

# Assessing Change in Patient Morbidity Over Time: A Lesson from a Study of Health Among Older Individuals Pre and Post Hurricane Katrina

*Data for this study were provided by:*



Your Medicare Health Team



Improving Your Hand in Care Management

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# Objectives:

- **Present a case study of morbidity change in a population of older adults**
- **Describe how ACG scores are used to measure morbidity change over time**
- **Compare with an expected morbidity change in a “mirror” population**



# Methods:

- 1) for measuring morbidity burden using ACG scores
- 2) to validate the morbidity burden assessment
  - by looking at service use within morbidity groups
  - by evaluating condition (EDC) prevalence
- 3) for finding a matching “mirror” population with comparable morbidity profile and age and gender distribution



# Analytic plan for developing age-gender adjusted ACG Scores

Medicare population (age 65+ and enrolled for 24 months):

1. Regress normalized beneficiary cost on ACGs and age-gender groups
2. Save all regression coefficients

Peoples Health population:

3. Apply coefficients to pre-Katrina ACG categories and age-gender groups
4. Repeat scoring for post-Katrina 12-month period

“Mirror” population:

5. Apply coefficients to base year ACG categories and age-gender groups
6. Repeat scoring for prediction year



# Change in ACG Score

<i>Peoples Health New Orleans Area</i>		<i>Parish as Proxy for Disruption due to Hurricane Katrina*</i>		
		<i>Study Population in 4 Combined Parishes N=20,612</i>	<i>Orleans Parish <b>Heavy Disruption</b> N=7,242</i>	<i>Jefferson, Plaquemines, St. Tammany <b>Moderate Disruption</b> N=13,120</i>
<i>Medicare Beneficiaries above age 64</i>				
<i>Enrolled from Sep 2004 to the end of Aug 2006</i>				
Age (%)	65-74	54	53	55
	75+	46	47	45
White (%)		66	34	84
Medicaid eligible (%)		9	12	7
<b>ACG score pre-Katrina</b>		<b>1.04</b>	<b>0.97</b>	<b>1.08</b>
<b>ACG score post-Katrina</b>		<b>1.18</b>	<b>1.12</b>	<b>1.21</b>
<i>Change in ACG score</i>		<b>+13%</b>	<b>+15%</b>	<b>+12%</b>
* FEMA damage reports: In Orleans parish, 77% of homes suffered catastrophic damage, compared to 49% in Jefferson, Plaquemines and St. Tammany parishes.				



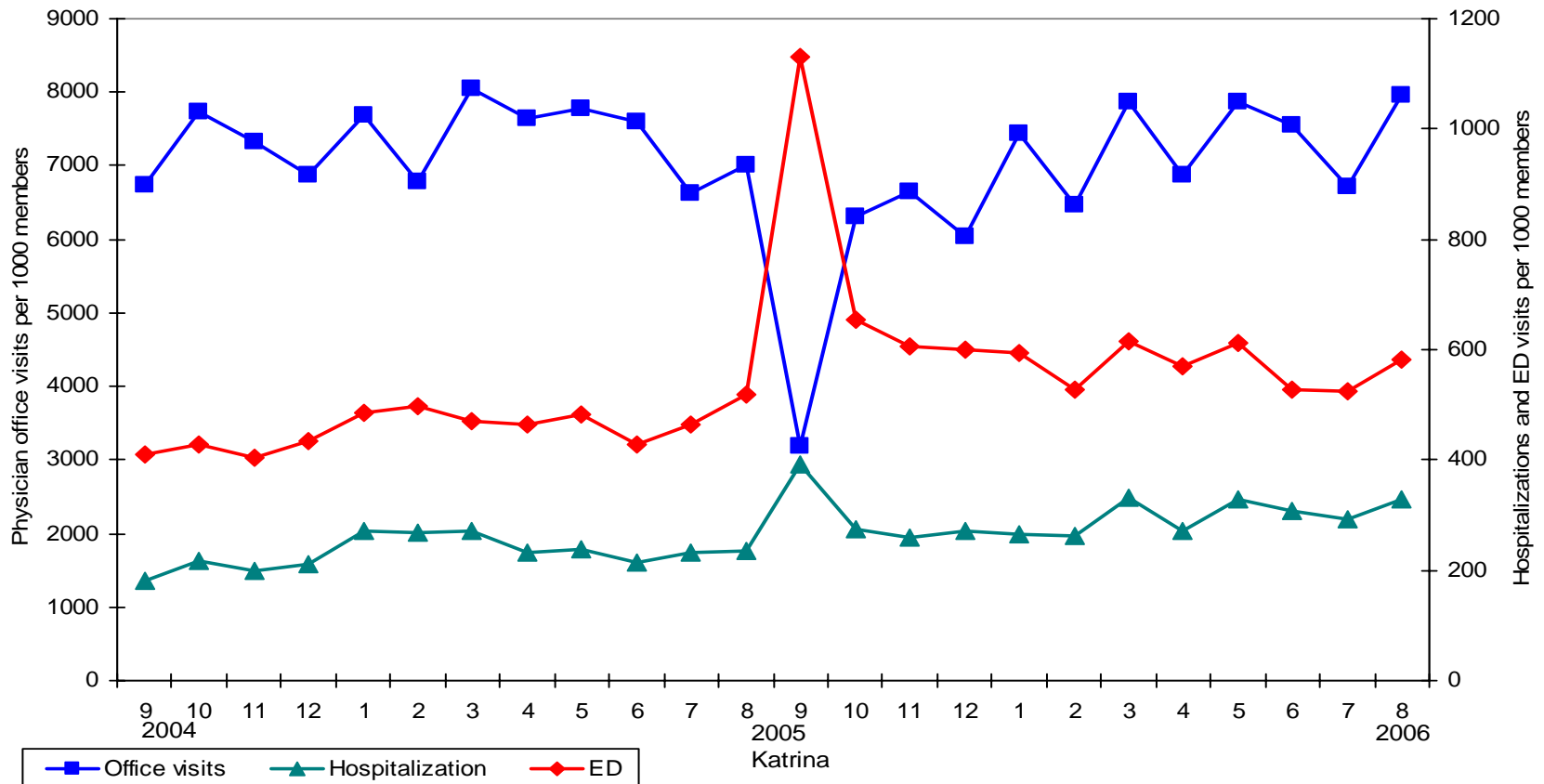
# Study Finding:

- *“We found a 13% increase in morbidity burden for the study population over the 12-month period after Hurricane Katrina.”*
- **What does this increase mean clinically for population health?**
- **What factors contribute to the increase?**
- **How can we support our finding with further evidence?**



# Impact of Katrina on Service Use

Figure 2: Physician Office Visits, Hospitalizations and Emergency Department Visits per 1,000 Members, Annualized, for the Months Pre and Post Katrina



# Outpatient and ED Visits by Resource Use Band (RUB)

<i>Pre-Katrina</i>			<i>Post-Katrina</i>		
<i>Resource Use Category</i>	<i>N</i>	<i>Outpatient and ED visits per member</i>	<i>Resource Use Category</i>	<i>N</i> $\Delta$	<i>Outpatient and ED visits per member</i>
<i>Low</i>	<i>2,206</i>	<i>.9</i>	<i>Low</i>	<i>2,308</i> <i>+102</i>	<i>.8</i>
<i>Mid</i>	<i>10,147</i>	<i>5.8</i>	<i>Mid</i>	<i>9,637</i> <i>-510</i>	<i>5.2</i>
<i>High</i>	<i>5,080</i>	<i>10.6</i>	<i>High</i>	<i>4,903</i> <i>-177</i>	<i>9.9</i>
<i>Very high</i>	<i>3,179</i>	<i>14.1</i>	<i>Very high</i>	<i>3,764</i> <i>+585</i>	<i>13.4</i>



## Inpatient Visits by RUB

<i>Pre-Katrina</i>			<i>Post-Katrina</i>		
<i>Resource Use Category</i>	<i>N</i>	<i>Inpatient visits per member</i>	<i>Resource Use Category</i>	<i>N</i> $\Delta$	<i>Inpatient visits per member</i>
<i>Low</i>	<i>2,206</i>	<i>.001</i>	<i>Low</i>	<i>2,308</i> <i>+102</i>	<i>.002</i>
<i>Mid</i>	<i>10,147</i>	<i>.05</i>	<i>Mid</i>	<i>9,637</i> <i>-510</i>	<i>.05</i>
<i>High</i>	<i>5,080</i>	<i>.24</i>	<i>High</i>	<i>4,903</i> <i>-177</i>	<i>.27</i>
<i>Very high</i>	<i>3,179</i>	<i>.96</i>	<i>Very high</i>	<i>3,764</i> <i>+585</i>	<i>1.14</i>



