The Value of Quality and Disparities Improvement:

A Framework for Prioritizing Healthcare Performance Measurement

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"The Opportunity Costs of Haphazard Social Investments in Life-Saving"
(Tengs and Graham 1996)

- 185 interventions that reduce premature death
- U.S. spent $21 billion
  - Prevented 56,700 premature deaths
  - Saved 593,000 life-years
- Choosing alternative set of interventions, $21 billion could have
  - Prevented additional 60,200 deaths
  - Saved additional 595,000 life-years

Avoiding Haphazard Investment in Healthcare Quality Improvement

- Over 1,400 quality indicators in the National Quality Measures Clearinghouse (NQMC)
- 2008 National Healthcare Quality Report (NHQR) includes 224 measures (45 core)

Problem: How to choose/prioritize measures for national reporting?

Approach: Choose set of measures that maximize population net health benefit of improving performance on that measure

  - Choose measures with greatest value of quality improvement (VQI)

Net Health Benefit

- Stinnett and Mullahy (1998)
- Given standard of care *S* and alternative *O, net health benefit of S is*

$$NHB_S = \Delta Effectiveness - \frac{\Delta Costs}{\lambda}$$

- Effectiveness measured in life-years or quality-adjusted life years
- Cost term is opportunity cost of spending in terms of health if spent cost-effectively
- Advantage over CEA is that NHB measures scale of net benefit of intervention – at least on per-capita level

Value of Perfect Implementation

- What is the value of perfect performance for a standard of care?

$$VPI = N_S \times NHB_S$$

Number of individuals who should receive *S*

Net Health Benefit of *S*

Value of Current Implementation

- What is the value of current performance for a standard of care?

$$VCI = N_S \times r_S \times NHB_S$$

Number of individuals who should receive *S*

Current Performance Rate

Net Health Benefit of *S*

Maximum Value of Quality Improvement

- What is the maximum potential value of improving performance for a standard of care?

$$MaxVQI = N_S \times (1 - r_S) \times NHB_S$$

Number of individuals who should receive *S*

Quality Gap

Net Health Benefit of *S*

Value of Quality Improvement

- What is the maximum potential value of improving performance for a standard of care?

