Quality and Variation in Medical Practice: Why are Doctors so Different?

Mark W. Shen, M.D.
November 19, 2010

Objectives

- List 3 examples of significant variation in pediatric practice
- Describe the relationship between variation and quality of a process
- Describe one method of improving quality of care by addressing variation

A Mad Lib

1. Pick a pediatric practitioner
   - Generalist, pulmonologist, rheumatologist, hematologist, neonatologist, ID, GI, ENT...
2. Pick a management scenario:
   - ITP, post-op T&A, HSP, bronchiolitis, protein-losing enteropathy, post-op cardiac surgery, bacterial meningitis...
3. Pick a word pair:
   - Given & stop OR Not given & start

Your Mad Lib

You are a pediatric [insert type of practitioner] and begin your busy Monday by seeing a patient cared for by your partner over the weekend.

The patient has been receiving care for [insert disease] and was [given/not given] steroids.

You completely disagree with this approach and [stop/start] the medication.

What a frustrating start to the day. Sometimes you wonder how 2 physicians could practice such different medicine.

As you leave the room, you notice a look of puzzlement on the family’s faces...

Encountering Variation: The 5 Stages of Grief

- Denial
  - Is that person board-certified?
- Anger
  - It’s my patient, I can do what I want
- Bargaining
  - Let me try to use the family to get my way (I’ll tell them my side)
- Depression
  - I’m an accomplice in providing poor care
- Acceptance
  - Just do whatever the other MD wants

The History of (the study of) Medical Variation
Puzzling as is the geographical distribution, the social distribution is yet more of an enigma. Tonsillectomy is at least three times as common in the well-to-do classes.”

<table>
<thead>
<tr>
<th>Area</th>
<th>1936 rate</th>
<th>Average of rates 1932-36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sussex W.C.</td>
<td>2.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Hampshire C.</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Royal Tunbridge Wells B.</td>
<td>4.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Margate B.</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Ramsgate B.</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Enfield U.D.</td>
<td>4.0</td>
<td>3.8</td>
</tr>
</tbody>
</table>

After 3 exams, only 65 children remained

The Beginnings of Modern Day Variations Research

John Wennberg’s House

Extreme Variation in Tonsillectomy Rates

<table>
<thead>
<tr>
<th>Surgical procedure</th>
<th>Low-end two areas</th>
<th>High-end two areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonsillectomy</td>
<td>20.5 22.4 23.5</td>
<td>35.0 37.0 38.0</td>
</tr>
<tr>
<td>Appendectomy</td>
<td>10.5 12.0 13.5</td>
<td>21.5 23.0 24.5</td>
</tr>
<tr>
<td>Hemorrhoidectomy</td>
<td>2.5 4.0 5.5</td>
<td>9.0 10.0 11.0</td>
</tr>
<tr>
<td>Males</td>
<td>29.5 30.0 30.5</td>
<td>47.5 48.0 48.5</td>
</tr>
<tr>
<td>Females</td>
<td>11.5 12.0 12.5</td>
<td>28.5 29.0 29.5</td>
</tr>
<tr>
<td>Cholecystectomy</td>
<td>17.5 18.0 18.5</td>
<td>27.0 28.0 28.5</td>
</tr>
<tr>
<td>Mastectomy</td>
<td>20.0 21.0 21.5</td>
<td>34.0 35.0 35.5</td>
</tr>
<tr>
<td>Dilatation and curettage</td>
<td>10.5 12.0 13.5</td>
<td>14.0 15.0 15.5</td>
</tr>
<tr>
<td>Vaginal cesarean</td>
<td>6.0 7.0 8.0</td>
<td>24.0 25.0 25.5</td>
</tr>
</tbody>
</table>

Source: Science 1973 182:1102-1108

Probability of Having Surgery in 11 Vermont Hospitals

Surgical Rates for the Most Populous Hospital Areas: Maine
The Surgical Signature

together, these factors cannot explain all the variation in rates of individual procedures. The strongest remaining hypothesis is that the judgments and preferences of physicians give rise to the surgical signature.

