Population Health, and the “Third Revolution”

Chuck Callahan
March 2017
Basic assumptions:

Health is a human right.
Basic assumptions:

Population health is a strategic problem.
Basic assumptions:

Medicine is intrinsically tactical.
It can’t be done without IT.
“What is the optimal balance of investments (e.g., dollars, time, policies) in the multiple determinants of health (e.g., behavior, environment, socioeconomic status, medical care, genetics) over the life course that will maximize overall health outcomes and minimize health inequities at the population level?”

Kindig D. Understanding Population Health Terminology. Milbank Q. 2007.;85:139-161
Population Health
Bridging the Gap in 21st Century Medicine

- “Micro-medical” care
  - Genomics, patient-centered care, individual outcomes

- “Meso-medical” care
  - Population Health - Group outcomes

- “Macro-medical” care
  - Public Health, health policy and planning

- “Meta-medical” care
  - Improving health and well-being
We need IT systems that work and the work of IT systems.
Basic questions:

Why now?
Value = Outcome / Cost

Need for Healthcare Leadership

World Health Organization 2000

USA

Global Ranking:
37th

Behind Columbia, Chile, Costa Rica & Cyprus

Maryland Medicare Exemption: Global Based Reimbursement

Using Medicare Data, Maryland has the Nation’s Highest Readmissions Rate

Medicare Readmission Rates per 1,000 Beneficiaries

Source: Delmarva Foundation

Source: Institute of Medicine: Geographic Variation Data Base
FIGURE 1-6 U.S. female life expectancy at birth relative to 21 other high-income countries, 1980-2006.

Baltimore 2015:

• Life expectancy 70.2 vs. 76.2 years (B vs. W)

• Black infants
  - 2x higher likelihood death before 1 year

• Black adults:
  - 8x more likely to die from HIV/AIDS
  - highest rate death CV disease
  - highest rate death from cancer
  - 2x more likely to die DM

“Place not Race” Health Affairs 2011
“Income not Race” JAMA 2016
Basic bias:

- Life Expectancy at Birth: 65.3 years
- Under One Mortality: 21.2 / 10,000

Life Expectancy at Birth: 83.1 years
Under One Mortality: 6.7 / 10,000
Healthcare Access...

Access ♦ Convenience ♦ Excellence
Information ♦ Insight ♦ Intervention
Basic questions:

...So how?
“All models are wrong... but some are useful.”

George E. F. Box
Basic definitions:

Public health:
efforts to assure conditions where people can be healthy.

Population health:
the health outcomes of a group of individuals.
(Includes the distribution of outcomes within the group.)
First Revolution: Communicable Disease

“Breslow Third Revolution in Health”

Lester Breslow, MD
First Revolution: Communicable Disease

1882

1943
First Revolution and the changing cause of death: 
*Communicable to Non-communicable causes*

---

**TABLE 1**  Death rates for leading causes of death. Death registration states, United States, 1900 and 1948. Source: Abstracted from (1)

<table>
<thead>
<tr>
<th>Rank order</th>
<th>1900 cause of death</th>
<th>Rate per 100,000</th>
<th>Rank order</th>
<th>1948 cause of death</th>
<th>Rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All causes</td>
<td>1719</td>
<td></td>
<td>All causes</td>
<td>989</td>
</tr>
<tr>
<td>1</td>
<td>Pneumonia, influenza</td>
<td>202</td>
<td>1</td>
<td>Diseases of the heart</td>
<td>323</td>
</tr>
<tr>
<td>2</td>
<td>Tuberculosis</td>
<td>194</td>
<td>2</td>
<td>Cancer</td>
<td>135</td>
</tr>
<tr>
<td>3</td>
<td>Diarrhea, enteritis</td>
<td>143</td>
<td>3</td>
<td>Intracranial vascular lesions</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>Diseases of the heart</td>
<td>137</td>
<td>6</td>
<td>Pneumonia, influenza</td>
<td>39</td>
</tr>
<tr>
<td>9</td>
<td>Cancer</td>
<td>64</td>
<td>7</td>
<td>Tuberculosis</td>
<td>30</td>
</tr>
</tbody>
</table>

---

Second Revolution: Non-communicable Disease

Lester Breslow, MD
Second Revolution and the cause of death: Non-communicable causes remain but improving