$$MaxVQI = N_S \times (1 - r_S) \times NHB_S$$

Number of individuals who should receive *S*

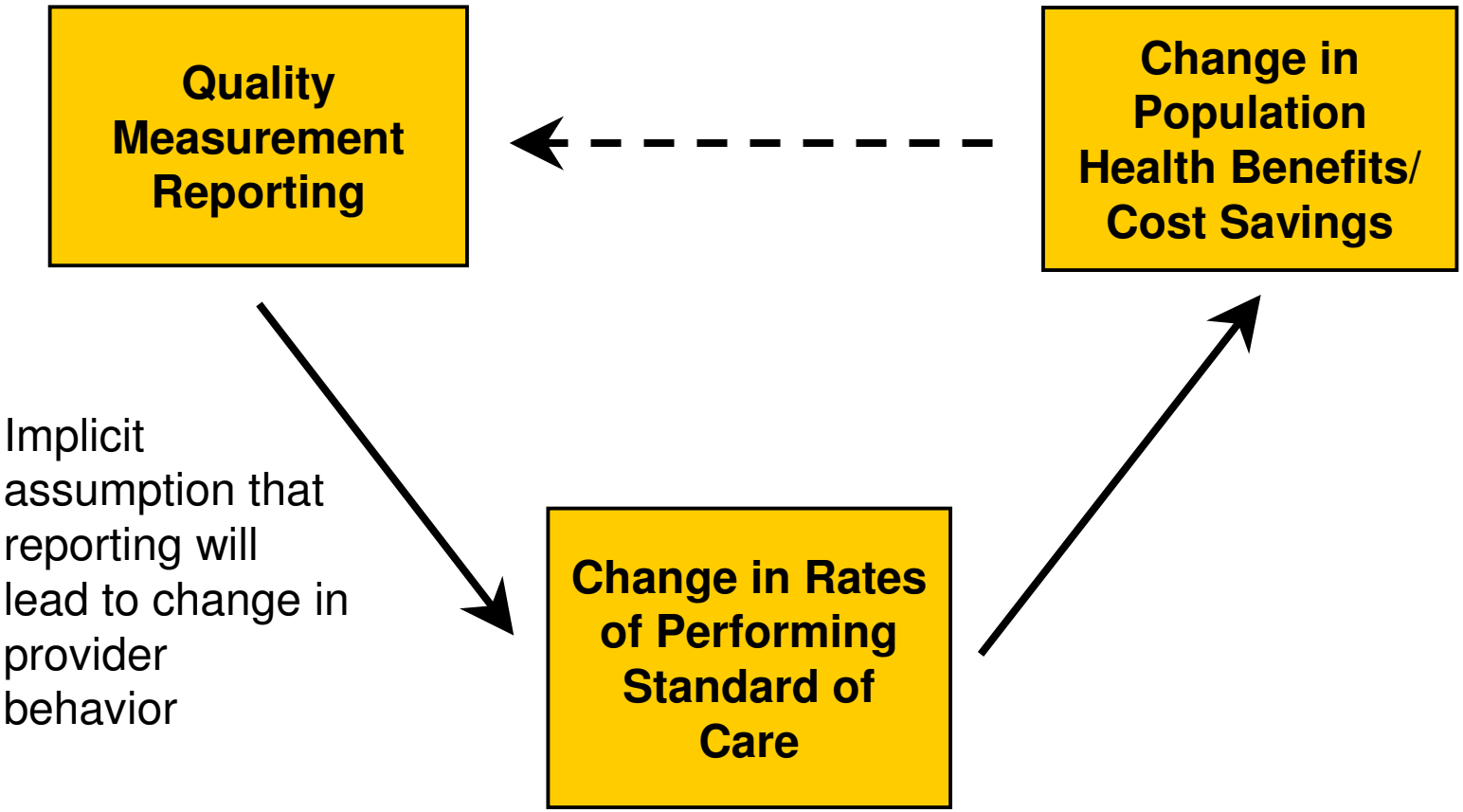
Quality Gap

Net Health Benefit of *S*

- *Max VQI* should not be used as estimate of value of a quality measure… why?

Action Model (Max VQI)

