

6.2a Healthcare Quality

10x10 – Introduction to Biomedical Informatics & Artificial Intelligence
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Overview

Definitions and framework for assessing quality

What we know about healthcare quality

Concerns about quality measures

Current quality measures and programs

Role of IT and informatics

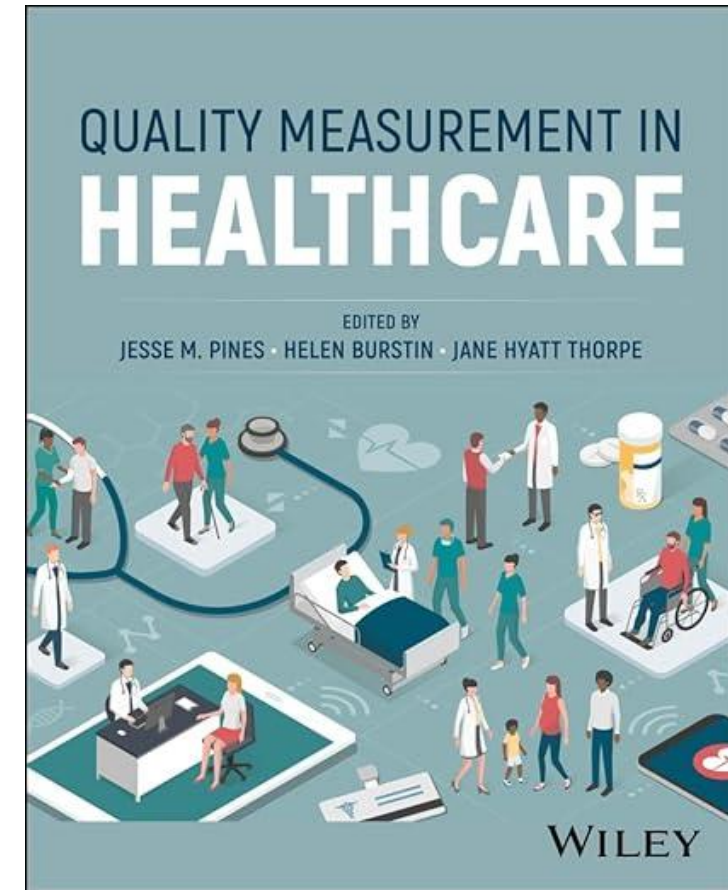
Definitions and operationalization

Early thought leader was Donabedian (1988): “That kind of care which is expected to maximize an inclusive measure of patient welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all its parts.”

Another widely quoted definition is from IOM (Lohr, 1990): The “degree to which health services for individuals and populations increase the likelihood of desired outcomes and are consistent with current professional knowledge.”

In era of rising costs and concerns about quality, physicians and the healthcare system must have public accountability (Chassin, 2010)

Recent overview textbook with focus on newer approaches and measures (Pines, 2025)



Why do we want to measure and improve quality?

Berwick “triple aim” (Berwick, 2008)

- Improving experience of care
- Improving health of population
- Reducing costs

Has expanded to

- “Quadruple” aim that includes clinician and staff well-being (Bodenheimer, 2014)
- “Quintuple” aim that adds health equity (Nundy, 2022)

Healthcare must strive to be “high-value, cost-conscious” (Owens, 2011), and “high reliability” (Chassin, 2011)

- An essential physician competency (Weinberger, 2011)
- Aiming to improve value of care is not rationing (Lee, 2014)

Investments in health IT can enable the “learning health system” (Friedman, 2010), allowing us to take advantage of data in the electronic health record (EHR) (IOM, 2012)

Donabedian (2002) model of quality

Three categories

- Structural – factors that make it easier or harder to deliver high-quality care, e.g., hospital volume, physician licensure, nurse staffing levels
- Process – factors describing healthcare content and activities, e.g., adherence to guidelines for screening, treatment, etc.
- Outcomes – changes attributable to care, e.g., mortality, morbidity, functional status

Implemented and measured at different levels at an institution, e.g., individual, department, organization

In general, want to focus on outcomes

- Represents what actually happens to patient
- But difficult to measure and have confounding factors

Ideal quality measures

“You can’t improve what you don’t measure”

- Various

“In God we trust, all others bring data”

- Edward Deming, statistician (1900-1993)

Landon (2003) attributes of ideal quality measures

- Evidence-based
- Agreed-on standards for satisfactory performance
- Standardized specifications
- Adequate sample size for reliable estimates
- Adjustment for confounding patient factors
- Care attributable to individual physician
- Feasible to collect
- Representative of activities of specialty

Other definitions

Pay for performance (P4P) (NEJM Catalyst, 2018)