<table>
<thead>
<tr>
<th>Year</th>
<th>All causes</th>
<th>Heart disease</th>
<th>Cerebrovascular disease</th>
<th>Cancer</th>
<th>Diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>1446.0</td>
<td>586.8</td>
<td>180.7</td>
<td>193.9</td>
<td>23.1</td>
</tr>
<tr>
<td>1960</td>
<td>1339.2</td>
<td>559.0</td>
<td>177.9</td>
<td>193.9</td>
<td>22.5</td>
</tr>
<tr>
<td>1980</td>
<td>1039.1</td>
<td>412.1</td>
<td>96.2</td>
<td>207.9</td>
<td>18.1</td>
</tr>
<tr>
<td>1990</td>
<td>938.7</td>
<td>321.8</td>
<td>65.3</td>
<td>216.0</td>
<td>20.7</td>
</tr>
<tr>
<td>1999</td>
<td>886.9</td>
<td>272.4</td>
<td>59.5</td>
<td>202.4</td>
<td>24.2</td>
</tr>
</tbody>
</table>

Source: (9)
Second Revolution:
Non-Communicable “Chronic” Disease
Second Revolution: Affluence and Chronic Disease
Obesity Trends* Among U.S. Adults
BRFSS, 1985
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Obesity Trends* Among U.S. Adults
BRFSS, 2010
(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Prevalence of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2015

Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.

*Sample size <50 or the relative standard error (dividing the standard error by the prevalence) ≥ 30%.
Obesity Trends* Among U.S. Adults
BRFSS, 1990, 2000, 2010
(*BMI ≥30, or about 30 lbs. overweight for 5′4″ person)

1990

2000

2010

No Data  <10%  10%–14%  15%–19%  20%–24%  25%–29%  ≥30%

Source: Behavioral Risk Factor Surveillance System, CDC.
Third Revolution: 
Building health*

*More than just the absence of disease.

Lester Breslow, MD
“Am I well?”
Ecology of Health Care: 

The patients aren’t “in” the hospital 

9 inpatients vs. 330 outpatients 1000/month

Figure 2. Results of a Reanalysis of the Monthly Prevalence of Illness in the Community and the Roles of Various Sources of Health Care. 

Each box represents a subgroup of the largest box, which comprises 1000 persons. Data are for persons of all ages.

UMMC Approach to Patient Populations
Updated HSCRC Risk Definitions December 2016

“BED’D ENC”
“Bedded Encounter” (Inpatient or observation hospital stay.)

High Risk
Medically Complex
≥ 2 Chronic Dz’s*
≥ 3 BED’D ENC

“Rising” Risk
≥ 2 Chronic Dz’s
≥ 2 BED’D ENC
≥ 2 ER Visits

Low Risk
≥1 Chronic Dz’s
Controlled
0 BED’D ENC

“Healthy”

University: 1,134 patients
Midtown: 577 patients

University: 313 patients
Midtown: 63 patients

* Hypertension, Chronic Obstructive Pulmonary Disease, Diabetes, Congestive Heart Failure
(Pediatric: asthma, sickle-cell anemia, seizures/ neurologic/ developmental delay, pneumonia/ chronic lung disease)
UMMC: Simultaneous approach to small “p” and capital “P” Population health

population health (small “p”)
• Peak of the pyramid
• Health & well-being of population affects healthcare institution
• Short-term imperatives and ROI
• Requires investment in the healthcare system
• Healthcare system-based interventions and metrics
• Seen through the lens of the healthcare provider
• Tendency to be “pejorative”

Population health (capital “P”)
• Base of the pyramid
• Healthcare institution affects health & well-being of population
• Long-term imperatives and ROI
• Requires investment in community
• Community-based interventions and metrics
• Seen through the lens of the healthcare recipient
• Tendency to be “restorative”
Population Health and the “Three Block” Medical Neighborhood

February 2017

Inpatient / Emergency Care

1. HOSPITAL CARE

SPECIALTY CARE

Patient-Centered Specialty Care Practice

2. CONNECT & COORDINATE

Transitional Care Coordination (TCC)

High Risk

“Rising” Risk

Low Risk

“Healthy”

Patient-Centered Primary Care Medical Home

3. PRIMARY CARE

Home Family Community Schools Congregations
“Cross-Sectional” Approach

Inpatient & Transitional Care Coordination

Complex Specialty-Based Chronic Disease Management

Primary Care
Well-Care
Chronic Disease Management
The Coordinated Care Center ("C3")
36 W Paca St, Baltimore Maryland
Coordinated Care Center Outcomes
Intensive Ambulatory Care (as of February 12, 2017)

