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The Duke Center for Health Care Quality and Clinical Excellence

*Next Generation of Quality:
Linking Clinical and Organizational Performance*

April 21, 2010

Presented by the Duke Clinical Research Institute, Duke University School of Medicine, and
The Fuqua School of Business Health Sector Management Program



DukeMedicine



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Meeting Participants

Asif Ahmad, MS, MBA Chief Information Officer, Duke University Health System	Chris Krubert, MD, MBA Chief Executive Officer, ApolloMD
Michael S. Cuffe, MD, MBA Vice President, Medical Affairs, Duke University Health System; Vice Dean, Medical Affairs, Duke University School of Medicine	Cathy Menkiena, RN, BSN, MBA Associate Partner, Business Analytics and Optimization Practice, IBM
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Meeting summary written by Patricia A. French

Next Generation of Quality: Linking Clinical and Organizational Performance April 21, 2010

Drs. Seth Glickman, Eric Peterson, Kevin Schulman, and Bimal Shah hosted the “Next Generation of Quality: Linking Clinical and Organizational Performance” conference at Duke University’s Fuqua School of Business.

Recent governmental mandates, coupled with economic and technological influences, are causing the definition of “quality” in health care to evolve rapidly. The challenge for health care systems in the current era is to incorporate the collection, analysis, and use of high-quality data into both daily operations and long-term strategic goals for the organization. Health care organizations that can adapt rapidly to changing requirements and anticipate future trends in health care delivery and quality assessment will be in the best position to succeed in this competitive environment.

Keynote Address

Topic: The Evolving Quality Agenda
Speaker: Eric D. Peterson, MD, MPH, Professor of Medicine, Associate Vice Chair for Quality, Duke University Medical Center; Associate Director and Director of Cardiovascular Research, Duke Clinical Research Institute

Presentations and Panel Discussions

Topic: Quality from an Organizational Perspective
Speaker: Seth Glickman, MD, MBA, Assistant Professor of Emergency Medicine, University of North Carolina at Chapel Hill (UNC); Assistant Research Professor, Duke University Fuqua School of Business

Topic: New Concepts in Quality: How Do We Build Accountability Into Health Care Organizations?
Speaker: Kevin A. Schulman, MD, MBA, Professor of Medicine, Duke University School of Medicine; Professor of Business Administration and Director, Health Sector Management Program, Fuqua School of Business; Director, Center for Clinical and Genetic Economics; Associate Director, Duke Clinical Research Institute

Topic: Panel Discussion: What Are the Strategies Related to Quality Across the System? Can We Improve Efficiency and Clinical Quality?
Moderator: Bimal Shah, MD, MBA, Assistant Professor of Medicine, Division of Cardiology, Duke University Medical Center
Panelists: Michael S. Cuffe, MD, MBA, Vice President, Medical Affairs, Duke University Health System; Vice Dean, Medical Affairs, Duke University School of Medicine
Chris Krubert, MD, MBA, Chief Executive Officer, ApolloMD
Thinh H. Tran, MD, Corporate Vice President, Chief Medical and Chief Quality Officer, Baptist Health South Florida

Topic: Measures and Methodologies
Speaker: Sean O’Brien, PhD, Assistant Professor, Biostatistics and Bioinformatics, Duke University Medical Center

Topic: Panel Discussion: IT Landscape

Moderator: Adrian F. Hernandez, MD, Assistant Professor, Duke University School of Medicine

Panelists: Asif Ahmad, MS, MBA, Chief Information Officer, Duke University Health System
Bharat Sutariya, MD, Vice President, Cerner
Cathy Menkiena, RN, BSN, MBA, Associate Partner, Business Analytics and Optimization Practice, IBM

Topic: Bridging the Gap: Leveraging Enterprise Data Stores in Support of Quality, Safety, and Research

Speaker: Jeff Ferranti, MD, MS, Associate Chief Information Officer, Enterprise Analytics and Patient Safety, Duke University Health System

Topic: Panel Discussion: Moving Forward: Next Steps on a Quality Agenda

Moderator: Katherine Grichnik, MD, Associate Dean for CME, Duke University School of Medicine; Professor of Anesthesia, Duke University Medical Center

Panelists: Kevin A. Schulman, MD, MBA, Director, Fuqua School of Business Health Sector Management Program, Fuqua School of Business; Director, Center for Clinical and Genetic Economics; Associate Director, Duke Clinical Research Institute
Michael S. Cuffe, MD, MBA, Vice President, Medical Affairs, Duke University Health System; Vice Dean, Medical Affairs, Duke University School of Medicine
Seth Glickman, MD, MBA, Assistant Professor of Emergency Medicine, University of North Carolina at Chapel Hill (UNC); Assistant Research Professor, Duke University Fuqua School of Business

Keynote: the Evolving Quality Agenda

Speaker: Eric D. Peterson, MD, MPH, Professor of Medicine, Associate Vice Chair for Quality, Duke University Medical Center; Associate Director and Director of Cardiovascular Research, Duke Clinical Research Institute

“Quality of care is the degree to which health care services ... increase the likelihood of desired health outcomes and are consistent with current professional knowledge.”