From Quality Measures to NHBs

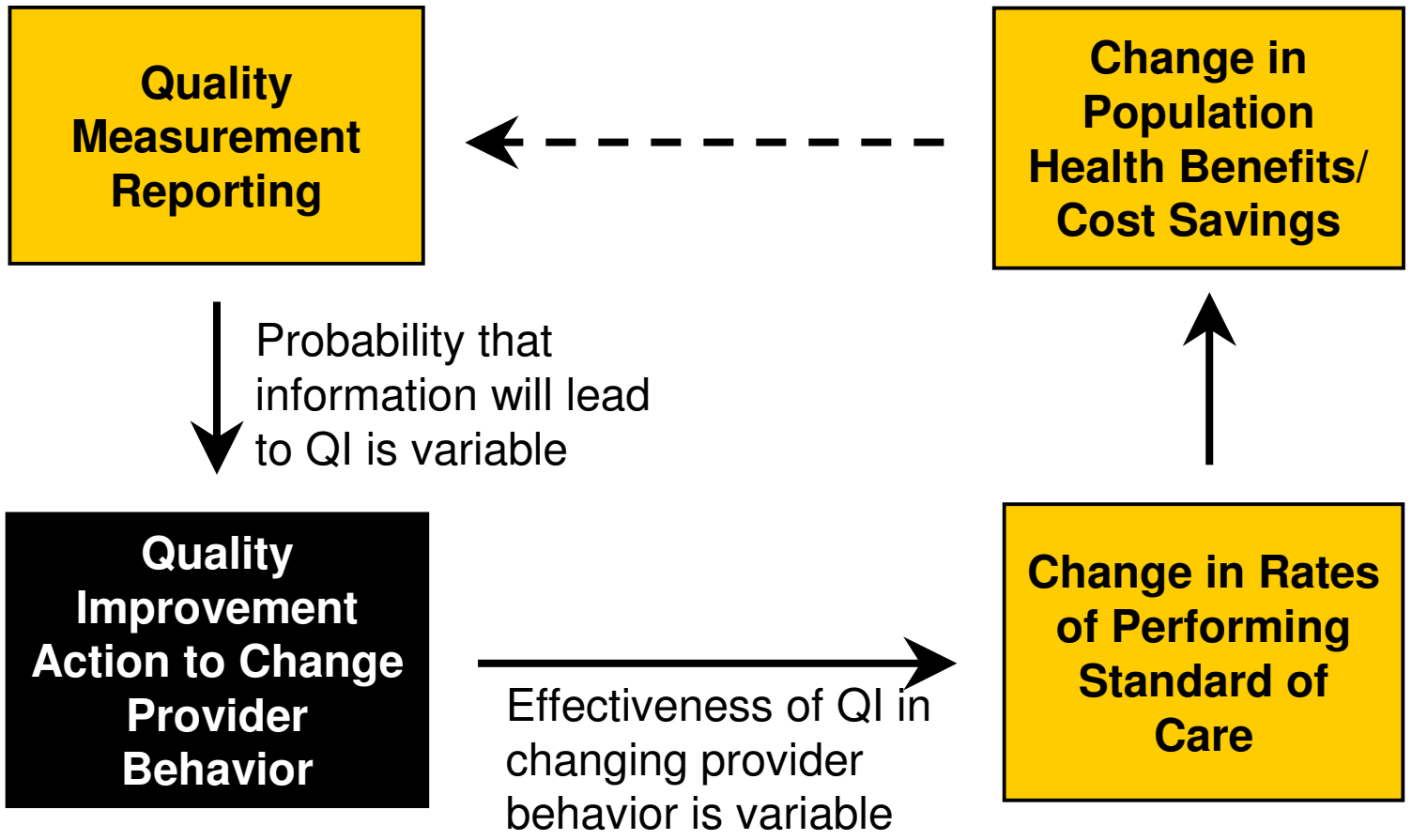


Black Box: Linking Measure Reporting to Behavior Change

- Feedback reports do not necessarily lead to quality improvement effort
  - Kiefe et al. (2001) – 55% physicians implemented QI intervention to improve practice after receipt of feedback report
  - Fung et al. (2008) – *"We identified no published studies of the effect of publicly reporting performance data on quality improvement activity among physicians or physician groups."*

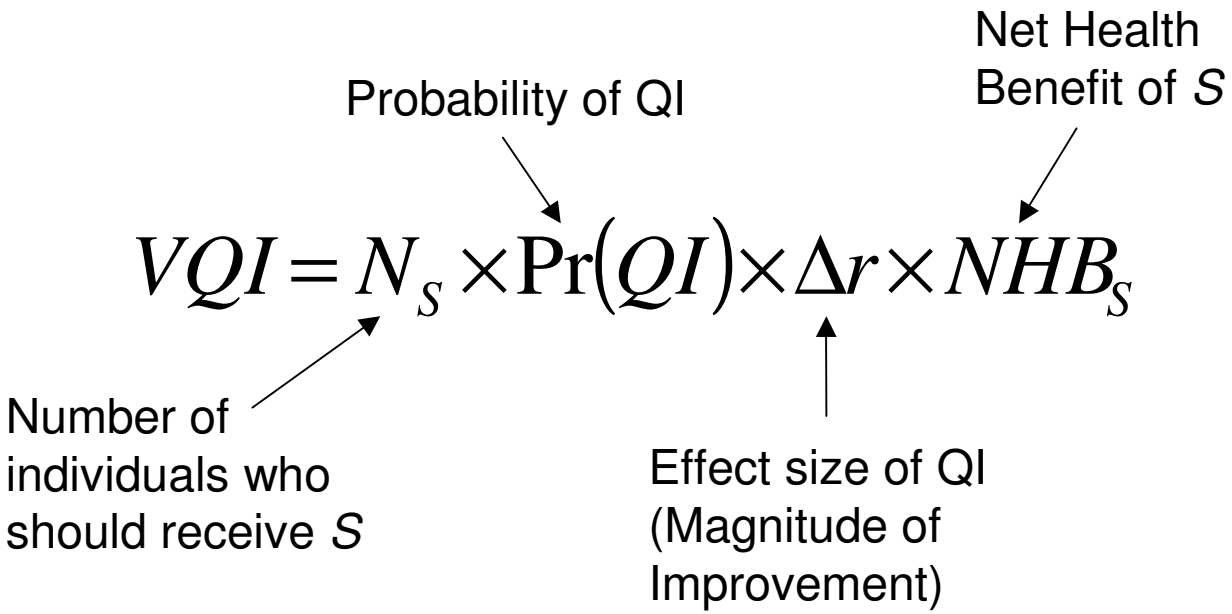
Action Model (VQI Approach)