Patient referrals:

• 930 scheduled appointments
• 562 arrived visits
  o 60% appointment completion rate
  o 13% no-show rate
    (others cancellation, reschedule etc.)
  o Transportation supported as needed
• 223 unique patients

• 70% reduction in rate for all admissions
  • 243 pre program – 73 post program
Patient referrals:

- 399 scheduled appointments
- 225 arrived visits
  - 56% appointment completion rate
  - 9% no-show rate
    (others cancellation, reschedule etc.)
  - Transportation supported as needed
- 107 unique patients
- 92% reduction in rate for all admissions
  - 147 pre program – 12 post program
Coordinated Care Center

Excellent early progress
“Universal” Approach

- Housing
- Health literacy
- Transportation
- Employment
- Communication
The Social Determinants of Health

To address health inequalities, you must address social and economic inequities.

Social & Economic Factors
- Education
- Employment
- Income
- Family & Social Support
- Community Safety

Quality of care: 40%
Access to care: 10%
Physical environment: 10%
Healthy behaviors: 30%

Data from "County Health Rankings & Roadmaps," University of Wisconsin Population Health Institute.
West Baltimore population survey identify transportation as a major healthcare barrier.
## Social Determinants of Health: Priorities and Partners

### Economic Stability
- Employment
- Income
- Expenses
- Debt
- Medical bills
- Support

### Neighborhood and Physical Environment
- Housing
- Transportation
- Safety
- Parks
- Playgrounds
- Walkability

### Education
- Literacy

### Food
- Hunger

### Community and Social Context
- Social integration

### Health Care System
- Health coverage
- Provider availability
- Provider linguistic and cultural competency
- Quality of care

### Mortality, Morbidity, Life Expectancy

### Functional Limitations
Basic questions:

...So how?
Medical Homes in a Medical Neighborhood caring for our military family.
"Ring Alignment"
Specialty Care and the Medical Neighborhood in an Integrated Delivery System

Fort Belvoir Community Hospital: Specialty Care Capacity Alignment & Recapture

Ring One: FBCH MTF Enrolled = 83K
Ring Two: Other MTF Enrolled = 41K
Ring Three: Civ. Network Enrolled = 37K
Ring Four: Others in Region
Ring Five: Others Global

Total Catchment TriCare Prime = 161K
Ecology of Health Care:  
*The patients aren’t “in” the hospital*

![Diagram](image)

**Figure 2.** Results of a Reanalysis of the Monthly Prevalence of Illness in the Community and the Roles of Various Sources of Health Care.  
Each box represents a subgroup of the largest box, which comprises 1000 persons. Data are for persons of all ages.

Fort Belvoir Community Hospital:
Ring One & Two – All No. Virginia MTF Enrolled*

Number of Consults / Specialty / 1000 persons / month

- Cardiology: 5
- Gastroenterology: 7
- Ophthalmology: 4
- Podiatry: 5
- ENT: 4

For 1000 persons:
- Dermatology: 10
- Orthopedics: 10
- Physical Therapy: 14

Total Rings: 124K

Total New Patient Consults Needed per month:
- Cardiology: 5
- Gastroenterology: 7
- Ophthalmology: 4
- Podiatry: 5
- ENT: 4
- Dermatology: 10
- Orthopedics: 10
- Physical Therapy: 14

*FBCH, Dumfries, Fairfax, Quantico, Rader, Pentagon, Dahlgreen
Fort Belvoir Physical Therapy “Demand Signal” and Adjustment: *Increased supply by focusing on demand.*
Basic assumptions:

Population health is a strategic problem.
Basic conclusions:

Population health is a strategic problem:

Solution requires:

...coordinated care, one person at a time.
- No definite formula
- No stopping rule
- Many players
- Solutions “good or bad” not “true or false”
- Unpredictable
- Unique
- Problem symptom of another problem
- Complex
- Ambiguous
- Uncertain

Horst Rittel, 1973
success?
“...to leave the world a better place, whether by a healthy child, a garden patch or a redeemed social condition; to know even one life has breathed easier because you have lived, this is to have succeeded.”

Ralph Waldo Emerson
“If you have built castles in the air, your work need not be lost; that is where they should be...

...Now put the foundations under them.”

Henry David Thoreau