The COVID-19 Pandemic: Reversing 20 years of rural mortality improvement

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Rural mortality disparities

James & Cossman, 2017: Age-adjusted mortality by residence and race

COVID and Rural, 2020:

• Fewer health care professionals
• Fewer hospitals
• Lower rates of health insurance
• And behavioral differences
  • Lower adoption of NPIs (Probst et al 2021; Callaghan et al 2021)
  • More despair? (Brown & Schuman 2021)
What did COVID-19 mean for rural?

• Excess rural mortality, but why?
  • “It’s their fault” has dominated the discussion
  • But excess mortality is not limited to COVID

• Our perspective:
  • A weaker rural infrastructure resulted in excess COVID deaths
  • **AND** excess deaths across time-sensitive diagnoses
Method:

• Data extracted from CDC Wonder
  • Age adjusted mortality from final cause of death files
• COVID (ICD U07.1) mortality
  • Age-adjusted information is available only through 2020
  • Checked 2021 (not available as of April 20)
• Other causes of death, divided into:
  • “Nonemergent care:” cancer, depression
  • “Emergency care:” trauma (unintentional), diabetes
Results
Rural mortality in 2020 exceeded 1999

Age-adjusted mortality per 100,000 residents by rurality of county of residence
Quick examination by race/ethnicity

Age adjusted mortality per 100,000 residents, non-Hispanic White

Age adjusted mortality per 100,000 residents, Hispanic
Quick examination by race/ethnicity

Age adjusted mortality per 100,000 residents, non-Hispanic Black

Age adjusted mortality per 100,000 residents, non-Hispanic A/PI
Quick examination by race/ethnicity

Consistent pattern across all groups

- Rural mortality exceeds urban mortality
- Sharp uptick in 2020
Next

• Increases in mortality were noted across all rural populations in 2020
• What caused these increases?
# Clear contributor: COVID-19

Age adjusted COVID death rate per 100,000 residents, 2020

<table>
<thead>
<tr>
<th>Group</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td>155.1</td>
<td>162.2</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>118.3</td>
<td></td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>64.2</td>
<td>47.1</td>
</tr>
<tr>
<td>Black or African American</td>
<td>137.2</td>
<td>166.2</td>
</tr>
<tr>
<td>White</td>
<td>64.2</td>
<td>75.5</td>
</tr>
<tr>
<td>Total</td>
<td>84.3</td>
<td>88.3</td>
</tr>
</tbody>
</table>

[Image: Rural & Minority Health Research Center]
BUT: COVID does not fully account for increased death rates, 2019 - 2020

Difference in age-adjusted mortality per 100,00 residents, 2020 v 2019

Gaps: Approximately 3 in 10 excess deaths have other causes

- 35.0 per 100,00 for urban, 29% of total
- 38.0 per 100,00 for rural, 30% of total
Disorders with a long-term treatment profile

• Cancer

• Depression (suicide as an indicator of inadequately addressed depression)
Cancer mortality: no increase 2019-2020

Age-adjusted mortality per 100,000 residents, malignant neoplasms, by rurality, 1999 - 2020

ICD-10 Codes: C00-D48 (Neoplasms)
Suicide among adults: no increase 2019-2020

Age adjusted mortality per 100,000, persons age 25 and older, intentional self harm, by rurality, 1999 - 2020

ICD-10 codes: X60-X84
Suicide among young persons: no increase 2019-2020

Age adjusted mortality per 100,000 residents, ages 5 - 24

ICD-10 codes: X60-X84
Diagnoses with potential short-term harms

• Disorders needing access to primary care
• Disorders with emergent episodes
Diabetes:
Ambulatory care sensitive condition with potential emergent episodes

Age adjusted mortality per 100,000 residents, diabetes, by rurality, 1999 - 2020

ICD-10 Codes: E10-E14 (Diabetes mellitus)
Accidental deaths, alcohol & other drugs

Age-adjusted mortality per 100,000 residents age 25 and older, by rurality

ICD-10 codes: X40-X45, Y10-Y15
Unintentional injury: emergent care

Age adjusted mortality per 100000, transport and other unintentional injury, by rurality, 1999 - 2020

ICD-10 Codes: V01-V99 (Transport accidents); W00-X59 (Other external causes of accidental injury)
COVID plus time sensitive diagnoses.