— Institute of Medicine, 1990

Although the United States spends much more on health care per capita than other developed countries, we do not receive a comparable return on our investment. For example, the U.S. ranks 37th in life expectancy among 191 member states according to the World Health Organization.

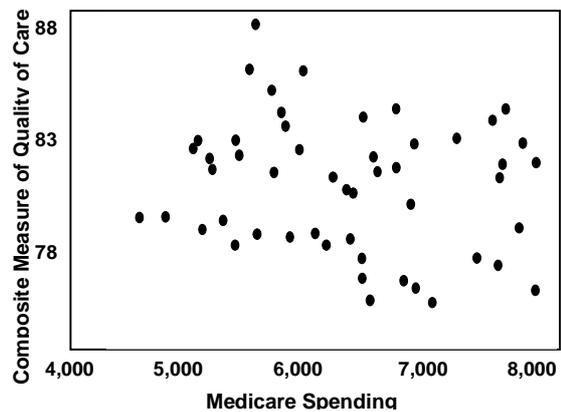
Similarly, in other measures of health care quality specified by the Institute of Medicine (IOM)—timely, effective, safe, equitable, patient-centric, and cost-effective—the U.S. system falls short. The use of guideline-recommended treatments for acute coronary syndromes, for example, varies widely among U.S. hospitals, and nonmedical factors such as race, insurance status, availability and physician ownership of equipment, and geographic location appear to drive some of the disparities in delivery of care. In fact, there appears to be no link between spending on health care and composite measures of quality (figure).

Medical errors of omission/commission remain depressingly frequent. Up to half of all bleeding after myocardial infarction can be attributed to excess heparin dosing, and up to 30% of all bleeding after acute coronary syndromes reflects excess dosing of antithrombotic therapies.

Lack of Evidence: a Multifactorial Issue

A primary reason for both variations in care and suboptimal quality of this care is a lack of evidence with which to make informed decisions. Only 25% of the recommendations in the best guidelines reflect evidence based on randomized controlled

trials. Given that patients in these trials are highly selected, the findings are unlikely to be generalizable to those encountered in practice.



The American Recovery and Reinvestment Act (ARRA) of 2009 economic stimulus package made \$1.1 billion available for comparative effectiveness research (CER), which “compares the benefits and harms of alternative methods to prevent, diagnose, treat, and monitor a clinical condition or to improve the delivery of care.” In addition, the Patient Protection and Affordable Care Act of 2010 (PPACA) established a nonprofit Patient-Centered Outcomes Research Institute, which identifies CER priorities. These investments are likely to provide evidence needed to answer important clinical questions at both the individual and population levels, derived from both analyses of existing datasets and performance of prospective investigations.

Another solution for the lack of clinical evidence is to give health care providers information technology (IT) support for decision-making. Only a minority of practices use electronic health records (EHR) at present, but such systems can drive better practice. For example, when a physician enters orders, the system can display prompts for dosing choices, corollary orders, contraindications to medications, and other aspects of care. EHR systems are gaining more prominence with passage of legislation requiring their installation and with “pay for performance”

requirements of private payers, the Centers for Medicare & Medicaid Services (CMS), and facility accreditation organizations. In the future, patients also might be able to enter real-time data through a common patient–provider portal.

Current quality-assessment measures may not reflect the data that are most important to patients. A well-known example of this phenomenon is the annual ranking of hospitals by [U.S. News & World Report](#), which reflects professional reputation, not clinical outcomes. Ratings sites that account for clinical outcomes include:

- [HealthGrades.com](#): a private, for-profit information company
- [hospitalcompare.hhs.gov](#): a voluntary reporting system coordinated by the U.S. Department of Health and Human Services
- [opa.ca.gov](#): a database on California hospitals, doctors, and health plans, coordinated by the Office of the Patient Advocate
- [leapfroggroup.org](#): a group of large employers providing “market reinforcement for quality and safety of health care”

What Is “Quality”?