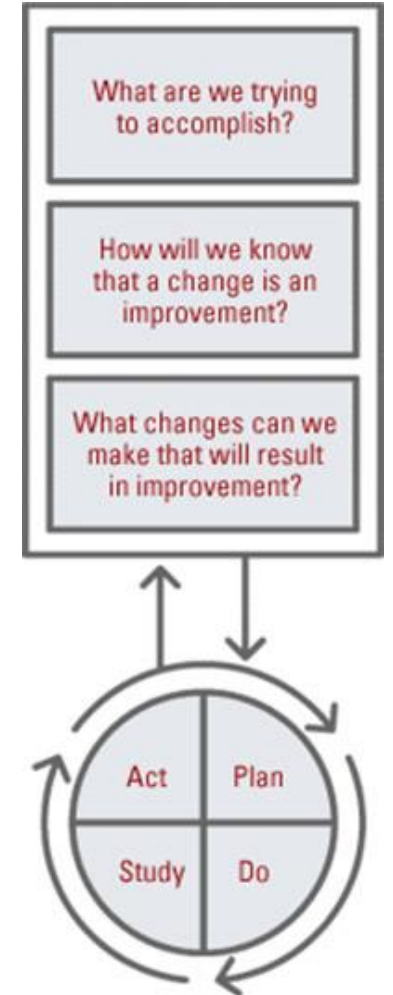
- Based on notion that healthcare should be held accountable financially and otherwise
- Sometimes called value-based purchasing or value-based care (Wilkerson, 2024)
- Often equated with quality measurement and improvement but is just one approach (Rosenthal, 2008)

Public reporting (Mehrotra, 2012)

- Publishing of information about quality, cost, and other aspects of healthcare performance

Plan-Do-Study-Act (PDSA) Cycle (Langley, 2009)

- Framework for implementing improvement work



What we know about healthcare quality

McGlynn and similar studies

Physician characteristics

US national studies

International comparisons

Quality for population at large (McGlynn, 2003)

One of early and most widely cited studies

Reviewed records of 6,712 adults in 12 metropolitan areas for assessment of quality

Records reviewed for 439 indicators of quality of care for 30 acute and chronic diseases and preventive measures (McGlynn, 2003)

Results found wide variations in quality

- Overall 54.9% received recommended care
- Ranged by condition
 - Senile cataract – 78.7%
 - Prenatal care – 73.0%
 - Diabetes mellitus – 45.4%
 - Alcohol dependence – 10.5%

Other data paint similar picture

AHA data for hospitals (Landon, 2006) – only 75.9% of patients receive recommended care for common conditions in hospitals

Quality of care in VA

- Higher for all care, chronic disease care, and preventive care, but not acute care (Asch, 2004)
- 30% better performance for mental healthcare than private sector (Watkins, 2016)
- Outperformed non-VA hospitals in federal patient satisfaction and hospital quality ratings (VA, 2024)

Low-value care remains prevalent at US hospitals but can be measurable and actionable (Ganguli, 2021)

Patient care experience worsened after private equity acquisition of hospitals (Bhalta, 2025)

Quality of care in US ambulatory settings (Levine, 2016)

Four clinical quality composites improved

- Recommended medical treatment (from 36% to 42%)
- Recommended counseling (from 43% to 50%)
- Recommended cancer screening (from 73% to 75%)
- Avoidance of inappropriate cancer screening (from 47% to 51%)

Two clinical quality composites worsened

- Avoidance of inappropriate medical treatments (from 92% to 89%)
- Avoidance of inappropriate antibiotic use (from 50% to 44%)

Three clinical quality measures unchanged

- Recommended diagnostic and preventive testing (76%)
- Recommended diabetes care (68%)
- Inappropriate imaging avoidance (90%)

Physician characteristics and quality

In systematic review of 62 studies, about 70% showed physicians in practice longer provide lower-quality care (Choudhry, 2005)

Delivery of preventive services – only 54% of recommended services delivered in primary care, decreased with age and increased with time spent in exam room (Shires, 2012)

Skill assessed by videotape of bariatric surgery associated with reduced postoperative complications, reoperations, and readmissions (Birkmeyer, 2013)

Hospitalists who scored better on American Board of Internal Medicine (ABIM) initial certification exam (Gary, 2024) or Longitudinal Knowledge Assessment (LKA) (Gray, 2025) had better patient outcomes

Annual quality reports in US

Agency for Healthcare Research and Quality (AHRQ) [annual reports](#) on quality and disparities shows progress being made but still suboptimal

Commonwealth Fund “Mirror, Mirror” report of OECD countries in overall healthcare system performance (Blumenthal, 2024)

	AUS	CAN	FRA	GER	NETH	NZ	SWE	SWIZ	UK	US
OVERALL RANKING	1	7	5	9	2	4	6	8	3	10
Access to Care	9	7	6	3	1	5	4	8	2	10
Care Process	5	4	7	9	3	1	10	6	8	2
Administrative Efficiency	2	5	4	8	6	3	7	10	1	9
Equity	1	7	6	2	3	8	—	4	5	9
Health Outcomes	1	4	5	9	7	3	6	2	8	10

Concerns about quality measures

Performance on measures or in programs may not improve outcomes of care

- Systematic review found association between P4P and process measures (especially from low baselines) but no evidence for improved patient outcomes (Mendelson, 2017)
- Participation in National Surgical Quality Improvement Program (NSQIP) not associated with improved surgical outcomes (Osborne, 2015) or lower complications and mortality (Etzioni, 2015)
- No association between cardiac bypass surgeon online rating and operative mortality rate (Okike, 2016)

Quality measures may be influenced by other factors

- Sociodemographic characteristics of patients (Lipstein, 2014; Kind, 2014)
 - May result in resources diverted to hospitals that are already under-resourced (Chen, 2017)
- Surveillance bias – Hospitals with higher quality scores have higher incidence of venous thromboembolism (Bilimoria, 2013)

Concerns (cont.)

