Older Adults in the Eye of the Storm: Research and Practice to Improve Health of Seniors after a Disaster

Sue Anne Bell, PhD, FNP-BC, NDHP-BC
University of Michigan
Ann Arbor, Michigan, USA
Disclosures and Funding

Nothing to disclose.

Funding Source:
NIH K23AG059890; “Individual and Community Drivers of Hospitalization among Older Adults after Natural Disaster,” role: PI
Individual and Community Drivers of Hospitalization among Older Adults after Disaster

Aim 1: Chronic disease care after disaster to avoid hospitalization.

Aim 2: Community resilience to improve health outcomes.

Aim 3: Strategies to promote aging in place after disaster.
300 doctors, nurses, and paramedics await takeoff on a C-17 before heading to Orlando for Hurricane Irma response

(Photo: U.S. Air Force)
There’s no such thing as a Natural Disaster.
Hazards are natural. Disasters are human-made.
This map denotes the approximate location for each of the 16 billion-dollar weather and climate disasters that impacted the United States during 2017.
Disasters disproportionately affect vulnerable populations.
Disaster definition

\[
\frac{\text{Vulnerability + Hazard}}{\text{Capacity}} = \text{Disaster}
\]

Definition: International Federation of the Red Cross/ Red Crescent
Chronic and Comorbid Disease

(Vulnerability + Hazard) \[\begin{array}{c}
\text{Capacity} \\
\text{Frailty} \quad \text{Social Isolation}
\end{array}\] = Disaster

Cognitive Impairment
Disasters exacerbate existing vulnerabilities for older adults.

Community supports are interrupted.
Health care services are disrupted.
Loss of basic infrastructure affects chronic disease processes.
Opportunities and challenges

“We fail to evacuate when advised. We rebuild in flood zones. We don’t wear helmets. We fail to purchase insurance. We would rather avoid the risk of “crying wolf” than sound an alarm.”

We don’t conduct data-driven research to understand the effects of disasters on population health.
Opportunities and Challenges

Research challenges:

• Reliance on cross-sectional or anecdotal accounts of individual disasters
• Little linkage to generalizable knowledge about after effects of disasters
• Linking large datasets to specific disasters
“Disaster research does not necessarily require a disaster. Available data should be mined to understand the impact of disasters on the elderly population. These include data from Medicare’s home health care payment program and other home health agencies that are required to undertake a similar assessment.”

GERIATRICS/ORIGINAL RESEARCH

All-Cause Hospital Admissions Among Older Adults After a Natural Disaster

Sue Anne Bell, PhD, FNP-BC*; Mahshid Abir, MD; Hwa Jung Choi, PhD; Colin Cooke, MD; Theodore Iwashyna, MD, PhD

*Corresponding Author. E-mail: sabel@umich.edu, Twitter: @sueannebell.
Setting: 2011 Southeast Superstorm
n=28,475
Methods

- Data source: MedPAR
- Self Controlled Case Series
- Individuals serve as their own controls and confounders are controlled for within the modeling
- Analysis based on when an event happened
Hospitalizations for older adults increased significantly in the month after one major disaster.

<table>
<thead>
<tr>
<th>Model</th>
<th>IRR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thirty-day all-cause admissions (n=28,475)</td>
<td>1.04 (1.01, 1.07)</td>
</tr>
<tr>
<td>Twenty-seven day all-cause admissions (n=28,350)</td>
<td>1.04 (1.01, 1.07)</td>
</tr>
<tr>
<td>Alabama (n=21,122)</td>
<td>1.09 (1.05, 1.12)</td>
</tr>
<tr>
<td>Georgia (n=3,942)</td>
<td>1.06 (0.98, 1.15)</td>
</tr>
<tr>
<td>Tennessee (n=5,030)</td>
<td>1.00 (0.92, 1.06)</td>
</tr>
<tr>
<td>Mississippi (n=2,198)</td>
<td>0.96 (0.86, 1.07)</td>
</tr>
</tbody>
</table>
Hospital Admissions Among Older Adults After Disaster