Increase in age-adjusted mortality, 2020 vs 2019, by cause

- The age-adjusted rural COVID death rate was only slightly higher than the urban rate

And

- Both urban and rural counties showed increases in death rates for diagnoses associated with both preventive and emergent care
How does 2021 look?
COVID mortality, overall mortality not trending well

Crude mortality rates, 2018-2021

<table>
<thead>
<tr>
<th>Year</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>821.3</td>
<td>1151.7</td>
</tr>
<tr>
<td>2019</td>
<td>822.3</td>
<td>1160.6</td>
</tr>
<tr>
<td>2020</td>
<td>975.0</td>
<td>1347.5</td>
</tr>
<tr>
<td>2021</td>
<td>989.6</td>
<td>1416.4</td>
</tr>
</tbody>
</table>

Deaths per 100,000 residents

Crude mortality, COVID, 2020 - 2021

<table>
<thead>
<tr>
<th>Year</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>102.4</td>
<td>129.3</td>
</tr>
<tr>
<td>2021</td>
<td>116.5</td>
<td>182.4</td>
</tr>
</tbody>
</table>

Deaths per 100,000 residents
Conclusions

• Both rural and urban healthcare systems were overwhelmed in 2020 and persons with emergent needs died

• The question: what’s next?
Trends not favorable: 22 rural hospitals closed in 2020
What we don’t know yet….

• Impact of the pandemic on rural healthcare workforce not yet known
• Impact of pandemic on outpatient service availability (FQHC’s, RHCs) not yet known
Action items

• Eyes on rural! COVID → increased attention to rural disparities; ride this momentum
• Continued attention to rural funding policies and adjustment
• Pushing “rural in all policies” across health, education and economic development spheres
Disclosures & Thanks

• The presenters have no conflicts to disclose

• This presentation has been approved by Sam the rural health advoCATe.

• Our web site:
  • rhr.sph.sc.edu

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The Rural Health Research Gateway provides access to all publications and projects from eight different research centers. Visit our website for more information.

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Hospital/emergency care gaps

Areas more than 30 minutes from a hospital, 2020

Even though there are about 5,250 of these acute care and critical access hospitals in the United States, in large areas of the country it is hard to reach one.

The next set of slides are just me noodling ideas….
Decline in transport deaths but increased travel in 2021

Crude mortality, cancer, 2018 - 2021

Deaths per 100,000 residents

<table>
<thead>
<tr>
<th>Year</th>
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<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>178.8</td>
<td>11.2</td>
</tr>
<tr>
<td>2019</td>
<td>178.0</td>
<td>11.1</td>
</tr>
<tr>
<td>2020</td>
<td>178.0</td>
<td>12.1</td>
</tr>
<tr>
<td>2021</td>
<td>178.5</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Crude mortality, transportation accidents, 2018 - 2021

Deaths per 100,000 residents

<table>
<thead>
<tr>
<th>Year</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>244.0</td>
<td>21.0</td>
</tr>
<tr>
<td>2019</td>
<td>245.3</td>
<td>21.0</td>
</tr>
<tr>
<td>2020</td>
<td>247.9</td>
<td>21.8</td>
</tr>
<tr>
<td>2021</td>
<td>248.8</td>
<td>17.6</td>
</tr>
</tbody>
</table>

U.S. driving soars in 2021 to 3.23 trillion miles, up 11.2%
For conditions like AMI that strike late, crude is really off from age-adjusted...

Crude & AA mortality, Acute Myocardial Infarction, 2018-2021

Deaths per 100,000 persons

Crude Mortality, Diabetes, 2018 - 2021

Deaths per 100,000 residents
Some trends improved:

Crude mortality, suicide, all ages, 2018-2021

Crude mortality, accidental alcohol/drug overdose, all ages, 2018-2021