- Longitudinal study of asymptomatic middle-aged individuals enriched for parental AD history

- Baseline cognitive testing to construct robust normative factor scores
  - Immediate memory (Rey AVLT trails 1, 2)
  - Verbal learning (AVLT trials 3, 4, and delayed recall)
  - Working memory (digit span, letter-number sequencing)
  - Speed/ flexibility (Trails A/B, Stroop color-word task)

- CSF biomarkers collected for Aβ42 and P-tau181

Area Deprivation Index (ADI): A Measure of Neighborhood Disadvantage

- Theoretical Domains:
  - Education
  - Poverty
  - Housing Quality
  - Unemployment

- Factor-based ranking index

- Census block group level
Limitations

- Unclear generalizability beyond the state of Wisconsin
- Limited number of CSF samples from participants within the most disadvantaged neighborhoods limits analytic power within biomarker analyses. Future studies will include larger participant numbers.
- Interactions amongst neighborhood disadvantage and other fundamental factors (including race, genetics, etc.) will be examined within future studies.
Conclusions

• These early data suggest that neighborhood disadvantage (a modifiable fundamental risk factor) may account for some of the observed disparities in prevalence of dementia

• Given the urgent need to reduce dementia and AD disparities, the current results suggest that neighborhood disadvantage deserves additional study

Case: One of Many...

• 78yo hospitalized with pneumonia
• Mild dementia, not recognized
• Discharged on oral antibiotic x 7 days
• Discharge teaching performed once (intensively) on the day of discharge. Caregiver not notified. (Daughter working 2 jobs to make ends meet.) Home health won’t visit due to neighborhood safety concerns.
• Rehospitalized 3 days later; recurrent pneumonia
• Antibiotic prescription found in patient’s pocket. He forgot to fill the medication.

How Can We Help?

Transitional Care

• Broadly, a set of actions designed to ensure the coordination and continuity of health care as patients transfer between different locations or different levels of care in the same location*

Unmet Need

• Many of the patients who need special care to support their post-hospital transition cannot access such services
  ✓ Socioeconomically disadvantaged populations
  ✓ Areas with poor health care access

• We need programs that adapt, succeed and sustain in underserved and disadvantaged areas

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* Coleman. JAGS. 2003

Concept for Comprehensive Post-Hospital Transitional Care

Coordinated-Transitional Care Program (C-TraC)
**Concept for Comprehensive Post-Hospital Transitional Care**

- **Home-Visit Based Transitional Care Program**
  - Strong Discharge Practices
  - Discharge Teaching/Materials
  - Medical Follow-Up Plans
  - Quality Discharge Documentation

- **Coordinated-Transitional Care Program (C-TraC)**
  - Hospital-Based C-TraC Nurses
  - C-TraC inpatient discharge

- **Highest-Risk Patients**
  - Patient must be physically able & agreeable to a home-visit
  - Could be identified by C-TraC nurses in inpatient setting

- **All Higher-Risk Patients**
  - Available regardless of prior hospitalization or medically complex

**C-TraC Goals**

1. Educate and empower the patient/caregiver in medication management
2. Ensure the patient/caregiver has medical follow-up
3. Educate the patient/caregiver regarding red flags
4. Ensure the patient/caregiver knows whom to contact if questions arise

*Kind, Health Affairs, 2012.

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**Coordinated-Transitional Care (C-TraC) Program**

**HOSPITAL**

- Core Risk for Transition inpatient discharge
- Core Risk for Transition 1-3 days post-discharge
- Core Risk for Transition 4-5 days post-discharge
- Core Risk for Transition 7 days post-discharge

**COMMUNITY**

- Core Risk for Transition 10 days post-discharge
- Core Risk for Transition 21 days post-discharge
- Core Risk for Transition 45 days post-discharge

**Pilot Data: C-TraC Cut Rehospitalizations in Patients with Dementia**

- 20% of intervention patients versus 33% of comparison patients experienced a 30-day rehospitalization (p-value = 0.03)

**Adjusted Odds Ratios for 30-Day Rehospitalization for Patients with Dementia in C-TraC versus Baseline**

<table>
<thead>
<tr>
<th>30-Day Rehospitalization</th>
<th>C-TraC Group Participants with Dementia</th>
<th>Adjusted Odds Ratio</th>
<th>95% CI</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline period, n = 64</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention period, n = 81</td>
<td>0.34 (0.14 - 0.82)</td>
<td>0.017</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Multivariate logistic regression model adjusted for veteran age, gender, race, Medicaid status, education level, and Charlson comorbidity score.