Clinical performance measures may not correlate with clinical outcomes. In one large heart failure registry, none of the 5 performance measures specified by the American College of Cardiology/American Heart Association related significantly to reduced early mortality, and only the use of an angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) at discharge was associated with reduced death or readmission at 2–3 months. In another study, there was no link between receiving the recommended counseling about smoking cessation and actual quit rates.

Furthermore, once most providers are following the recommended guidelines and performance measures, the definition of “excellence” must necessarily change. We have reached this point with a few standards of care, such as the use of aspirin after myocardial infarction. How definitions of quality will evolve in response to this

phenomenon remains to be determined.

Finally, the definition of quality may hinge on a suboptimal model of care: under the current payment systems, providers are reimbursed for performing procedures. There are no incentives to provide prevention-centered, coordinated, cost-effective care.

Accountable Care Organizations: The Way of the Future?

The concept of accountable care organizations (ACOs) has emerged as one possible model for refocusing care on patients while controlling costs and coordinating resource use. In its most common structure, the ACO includes a local health care organization and a related set of providers (primary care physicians, specialists, hospitals) that are held accountable for the costs, quality, and capacity of care delivered to a defined population. The Kaiser Permanente system, Mayo Foundation, and Geisinger Health System are all examples of ACOs.

The PPACA authorized creation of a pediatric ACO demonstration project in 2012, which will allow pediatric medical providers meeting specified performance and savings requirements to receive incentive payments. The Act also calls for establishment by 2012 of a shared savings program for existing ACOs providing services to Medicare beneficiaries. Among the requirements are that the ACO “define processes to promote evidence-based medicine and patient engagement, report on quality and cost measures, and coordinate care, such as through the use of telehealth, remote patient monitoring, and other such enabling technologies” and “...meets patient-centeredness criteria ... such as the use of patient and caregiver assessments or the use of individualized care plans.”

Clearly the definition and processes related to quality will continue to evolve.

Quality from an organizational perspective

Speaker: Seth Glickman, MD, MBA, Assistant Professor of Emergency Medicine, UNC; Assistant Research Professor, Duke University Fuqua School of Business

Overview

Health care in the U.S. varies depending on nonmedical factors, and it is fragmented and uncoordinated. Traditional methods of measuring quality fail in such systems. An updated quality framework is presented that integrates people, information, and technology within health care organizations (HCOs).

Discussion topics

- **Components of classic quality framework.**

The three main components in the classic framework for assessing the quality of HCOs are structure (conditions, facilities, equipment, provider characteristics), process (tasks involved in diagnosis and treatment), and outcomes (morbidity, mortality, length of stay, patient satisfaction). All three of these components vary considerably under the current health care system. For outcomes, in-hospital mortality after myocardial infarction, heart failure, and pneumonia varies greatly by hospital volume, and overall readmission rates within 30 days vary by 50% among Medicare beneficiaries. For process variations, a survey of ~20,000 adults indicated that they receive only 50% of the care recommended for 18 major medical conditions, ranging from 10.5% for alcohol dependence to 75.7% for breast cancer. In North Carolina, more than half of the emergency management services (EMS) response times exceeded 20 minutes; in one case, the time approached 1 hour.

- **Updated quality framework.**

Discussions of structure must now include not only “bricks and mortar” facility characteristics but also organizational support for high-quality processes. This updated framework includes management, incentives, culture, organizational design, and information management/IT. **Management:** Quality improved to an unexpectedly large degree when administrative support and leadership barriers were addressed in a large registry of patients with acute coronary syndromes. In another analysis of 79 academic medical centers, the highest-quality hospitals had the following common themes: leadership style, shared sense of purpose, accountability, focus on results, and emphasis on collaboration, and an involved governing board. **Incentives:** Studies conflict about whether pay-for-performance (PFP) schemes improve quality measures. In addition, several outstanding questions remain about the optimal use of incentives. For example, quality has been shown to stagnate after incentives have been met—what should the next step be? Should process, outcomes, or both be incentivized? What about the effect of PFP on health care disparities, given that hospitals treating minorities often are penalized for poorer outcomes? **Culture:** This is the deeper level of basic values, assumptions, and beliefs shared by members of the organization. Patient satisfaction measures are often used to measure whether care is patient-centered, and one study has shown robust correlations between patient satisfaction and both guideline adherence and in-hospital survival after myocardial infarction. **Organizational design:** Strategy, not history, should dictate the integration of people, information, and technology within the organization. Many hospitals are moving to service-line organizations, with each responsible for administering its own quality processes. **Information management/IT:** Only 1.5% of U.S. hospitals have comprehensive EHRs, and only 17% have computerized physician order entry (CPOE). The primary barriers to installing EHRs are the capital requirements and an unclear return on investment. Universal adoption of IT might improve productivity and reduce health care spending by as much as half a trillion dollars over the next decade.