Unintended consequences

- “When a measure becomes a target, it ceases to be a good measure” (Goodhart’s Law, from Koehrsen, 2018)
- Ethical concerns about “routine measurement” (Mitchell, 2021)
- Time to first antibiotic dose in pneumonia (Wachter, 2008)

Variability in rating measures

- US News & World Report “Best Hospitals” minimally associated with improved quality measures or mortality; many non-ranked hospitals comparable (Wang, 2007; Sehgal, 2010)
- Proliferation of measures resulting in different rating levels of same hospitals (Austin, 2015; Hwang, 2016)

Concerns (cont.)

Patient preferences

- What patients want may be at odds with what is measured – Medicare beneficiaries prefer (Trenaman, 2023)
 - Clinical outcomes – 49%
 - Safety – 22%
 - Patient experience – 21%
 - Efficiency – 8%

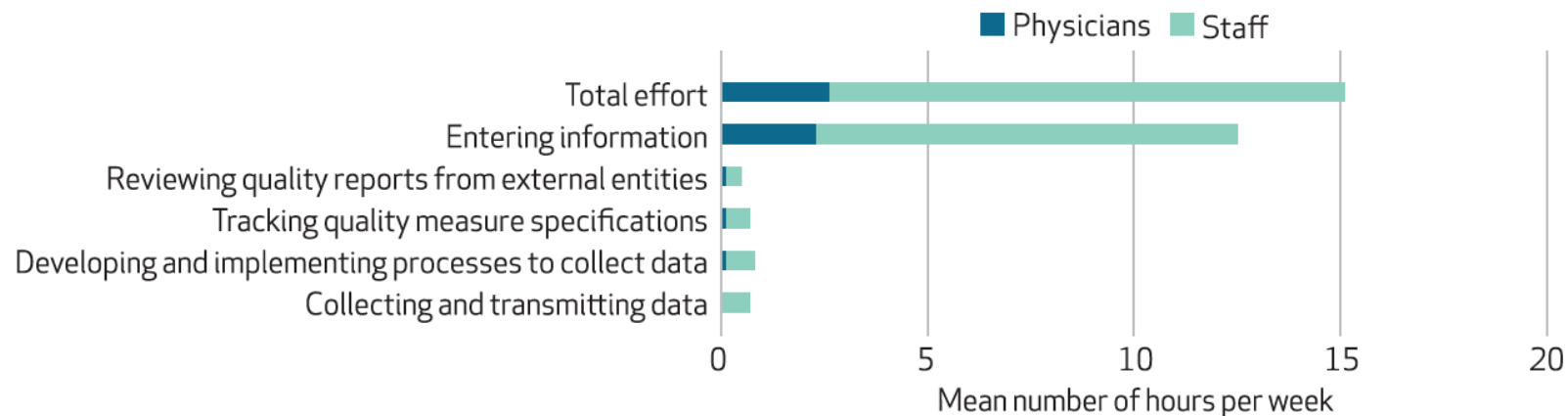
Academic centers and healthcare quality

- May explain why well-known academic medical centers not in “top-performing” 620 hospitals recognized by Joint Commission (Bottles, 2012)
 - In part due to their focus on specialty care and association margins, which may be at odds with value-based care (Kocher, 2023)

Concerns (cont.)

Time and effort

- Physician delivering all recommendations of US Preventive Services Task Force to a patient panel of 2500 with age/sex distribution similar to population would require 7.4 hours per day (Yarnall, 2003)
- Survey of US physician practices of multiple specialties found total cost to healthcare system estimated to be \$15.4 billion (Casalino, 2016)
- For large acute care academic hospital, reporting costs \$5.6M and used >100K person-hours (Saraswathula, 2023)
- Growing number of value-based contracts for primary care physicians increase number of measures to report on, average – 57 (Boone, 2024)



Patient satisfaction measures

Are patients able to evaluate care quality, or will providers be judged on factors beyond their control? (Price, 2015)

- Even well-resourced patients may not make best choices, e.g., President Clinton cardiac surgery (Sanghavi, 2009)
- Studies in UK and US find trade-off between meeting patient demands (e.g., antibiotic prescriptions) and patient satisfaction (Ashworth, 2016; Jerant, 2017)
- No correlation between online physician ratings and quality provided (Daskivich, 2017)
- Although patient satisfaction with surgery leads to lower rates of readmission (Carter, 2017; Prabhu, 2018)

“Pressure to get good ratings can lead to bad medicine”
(Junewicz, 2015)

Concerns about methodology of Press-Ganey instrument
(Sullivan, 2010), e.g., sample size, meaningful differences, and a contributor to physician burnout (Bermas, 2022)

[Additional vital sign](#)