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**The Coordinated-Transitional Care (C-TraC) Program**

- Net cost avoidance of over $1,200 per patient served
- Patients and caregivers reported high satisfaction, decreased caregiver stress, improved medication management skills
- **CONCLUSION:** C-TraC shows promise for improving the post-hospital outcomes of AD patients

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**CTRAC (Madison WI) FY 2011-2012**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Baseline (n=207)</th>
<th>Intervention (n=232)</th>
<th>Difference</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-day post-discharge rehospitalization rate (VA inpatient)</td>
<td>7.5%</td>
<td>11.1%</td>
<td>-3.6%</td>
<td>0.019</td>
</tr>
<tr>
<td>30-day rehospitalization rate (VA or Medicare inpatient)</td>
<td>9.8%</td>
<td>14.9%</td>
<td>-5.0%</td>
<td>0.004</td>
</tr>
<tr>
<td>Any use of inpatient, ER or observation days within 30-day of discharge (VA or Medicare)</td>
<td>11.1%</td>
<td>17.2%</td>
<td>-6.1%</td>
<td>0.001</td>
</tr>
<tr>
<td>Total VA costs 30-days post discharge</td>
<td>$4,585</td>
<td>$6,081</td>
<td>-$1,496</td>
<td>0.006</td>
</tr>
<tr>
<td>30-day mortality</td>
<td>5.7%</td>
<td>4.5%</td>
<td>1.2%</td>
<td>0.327</td>
</tr>
<tr>
<td>90-day mortality</td>
<td>8.8%</td>
<td>3.1%</td>
<td>-5.6%</td>
<td>0.739</td>
</tr>
</tbody>
</table>

*GEC Bending the Cost Curve 26 December 2016 36*
Wisconsin ADRC Project 3: 5-year C-TraC RCT

- Single-blind, prospective, randomized controlled trial to determine the effects of C-TraC versus usual care on:
  1. Rehospitalizations at 14, 30 and 90 days
  2. Post-Hospital Delirium, Function, Falls
  3. Caregiver Stress
   in patients with dementia discharged from the hospital to the community
   ✓ Completion: 2020

Goal: Engineer Sustainable Programs for the Most Socioeconomically Disadvantaged Areas

Implementing the Coordinated-Transitional Care (C-TraC) Model in Critical Access Hospitals in Rural Colorado

Pre-Conditions
- Identification of need
- Review existing interventions

Pre-Implementation
- Core elements
- Customize delivery
- Logistics/training

Implementation
- Process evaluation
- Feedback/protocol refinement

Maintenance and Evolution
- Sustain
- Disseminate

Implementation Mentoring* for C-TraC

* Adapted from CDC's Replicating Effective Programs Implementation Theory Model

* Kind et al, JAGS, 2016
30-Day Readmission Rates

C-TraC Participants: 9.5%*  
versus  
Non-C-TraC Patients: 14.3%*  

Medicare-funded 2-year C-TraC Pilot

- Consideration for additional spread  
- Initial findings promising for local sustainability (report):  
  "...CEO confirmed decreased ER visits, increased clinic visits, and a potential increase in HCAPS scores, which they attribute to C-TraC..."

How Can We Meaningfully Improve Health in Disadvantaged Contexts?

Neighborhood Disadvantage by ADI

Acknowledgements

Team/Collaborators
- Larry Jensen
- Ken Shay, Karen Massay
- Madison VA Hospital Leadership
- VACO Leadership
- Madison VA C-TraC Team
- Kind-team
- Bendlin-team
- WAI leadership, faculty and staff
- WADRC leadership, faculty and staff
- UW Department of Medicine

Funding
- NIMHD R01MD010243-01 (Kind PI)
- NIA 2P5AG033514-06 (Asthana PI; Kind Project 3 PI)
- NIA R01AG027161 (Johnson PI)
- UW Institute for Clinical and Translational Research (1UL1RR025011)
- Madison VA GRECC
- VA T-21 GEC: Innovative Patient Centered Alternatives to Institutional Care
- Wisconsin Partnership Program
- Centers for Medicare and Medicaid Services

Thank you!
- C-TraC patients and families
- WRAP participants