New concepts in quality: how do we build accountability into health care organizations?

Speaker: Kevin A. Schulman, MD, MBA, Professor of Medicine, Duke University School of Medicine; Professor of Business Administration and Director, Health Sector Management Program, Fuqua School of Business; Director, Center for Clinical and Genetic Economics; Associate Director, Duke Clinical Research Institute

Overview

As with other corporations, HCOs can use branding as a way to develop high-quality products and services, to distinguish themselves from other HCOs, and to sustain excellent performance for the organization.

Discussion topics

- **What is a brand?**

A brand is the face of a business strategy, an orientation tool for employees, investors, and customers. Its aspects include the anticipated customer experience, value, design, price, safety, convenience, variety, reliability, and track record. The brand is built around the core organizational values and must answer the following question: What is different about our value proposition? If an organization cannot answer the question, it likely produces a commodity, and it should compete on price. Branding can be the key driver of corporate value. More than half of the value of Nike, McDonald's, Disney Corp., and Coca Cola is brand value, not market capitalization.

- **Building a brand.**

The brand first becomes the core of the business strategy, and then is used in efforts to build customer loyalty and lifetime relationships. The long-term focus is to gain customer commitment to the brand. All areas/departments of the company live and manage the brand; this is not a marketing issue but an organizational commitment and cultural shift, with corresponding metrics and reward systems. For health care, the organization behind the brand can include physicians, practices/divisions, hospital and practice management, hospitals, integrated delivery systems, and payers. All components of the brand's organization should have the same mission (purpose) and vision (guiding principles).

- **Branding and the mission.**

Different HCOs will have different missions, reflecting the promises made to the patients, physicians, and community at large. "Mayo Clinic will provide the best care to every patient every day through integrated clinical practice, education and research." "Kaiser Permanente's mission is to provide high-quality, affordable health care services to improve the health of our members and the communities we serve." "As a world-class academic and health care system, Duke Medicine strives to transform medicine and health locally and globally through innovative scientific research, rapid translation of breakthrough discoveries, educating future clinical and scientific leaders, advocating and practicing evidence-based medicine to improve community health, and leading efforts to eliminate health inequalities."

- **Branding and health care.**

Quality health care is the product of organizations that educate, treat, and care for patients and families. Most HCOs are not organized around this goal. The concept of branding as an organizational strategy offers promise for improving health care quality.

What are the strategies related to quality across the system? Can we improve efficiency and clinical quality?

Moderator: Bimal Shah, MD, MBA, Assistant Professor of Medicine, Division of Cardiology, Duke University Medical Center

Panelists: Michael S. Cuffe, MD, MBA, Vice President, Medical Affairs, Duke University Health System; Vice Dean, Medical Affairs, Duke University School of Medicine
Chris Krubert, MD, MBA, Chief Executive Officer, ApolloMD
Thinh H. Tran, MD, Corporate Vice President, Chief Medical and Chief Quality Officer, Baptist Health South Florida

Overview

This panel discussion covered how to ensure consistent quality across geographically and culturally dispersed organizations, how to set priorities, how to engage patients and families in quality assessments, and how to reduce variations in care.

Discussion topics

- **Driving quality across geographically and culturally diverse staff and facilities.**
An engaged board of directors is critical for ensuring quality across an HCO. Other aspects of delivering consistent-quality care include integration and engagement of the clinical providers, the nonclinical staffs, and the patients and families across the HCO. One successful approach is to align processes with patient-centered care; in other words, patient satisfaction drives provider performance. Another is to create “centers of excellence” for given conditions. Quality should be embedded throughout the organization and made automatic whenever possible, through use of CPOE, prescribing modules, etc.
- **Prioritizing metrics for an HCO over time.**
In addition to evolving practice standards, patient satisfaction and the shorter-term business strategy are likely to drive the acute selection of metrics. Given the financial and personnel costs of implementing changes in data monitoring and reporting, it behooves HCOs to try to anticipate what metrics will be required over the longer term, whether because of government mandates/incentives or for internal strategic purposes. A 3-year horizon might be typical for this process. At the same time, metrics that have outlived their usefulness (because of excellence achieved or obsolescence) should be removed from measurement systems.
- **Engaging patients and families in quality assessment.**
Patient satisfaction survey data are the primary means of engaging patients and families at present. In the future, options for engagement might include 100% follow-up calls, monitoring blogs, having patient advisors for each care unit, and giving patients/families the ability to call a Condition H(elp) to summon a team if they feel that a situation requires medical attention. The new Society for Participatory Medicine also aims to “advance the understanding of physicians and other professionals in the importance of well-informed, empowered and engaged patients making informed decisions about their care and treatment.”
- **Reducing variations in care across the HCO.**
Variations in care should be included in the reporting documentation, and the EHR should be used for data mining related to variations in health care delivery. Payers must also be engaged in this area; at present, no incentive exists for companies to reward good, coordinated care.