International Differences in Surgical Rates

Proof of Preference-Sensitive Care

Preference-Sensitive Care aka:

Terminology

• Unwarranted Variation:
  – Care that is not consistent with a patient’s preference or related to their underlying illness
• Preference-Sensitive Care
  – No right rate (T&A)
  – Misuse
• Effective Care
  – Evidence-based care not provided
  – Underuse
Evidence for Underuse of Effective Care: Adults

The Quality of Health Care Delivered to Adults in the United States

Elizabeth A. McGlynn, Ph.D., Steven M. Asch, M.D., M.P.H., John Adams, Ph.D., Joan Keese, B.A., Jennifer Hicks, M.P.H., Ph.D., Alison DeCristofaro, M.P.H., and Eve A. Kerr, M.D., M.P.H.

Terminology

- **Unwarranted Variation:**
  - Care that is not consistent with a patient’s preference or related to their underlying illness
- **Preference-Sensitive Care (Misuse):**
  - No right rate
- **Effective Care (Underuse):**
  - Evidence-based care not provided
- **Supply-Sensitive Care (Overuse):**
  - Systems supply creates demand

The Dartmouth Atlas: Medicare Spending Varies Dramatically

Variations in Spending for Patients with Severe Chronic Disease across U.S. News and World Reports top 15 “Honor Roll” Academic Medical Centers.

How can the best medical care in the world, cost twice as much as the best medical care in the world? (Uwe Reinhardt)

Most of the differences in spending are due to differences in volume (or intensity), not price. For example, 66% of the variation in spending across academic medical centers can be explained by the number of inpatient days and physician visits alone.

Unwarranted Variation in Medicare Spending

http://www.dartmouthatlas.org/downloads/reports/Spending_Brief_022709.pdf

The Dartmouth Atlas: Effective Care Delivered to Children in the United States

Evidence for Underuse of Effective Care: Children

http://www.ahrq.gov/about/annualconf09/brownlee.htm

63%

12%

25%
Examples of Data Sources in Pediatrics

- Databases
  - PHIS (Pediatric Health Information Systems)
    - Proprietary administrative database
    - Maintained by Child Health Corporation of America (CHCA)
      - Business Alliance of 42 children’s hospitals
  - Proprietary administrative database
    - Maintained by Child Health Corporation of America (CHCA)

- Collaborative Networks
  - VIP (Value in Inpatient Pediatrics)
    - Grassroots collaborative improvement network
    - Data: administrative and chart review

Osteomyelitis: Variability in Early Conversion to Oral Therapy

UTI in Infants: Variability in Length of IV Therapy

Corticosteroid Use After Congenital Heart Surgery
Isn’t Variety the Spice of Life?

Unwarranted Variation: The Losers
- Patients
- Learners
- System (everyone loses)

Preference-Sensitive Losers: The Patients
- Patients lose when not involved
  - Recent Dell Children’s patient comments:
    - “Doctors, deliver a consistent message. We heard different plans from different doctors.”
    - “Lack of communication between doctors”
    - “I was given conflicting info, on which I had to make a judgment call.” I didn’t know who to talk to.
    - “Too many doctors involved”

Preference-Sensitive Losers: The Learners
- “What do you want to do?”
  (everyone does things differently so just tell me what you want to do)
- “I don’t care”
Adverse Effects of Unmeasured Variation

Variation
The Key to Chaos
Donald J. Wheeler
Second Edition

Adverse Systems Effects of Unwarranted Variation

Percent of GDP (gross domestic product). 16.0% in 2007

Medicare: Cost vs Quality

EXHIBIT 1
Relationship Between Quality and Medicare Spending, As Expressed by Overall Quality Ranking, 2000–2003

Quality

Value = ---------------------
Cost

Average Annual Reimbursement per Beneficiary (Wage-Index Adjusted)

Variation in Annual Total Cost and Quality for Chronic Disease

Best Practice Curve

Population per sq. mile
- 10
- 25
- 50
- 100
- 250
- 500
- 1000
- 1500

Beyond Just The Numbers

Quality

Value = ---------------------
Cost

Population per sq. mile
- 10
- 25
- 50
- 100
- 250
- 500
- 1000
- 1500

Source: U.S. Census Bureau
Census 2000 Summary File 1
McAllen vs El Paso: Medicare Spending

A Divergence: Per Capita Real Medicare Expenditures in El Paso and McAllen

To Vary is Human

CABG Rates in California

Public Perception: 'CABG Rates, Redding vs CA

Doctors’ Decisions and Impact on Medical Care
Lenses Under Which to Analyze Doctors’ Decisions

- Uncertainty & limits of the human brain
  - Medical decision-making, clinical problem-solving
- Different Disciplines
  - Clinical, economic, sociological, psychological
- Components
  - Patient, physician, system

We Are Surrounded By Uncertainty

- Defining a Disease
- Making a Diagnosis
- Selecting a Procedure (e.g., test or intervention)
- Observing Outcomes
- Assessing Preferences

Colorectal Experts: Consensus???