- Adults 65+ who lived near the 2011 Tornado Super Outbreak
- Admissions in 30 days after disaster
- Admissions excluding immediate injuries

@sueannebell
Health Risk Behaviors Among Older Adults after Disaster

Sue Anne Bell, PhD, FNP-BC, HwaJung Choi, PhD, Kenneth M. Langa, MD, PhD, Theodore J. Iwashyna, MD, PhD, (In press), PreHospital and Disaster Medicine.
Research Question: Do health risk behaviors change after disaster?

• Data Sources:

A public resource for data on aging in America since 1990

FEMA
### Health Risk Behaviors Among Older Adults after Disaster

<table>
<thead>
<tr>
<th>Unadjusted and Adjusted Logit Models</th>
<th>Effect Size*</th>
<th>(95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Change in Physical Activity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>OR=.89</td>
<td>(.84 - .95)</td>
<td>.001</td>
</tr>
<tr>
<td>Adjusted</td>
<td>OR=.84</td>
<td>(.79 - .89)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Increase in weight</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>RRR=1.19</td>
<td>(1.11 – 1.27)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Adjusted</td>
<td>RRR= 1.21</td>
<td>(1.13 – 1.30)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Change in Smoking</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>OR=.96</td>
<td>(.87 - 1.06)</td>
<td>.40</td>
</tr>
<tr>
<td>Adjusted</td>
<td>OR=.99</td>
<td>(.91 - 1.08)</td>
<td>.92</td>
</tr>
</tbody>
</table>

*OR, RRR
Living Through a Disaster Leads to Less Healthy Behaviors
Sue Anne Bell (@sueannebell) et al. PreHospital and Disaster Medicine (In Press).

In a national longitudinal cohort
- 20,671 Individuals
- 59,450 Interviews

using Health and Retirement Study data (@HRSisr) combined with Federal Emergency Management Agency disaster declaration data

Comparing those who experienced a disaster versus those who did not
- 1,451 unique disasters
- 60% exposed

16% less likely to be physically active
21% more likely to gain weight

adjusted odds ratio, change over time in health risk behaviors adjusting for many potential confounders
Cancer Survival after Disaster

Sue Anne Bell, PhD, FNP-BC: Theodore J. Iwashyna, MD, PhD;
Jennifer Griggs, MD, MPH; Matthew A. Davis, PhD
Study Objective

To determine the extent to which exposure to a disaster affects long-term cancer survival.
Exposure Variable

Cancer cases diagnosed six months before Hurricane Katrina.
• 19 separate population-based cancer registries across the US
• Louisiana data collection started in 2001
• SEER excluded Louisiana cases after Katrina
15 parishes included
Exposed to Katrina 1,738

- 794 Breast
- 412 Lung
- 532 Colorectal

No Disaster 6,848

- 3,176 Breast
- 1,648 Lung
- 2,024 Colorectal
1:4 Match
Overall Time to Mortality

- Disaster exposure
- No disaster exposure

Proportion Surviving

Time since diagnosis, years

p = .02
Proportion Surviving

Time since diagnosis, years

Disaster exposure

No disaster exposure

83/1000

92/1000

\(p = .02\)
8% higher mortality among the disaster exposed group than the unexposed, (HR=1.08, p=.04)

Adjusted for:
- Cancer stage
- Age at diagnosis
- Sex
- Race/ethnicity
- Marital status
- Education
- Household Income
Cancer Control Continuum

Prevention
Early Detection
Diagnosis
Treatment
Survivorship
End of Life Care
How can we do better?
“With a shared healthy community vision, strategic planning that prioritizes health, and coordinated implementation, disaster recovery can result in communities that are healthier, more livable places for current and future generations to grow and thrive—communities that are better prepared for future adversities.”

National Academy of Medicine, 2015
Thank you!

Email: sabell@umich.edu
Twitter: @sueannebell