# “Disaster-affected Conditions”

<i>Evaluating Change in Morbidity with Expanded Diagnosis Clusters</i>	<i>Prevalence per 10,000 Members</i>		$\Delta$
	<i>Pre-Katrina</i>	<i>Post-Katrina</i>	
<b>Disaster-affected Conditions</b> *** significant differences pre- to post-Katrina ***			
<i>Hypertension w/ major complication</i>	1211	1473	+22%
<i>Congestive heart failure</i>	887	1103	+24%
<i>Acute myocardial infarction</i>	116	158	+36%
<i>Sleep problems</i>	256	370	+45%
<b>Control Conditions</b> (no significant differences pre- to post-Katrina)			
<i>Allergic rhinitis</i>	975	954	-2%
<i>Cholecystitis</i>	150	146	-3%
<i>Otitis externa</i>	134	130	-3%



# Study Finding Explained:

- **Greater prevalence of “disaster-affected” conditions explains the higher morbidity burden.**
- **The increase in ACG score is explained by greater numbers of individuals in categories with higher morbidity burden.**



**A case study will be presented, comparing the change in health pre and post Katrina of a managed care population with that of a “mirror” managed care population that has not been affected by the disaster.**

***Our challenge is to assess the expected change in health over a one year period in a normally aging elderly population from an elderly population that suffered a disaster.***



# Pharmetrics “Mirror” for the Peoples Health Population-no morbidity matching

<i>Measuring Change in Morbidity w/ ACG Scores</i>	<i>Pharmetrics “mirror”</i>	<i>Peoples Health</i>
<b>N of 24-month Medicare Beneficiaries</b>	<b>77,603</b>	<b>20,612</b>
<b>% Age 65 – 74 // 75 +</b>	<b>52 // 48</b>	<b>54 // 46</b>
<b>% Female // Male</b>	<b>58 // 42</b>	<b>58 // 42</b>
<b>% Beneficiaries with healthcare utilization</b>	<b>95.0</b>	<b>94.6</b>
<b>Base year or pre-Katrina ACG score</b>	<b>.77</b>	<b>1.04</b>
<b>Prediction year or post-Katrina ACG score</b>	<b>.80</b>	<b>1.18</b>
<b>% change in ACG score</b>	<b>+4%</b>	<b>+13%</b>



# Propensity Score Matching: An Overview

- **Starting point: We combine the (Peoples Health) Katrina population with our Pharmedics “mirror”**
- **Our propensity score is the probability of being in the Katrina population, conditional on independent variables that we enter into the logistic regression.**
- **We pair up individuals who have a very similar propensity score, but one is from the Katrina population and the other from the “mirror”**  
(we adapted a SAS macro written by Lori Parsons to do this.)
- **End point: We think that a difference between the base to prediction year change in morbidity and the pre- to post-Katrina ACG score change might be attributable to Hurricane Katrina.**



# Mirroring the Peoples Health Population using Propensity Score Matching

<i>Measuring Change in Morbidity with ACG Score</i>	<u>Pharmetrics</u> "mirror"	Peoples Health
<b>Propensity Score Variables (and number of pairs)</b>		
<b>1. Age·gender (n=20,279)</b>		
<b>Base or pre·Katrina // Prediction or post·Katrina</b>	<b>.805 // .83</b>	<b>1.04 // 1.18</b>
<i>% change in ACG score</i>	<i>+ 3%</i>	<i>+ 13%</i>
<b>2. Age·gender &amp; pre·Katrina ACG morbidity group (n=20,274)</b>		
<b>Base or pre·Katrina // Prediction or post·Katrina</b>	<b>.97 // .94</b>	<b>1.04 // 1.18</b>
<i>% change in ACG score</i>	<i>- 3%</i>	<i>+ 13%</i>
<b>3. Age·gender &amp; base·year or pre·Katrina ACG score (n=20,518)</b>		
<b>Base or pre·Katrina // Prediction or post·Katrina</b>	<b>1.04 // .95</b>	<b>1.04 // 1.18</b>
<i>% change in ACG score</i>	<i>- 9%</i>	<i>+ 13%</i>



# What we have learned:

- *The measured increase in morbidity burden in the Katrina population may not be fully attributed to normal aging.*
- *Hurricane Katrina may have had a larger detrimental effect on morbidity burden than we were able to measure, and considering how population health might have changed in the absence of Katrina.*
- *Using the pre-Katrina ACG score gave us the largest count of matched pairs.*



## In conclusion:

- *ACG scores can be used to measure change in morbidity burden in evaluations of healthcare interventions.*
- *Propensity score matching can be used to verify that a change in morbidity burden can be attributed to a healthcare intervention.*



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