Question: What is the effect of screening annual fecal occult blood and flexible scope on colorectal cancer?

Eisenberg: Determinants of Medical Decision-Making

- Physician as a self-fulfilling practitioner
- Physician as patient’s agent
- Physician as guarantor of social good

Eisenberg: Determinants of Medical Decision-Making

- Physician as a self-fulfilling practitioner
  1. Desire for income
  2. Desire for a style of practice
  3. Personal characteristics
  4. Practice setting
  5. Standards established by clinical leadership

Older Doctors Use Fewer Laboratory Tests
Eisenberg: Determinants of Medical Decision-Making

• Physician as a self-fulfilling practitioner
  1. Desire for income
  2. Desire for a style of practice
  3. Personal characteristics
  4. Practice setting
  5. Standards established by clinical leadership

• Physician as patient’s agent
  1. Economic agent
  2. Clinical agent
  3. Patient demand
  4. Defensive medicine
  5. Patient characteristics
  6. Convenience

• Physician as guarantor of social good
  – Duty to the patient vs steward of resources
  – Tension between “the prisoner’s dilemma” and “the tragedy of the commons”
    • Classic scenario: end-of-life care (flat of the curve medicine)

Does Genotype Determine Medical Decision-Making?

Genotype-phenotype correlations with personality traits of healthcare professionals: a new use for the Human Genome Project

<table>
<thead>
<tr>
<th>Personality trait</th>
<th>Genotype</th>
<th>Phenotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belligerence</td>
<td>bel</td>
<td>All surgeons and hospital administrators</td>
</tr>
<tr>
<td>Charisma</td>
<td>cub</td>
<td>Oily charm; mostly cardiothoracic and plastic surgeons</td>
</tr>
<tr>
<td>Cynicism</td>
<td>Originally cyn, now dub</td>
<td>Writers of medical humour; cardiologists heterozygous</td>
</tr>
<tr>
<td>Housekeeping</td>
<td>Vsc and urn</td>
<td>Inverse correlation with Y chromosome</td>
</tr>
<tr>
<td>No personality</td>
<td>ddx-1</td>
<td>Orthopaedic surgeons</td>
</tr>
<tr>
<td>Obsessive-compulsive</td>
<td>pic-e</td>
<td>Medical journal editors, oncologists</td>
</tr>
<tr>
<td>Gullibility</td>
<td>sulk-r</td>
<td>Social workers and those not born yesterday</td>
</tr>
</tbody>
</table>

Knowledge is Paralyzing

The more you know, the harder it is to take decisive action. Once you become informed, you start seeing complexities and shades of grey. You realize that nothing is as clear and simple as it first appears. Ultimately, knowledge is paralyzing.

Being a man of action, I can’t afford to take that risk. You’re ignorant, but at least, you act on it.
**How Do We Improve?**

**Learn from Patients**

- Paternalistic Craft-based Silos are archaic

**Learn from Improvement Science**

1. Measure the process
2. Analyze the data
3. Intervene: Control the process

**Learn from Improvement Science**

- Control unwarranted variation through standardization
- Continue to measure and analyze

**Learn from Improvement Science**

- Measure the process
- Analyze the data
- Intervene: Control the process

**Quality Improvement in Action: Control Chart**

- Step 1: Measure
- Step 2: Analyze
- Step 3: Intervene - Standardize
- Step 4: Analyze

**Research is a Slightly Different Order**

1. Measure the process
2. Control everything
3. Intervene
4. Analyze the data
Learn from High Performers

- Pediatric Oncology
  - Minimal unwarranted variation
  - All variation is measured & patient-level
  - Enormous success
    - Pediatric cancer transformed from uniformly fatal disease in 1950s to 78% five-year survival for all types
    - Better outcomes than adult groups for adolescents and young adults (AYA)

Pediatric vs Adult Trials in AYA with ALL

- Reasons
  - Better compliance on pediatric protocols
  - Better enrollment in pediatric trials

- Next Steps
  - Enrolling adults in trials with pediatric protocols

If to vary is human, then only through collaboration will we truly divine