Quality Control in American Healthcare

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Motivation

• Practically every industrial process uses statistical methods of process control to minimize variability and enhance efficiency

• The American health care industry uses statistical methods unevenly, if at all

• We need to view health care as a process and strive to minimize outside sources of variability and maximize efficiency and effectiveness
Approach

• Shewhart’s notion of total quality management: [1]

Examine the total variability of the system and isolate the random variation from the variation due to assignable causes

Once causes are detected, they can then be removed from the process

Note: Intended variation due to the better judgement of doctors is not targeted for elimination, but rather the unintended, misinterpreted variation.
Current state of quality

- Quality is improving at a slow pace [9]

- Hospital care is improving quicker than outpatient care [9]

- Acute care is improving quicker than preventative care and chronic disease management [9]
Sources of Variability

- Over-utilization of services
- Under-utilization of services
- Variation of service
- Error
Over-utilization of services

- Unnecessary surgeries, over medication, unnecessary hospitalization, etc.

- Over-utilization of services is a drain on resources and exposes patients to unnecessary risks
Over-utilization of services

• **Example: Unnecessary surgery** [8]

  16% of women undergoing hysterectomies were doing so for clinically inappropriate reasons

  49% of carotid endarterectomies were of uncertain clinical value, and 18% were considered inappropriate

• **Example: Over medication** [8]

  10% of doctors visits are due to respiratory infections with viral causes, but in 30-70% of these visits useless antibiotics were prescribed

  42% had useless anti-inflammatory drugs prescribed
Over-utilization of services

- **Example**: Unnecessary hospitalization[^8]

  Varies regionally, but in one community, 10-35% of hospitalizations were deemed inappropriate.

  61% of hospitalizations for pneumonia were deemed medically inappropriate.
Under-utilization of services

- Preventative care:
  - Immunizations
  - Disease screening
  - Health counseling
  - Preventative treatments in acute care

- Under-utilization of services leads to unnecessary added costs and wasted resources and exposes patients to preventable health risks/complications

- Key contributing factor to the under-utilization of services is lack of health insurance
Under-utilization of services

Example: Breast cancer screening

- New cases of breast cancer (2008): 192,370
- 13% of total new cancer cases

<table>
<thead>
<tr>
<th>Costs</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Costs</td>
<td>$144.4 billion</td>
</tr>
<tr>
<td>Direct Costs</td>
<td>$99 billion</td>
</tr>
<tr>
<td>Total Costs</td>
<td>$243.4 billion</td>
</tr>
<tr>
<td>Screening Costs</td>
<td>$35,000-$165,000</td>
</tr>
</tbody>
</table>

[9]
Under-utilization of services

- **Example:** Immunizations
  - 67.8% of individuals aged 19-35 in Arkansas were up to date on immunizations (2008)[5]

- **Example:** Health counseling
  - 70% of current smokers have wanted to quit at some point, while only 40% of current smokers have quit for greater than one day[2]

- **Example:** Lack of insurance
  - Median level of receipt of services for uninsured is 50% vs. 65% for insured individuals[9]
Under-utilization of services

- **Example**: Lack of insurance

<table>
<thead>
<tr>
<th>Measure</th>
<th>Private insurance (%)</th>
<th>No insurance (%)</th>
<th>Difference (Private - No insurance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women ages 40-64 who had a mammogram in the last 2 years</td>
<td>74.2</td>
<td>38.3</td>
<td>35.9</td>
</tr>
<tr>
<td>Children ages 2-17 who had a dental visit in the calendar year</td>
<td>59.6</td>
<td>27.9</td>
<td>31.7</td>
</tr>
<tr>
<td>Adults ages 40-64 with diagnosed diabetes who received a dilated eye examination in the calendar year</td>
<td>64.1</td>
<td>35.4</td>
<td>28.7</td>
</tr>
<tr>
<td>Adults ages 50-64 who ever received a colonoscopy, sigmoidoscopy, or proctoscopy</td>
<td>47.5</td>
<td>20.7</td>
<td>26.8</td>
</tr>
<tr>
<td>Adults ages 18-64 with obesity who received advice from a provider to exercise</td>
<td>61.0</td>
<td>41.2</td>
<td>19.8</td>
</tr>
<tr>
<td>Women ages 18-64 who received a Pap smear in the last 3 years</td>
<td>86.3</td>
<td>66.9</td>
<td>19.4</td>
</tr>
<tr>
<td>Adults ages 40-64 with diagnosed diabetes who received a hemoglobin A1c measurement in the calendar year</td>
<td>94.2</td>
<td>75.7</td>
<td>18.5</td>
</tr>
<tr>
<td>Adults ages 18-64 with obesity who received advice about healthy eating</td>
<td>50.3</td>
<td>32.0</td>
<td>18.3</td>
</tr>
<tr>
<td>Children ages 2-17 who received advice about healthy eating</td>
<td>59.1</td>
<td>41.4</td>
<td>17.7</td>
</tr>
<tr>
<td>Adults ages 18-64 at high risk (e.g., diabetes) who received an influenza vaccination in the last 12 months</td>
<td>32.5</td>
<td>16.8</td>
<td>15.7</td>
</tr>
</tbody>
</table>

**Note**: All differences in this table are statistically significant.
Errors

• A medical error is the failure of a planned action to be completed as intended, or the use of a wrong plan to achieve an aim

• Four types of errors: [3]

  • Diagnostic: Errors/delays in diagnosis, failure to perform required tests, failure to act on tests, use of outdated tests, etc.