From Quality Measures to NHBs



Value of Quality Improvement

- What is the potential value of improving performance for a standard of care?



Determining the Value of Quality Measurement

- Probability that measure reporting will lead to QI effort
- Effectiveness of QI effort
- Current levels of implementing standard of care
- Size of measure population (number of individuals who should receive the standard of care)
- NHB of standard of care

Value of Quality Improvement

- What is the potential value of improving performance for a standard of care?

Expected Value of Improvement in Performance Rate

Net Health Benefit of *S*

$$VQI = N_S \times E(\Delta r) \times NHB_S$$

Number of individuals who should receive *S*

Determining the Value of Quality Measurement

- Expected value of quality improvement with measure reporting
- Size of measure population (number of individuals who should receive the standard of care)
- NHB of standard of care

Scope of Application

- Can estimate NHB gained from reducing overuse/inappropriate use
- In theory, can handle
  - Process measures, composites
  - Outcomes measures
  - Access/utilization
  - Patient experience
- Main limitation in application is due to availability of information regarding
  - NHB
  - Probability of QI, effectiveness of QI

Example: Pap Smear

Measure: Percent of women ages 18+ who had a pap smear in the last 3 years

Consider a single cohort of 18 year-old women in 2008…

- N_S=2,097,419

Screening Frequency

- Of the 2,097,419 18 year-olds in 2008, suppose:
  - 6% do not get screened (underuse)
  - 16.9% get screened every 3 years
  - 59.2% get screened every year (overuse)
  - 17.9% get screened every 2 years (overuse)

What Is the Value of Quality Improvement for this Cohort?

A. Value of implementing triennial screening for 6% of cohort
B. Value of reducing screening from every years to every 3 years for 59% of cohort
C. Value of reducing screening from every 2 years to every 3 years for 18% of cohort
D. Max VQI for moving cohort to triennial screening?

A. NHB Pap Smear Every 3 Years for 6% of Cohort Not Getting Screened

- Alternative: No screening

$$\Delta e = 0.19\ Life-years\ gained$$

$$\Delta c = \$500$$

$$\lambda = \$50{,}000$$

$$NHB_S = 0.19 - \frac{\$500}{\$50{,}000} = 0.18\ Life-years$$

A. VPI Pap Smear Every 3 Years Among Those Not Screened

- Population NHB if all women aged 18 currently not screened received triennial pap smears

$$VPI_S = N_S \times NHB_S$$
$$= 125{,}845 \times 0.18 Life - years$$
$$= 22{,}652 \, Life - years \, gained$$

1. This is also MaxVQI

B. VCI Pap Smear Among Those Currently Screened Every Year

- NHB of annual screening vs. triennial screening

$$\Delta e = 0.003\ Life-years\ gained$$

$$\Delta c = \$1000$$

$$\lambda = \$50{,}000$$

$$NHB_S = 0.003 - \frac{\$1000}{\$50{,}000} = -0.017\ Life-years$$

- VCI of annual screening

$$VCI_S = 375{,}438 \times (-0.017)$$
$$= -6{,}382\ Life-years\ gained$$

C. VCI Pap Smear Among Those Currently Screened Every 2 Years

- NHB of biennial screening vs. triennial screening

$$\Delta e = 0.002\ Life-years\ gained$$
$$\Delta c = \$250$$
$$\lambda = \$50{,}000$$
$$NHB_S = 0.002 - \frac{\$250}{\$50{,}000} = -0.003\ Life-years$$

- VCI of biennial screening

$$VCI_S = 1{,}241{,}672 \times (-0.003)$$
$$= -3{,}725\ Life-years\ gained$$

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