Population Health: New Paradigms and Implications for Health Statistics

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National Committee on Vital and Health Statistics
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Challenges of 21st Century Health Systems

• The poor and worsening position of US population health indicators

• Quality of health services
  – Responsiveness to needs
  – Comorbidity
  – Coordination of care
  – Overuse

• Quality of health systems
  – Population outcomes
  – Disparities (inequities)
Is population health the sum of individual health?
Distinction between focus on individuals and populations or subpopulations is at the heart of distinctions among the branches of medicine.
Clinical Medicine
What disease might this patient have, and how should it be managed?

Clinical Epidemiology
What is the relative likelihood that this patient has, or is at risk for, this disease, and what is the evidence to support its management?
**Social Medicine**
Why does this patient have this disease at this particular time, and how might this affect management?

**Community Medicine**
Is this disease important? If so, how important is it, to whom, and what is the overall benefit of management to the community?
What characteristics are most salient in improving overall health and the distribution of health in populations, and what does evidence suggest should be priorities for intervention?
Clinical, Epidemiological, and Social Views towards Health
Social Influences on the Health of Individuals

Shading represents degree to which characteristics are measured at the ecological level (lighter color) or at the individual level aggregated to community.

**“Health” has two aspects: occurrence (incidence) and intensity (severity).**
Community Medicine and Public Health Views towards Health
Societal Influences on Population Health and Equity

Dashed lines indicate the existence of pathways through individual-level characteristics that most proximally influence health.

Shading represents degree to which characteristics are measured at the ecological level (lighter color) or at the individual level aggregated to community.

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Societal Influences on Population Health and Equity (continued)

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Implications for Data/Information Systems: I. Linkages

• Linking individual/aggregated individual data with contextual/ecological data
  i.e., clinical approaches with systems approaches
Implications for Data/Information Systems:

II. Areas

• Characteristics of areas in which people live and work
• Social and political (power) characteristics of the people in an area
• Characteristics of health system
Implications for Data/Information Systems:
III. Health Services

- Problems (ICPC)
- Diagnoses (comorbid diagnoses)
- Management (disease or morbidity-oriented?)
- Reassessment (disease or problem-oriented?)
Implications for Data/Information Systems:
IV. Disease, Morbidity, or Health Oriented?

- Comorbidity
- Concept of health
Comorbidity

Diseases, risk factors, and influences are not independent of one another. Data systems must allow for coordination among different providers and types of providers.
Ratios of Observed and Expected (Co-)Occurrences of Diseases, Overall and for Different Ages

Adapted by CTLT from van den Akker et al, J Clin Epidemiol 1998; 51:367-75.
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### Decision Tree for ACGs

**Entire Population**

- **Age < 1**\rightarrow MAC-26
  - To MAC 26 tree

- **Age ≥ 1**
  - Split into MACs, Based on CADGs

**MACs Tree**

- **MAC-1**
  - **MAC-3**
    - **MAC-5**
      - **MAC-7**
        - **MAC-9**
          - **MAC-11**
            - **MAC-13**
              - **MAC-15**
                - **MAC-17**
                  - **MAC-19**
                    - **MAC-21**
                      - **MAC-23**
                        - **MAC-25**

- **MAC-2**
  - **MAC-4**
    - **MAC-6**
      - **MAC-8**
        - **MAC-10**
          - **MAC-12**
            - **MAC-14**
              - **MAC-16**
                - **MAC-18**
                  - **MAC-20**
                    - **MAC-22**
                      - **MAC-24**

- **MAC-25**
  - **MAC-26**

**Key**

- **MAC** Major Ambulatory Category
- **ADG** Ambulatory Diagnostic Group
- **CADG** Collapsed ADG
- **ACG** Ambulatory Care Group

**Source:** JHU ACG Case Mix Adjustment System, V. 4.0, 1997.

**Starfield 09/07**

- ACG 5090 n
What Is Health?