  • Treatment: Errors in dosage/administration of drug or treatment, error in performing treatment, failure to provide appropriate care, etc.

  • Preventative: Failure to provide preventative treatment, inadequate monitoring of a treatment, etc.

  • Other: Failure to communicate, equipment failure, system failure, etc.
Errors

- In 1997, preventable errors exceeded the number 8 cause of death in the U.S., exceeding motor vehicle accident deaths and breast cancer [3]

- Total cost (indirect + direct): $37.4 billion - $50 billion (2000)

  Total cost (indirect + direct) for preventable errors: $17 billion - $29 billion [3]

- Quality of hospital safety is not improving fast enough; only 36% of hospitals are improving at a rate greater than 5% per year [9]

- Rates for hospital related infections are not improving; rates for post-operative sepsis infections are getting worse [9]
Errors

- More than 70% of errors in a 2000 study were found to be preventable. Out of this: [9]
  - 44% were technical errors
  - 17% diagnosis errors
  - 12% failure to prevent injury errors
  - 10% error in drug use
Variation of services

• Overcorrection:
  • Stems from psychological unwillingness to accept natural, random variability
  • Type I error

• Regional:
  • Regional standards of practice
  • Regional variation of quality of care

• Standards of practice:
  • Need for standards to be determined via analytic, evidence-based decision making processes
Variation of services

- Regional variation of services

- **Example**: Rates of mammography, a preventative service, by state

- Midwest and New England tend to have highest level of quality care, while the Southwest and South Central regions have the lowest quality of care [10]
Variation of services

- Standards of practice:
  - Guidelines which are governed by certain quality indicators
  - Each professional organization (regionally and nationally) has their own standards of practice
  - Dictated by a mix of properly designed, randomized controlled trials paired with opinions of ‘respected authorities’, and mostly improperly designed trials [7]
Variation of services

- **Example**: Smoking cessation guidelines which used systematic reviews of controlled trials: [7]

- Canada 60%
- New Zealand 56%
- United Kingdom 59%
- United States 47%

- 39-73% of the recommendations could have been developed using a rigorous systematic method, but only 0-36% were
Areas to focus improvement efforts

- Decision making processes
- Healthcare providers
- Patients
- Systems
Decision making processes

• We need a dramatic shift from opinion-based decision making processes to evidence-based processes [7]

• 50-74% of all methods used to create standard of practice guidelines came from improperly designed trials coupled with opinions from respected authorities

• Use of ‘intervention services’ based on scientific reasoning if a doctor prescribes a procedure in which the expected health risk exceeds the expected health benefit
Health care providers

• Individualized outreach efforts to remove erroneous, outdated or absent information and skills

• Supply structured ‘encounter forms’ to follow to provide a given set of treatments and milestones to check for

• Standardized standards of practice guidelines to follow

• Enhanced communication and feedback
  • Aids in locating possible sources of inefficiency

• Focus on team model
  • Everyone feels their input is valued, thus are more willing to bring up potential problems
Patients

• Focus on preventative care to curb refusal of treatment

• Increasing frequency and intensity of visits increases patient willingness to participate

• Reminder systems: phone calls and birthday reminders are the most effective
Systems

• Empower health care providers with health information technology and training

• Take ideas from successful VA restructuring program:
  
  • New emphasis on preventative and ambulatory care
  
  • Enhanced information management
  
  • Decentralized decision making
  
  • Increased partnerships
  
  • Team based focus

• Emphasis on simplicity; errors increase as system complexity increases
Perceived obstacles

• Keeping up with new technology and methods
  • Solved by uniform standards of practice combined with a system which coordinates hospitals as groups

• Resistance from health care providers
  • Solved by individualized outreach efforts, increased accountability, guidance, more effective forms of feedback and a team based approach
Concluding remarks

• Steps to improving efficiency:

  • Recognize main sources of variability from identifiable causes:

    • Overuse and underuse of resources, preventable errors and variation in care

  • Address these sources to reduce the total system variability:

    • Change decision making processes and systems, while focusing on health care providers and patients

• Increase health care coverage consistently across the nation
Sources