Health is the extent to which an individual or group is able, on the one hand, to realize aspirations and satisfy needs and, on the other hand, to cope with the interpersonal, social, biological, and physical environments. It is a resource for everyday life, not the objective of living; it is a positive concept embracing social and personal resources as well as physical and psychological capacities.

How Is Population Health Measured?

- Infant mortality rates vs. neonatal and postneonatal
- Mortality rates vs. age-adjusted mortality rates
- Cause-specific mortality
- Life expectancy
- Years of potential life lost
  (GAO choice among 17)
- Disease occurrence/severity
  - All diseases
  - Target diseases
    (Popular in US and worldwide)
- Self-reported health
- DALYs

Which of these represent health?
Alternatives for Characterizing Population Health

1. Diagnosed morbidity case mix by age
2. DALYs
3. Profiles of health derived from combinations of separate domains
<table>
<thead>
<tr>
<th>Profile</th>
<th>Type</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent health</td>
<td>Excellent health on 3 or 4 domains, with no domains of poor health</td>
</tr>
<tr>
<td>B</td>
<td>Good health</td>
<td>At least average health on all domains, with excellent health on no more than 2 domains</td>
</tr>
<tr>
<td>C</td>
<td>Dissatisfied</td>
<td>Poor health only on satisfaction</td>
</tr>
<tr>
<td>D</td>
<td>Discomfort</td>
<td>Poor health only on discomfort</td>
</tr>
<tr>
<td>E</td>
<td>Low resilience</td>
<td>Poor health only on resilience</td>
</tr>
<tr>
<td>F</td>
<td>High risks</td>
<td>Poor health only on risks</td>
</tr>
<tr>
<td>G</td>
<td>Dissatisfied/high discomfort</td>
<td>Poor health on satisfaction &amp; discomfort</td>
</tr>
<tr>
<td>H</td>
<td>Dissatisfied/low resilience</td>
<td>Poor health on satisfaction &amp; resilience</td>
</tr>
<tr>
<td>I</td>
<td>Dissatisfied/high risks</td>
<td>Poor health on satisfaction &amp; risks</td>
</tr>
<tr>
<td>J</td>
<td>Discomfort/low resilience</td>
<td>Poor health on discomfort &amp; resilience</td>
</tr>
<tr>
<td>K</td>
<td>Discomfort/high risks</td>
<td>Poor health on discomfort &amp; risks</td>
</tr>
<tr>
<td>L</td>
<td>Low resilience/high risks</td>
<td>Poor health on resilience &amp; risks</td>
</tr>
<tr>
<td>M</td>
<td>Worst health</td>
<td>Poor health on 3 or 4 domains</td>
</tr>
</tbody>
</table>
Dealing with Disparities

Stratified analysis rather than statistical adjustment
Social and Political Context

Important future direction to understanding the variety of influences on health
Directions for Population Health Data

Information systems moving towards characterizing

• Health
• Contexts
• Comorbidity as well as disease
• Disparities (systematic differences)
• Bridging clinical medicine and public health to use knowledge about health, risks, and resiliencies
Data Systems for Bridging Public Health and Clinical Medicine

Boundaries between public health and clinical medicine are fluid. Data systems are needed to coordinate the activities of both sectors.
Population health is not the sum of any individual measure of health because of

NON-RANDOM DISTRIBUTION OF HEALTH AND INFLUENCES ON HEALTH

– Age and gender distributions
– Political/economic/social/environmental contexts

INDIVIDUAL MEASURES OF HEALTH DO NOT REPRESENT HEALTH.
Summary: Health

Population health is NOT the sum of individual health. Averages do not represent population health or provide information about the context in which systematic differences in health occur and how they can be remedied.
Summary: Why Population Health Is NOT the Sum of Individual Health, in Any Useful Sense

- Comorbidity: individual measures of health do not represent health
- Non-random distribution of health, e.g., age, geography, societal differences cause systematic differences in population subgroups