Measures and methodologies

Speaker: Sean O'Brien, PhD, Assistant Professor, Biostatistics and Bioinformatics, Duke University Medical Center

Overview

Ignoring uncertainty in performance measures can yield counterintuitive results. Appropriate reporting with measures of uncertainty can therefore prevent misleading interpretations. Although techniques such as Bayesian inference (BI) can provide a rigorous statistical framework for performance measurement, small sample sizes sometimes preclude useful reporting.

Discussion topics

- When reporting performance and quality measures, the sample average represents the population average plus some amount of error. The use of error bars can indicate the robustness of the data, as can the widths of different confidence intervals used (99% versus 95% CIs). Other methods of conveying relative performance include the use of categories of significance (higher, lower, nonsignificant differences), composite scores (one star, two stars, etc.), or Spiegelhalter funnel plots (scattered data points plus CIs).
- BI can be used to express beliefs about unknown qualities in terms of probabilities. For example, the probability that the mortality rate at Hospital A is higher than that at Hospital B is 50% before any data are collected or analyzed. Bayes' formula provides the correct way to update this probability as data continue to accrue, dependent on the context. For a measure such as deaths, 99% certainty is not required.
- The chief advantage of BI is that it can directly answer the question of interest. In contrast, conventional statistical analysis yields a P value with which to reject a null (indirect) hypothesis. In addition, BI allows researchers to take action reflecting the current degree of certainty; they also can calculate the probability of any hypothesis of interest, as well as CIs for ranks.
- Bayesian Estimation of Percentile Benchmarks, probability that hospital is above a given benchmark threshold.
- The main disadvantage of BI is that it requires specifying *a priori* distributions for all unknown parameters. This process is inherently subjective, but it is possible to specify relatively noninformative prior probabilities. Further, as the sample size accumulates, the choice of prior probabilities matters less and less.
- Although there are many methods that can account for uncertainty in calculated estimates, they are not applied universally. For example, at hospitalcompare.hhs.gov, the results for "the percent of heart attack patients receiving percutaneous intervention within 120 minutes" are shown with neither sample sizes nor CIs. A better illustration would provide both of these for the hospitals in question as well as for the national findings. In addition, the site suffers from ceiling effects: if two hospitals have similar and high rates of a quality measure, the likelihood that they will be indistinguishable or ranked incorrectly is also high, especially if the patient sample sizes are small.
- For many measures, hospitals will never accumulate enough data for robust analysis. In such cases, the alternatives include increasing the reporting window (from 1 year to 3 years, for example), reducing the statistical criteria (from 95% CI to 80% CI), "borrowing" information across measures, or using compositing measures. Any of these strategies will yield more events and thus facilitate analysis, but bias and misweighting must be avoided.

IT landscape

Moderator: Adrian F. Hernandez, MD, Assistant Professor, Duke University School of Medicine
Panelists: Asif Ahmad, MS, MBA, Chief Information Officer, Duke University Health System
Bharat Sutariya, MD, Vice President, Cerner
Cathy Menkiena, RN, BSN, MBA, Associate Partner, Business Analytics and Optimization Practice, IBM

Overview

The federal government's recent requirements for data reporting make the development of coordinated, integrated information networks mandatory. This panel discussed how best to accomplish this goal, given existing resources and cultures, and how the delivery of health care might be affected.

Discussion topics

- **IT challenges on the short-term horizon.**
Within the next 3 years, the biggest challenge will be integrating technological requirements into operational procedures. Although EHRs have been deployed in the past, multiple systems must now be integrated, and algorithms developed to analyze the aggregated data. Systems will also need to be altered to become patient-centric, not provider-centric (medicine, nursing, pharmacy, etc.), which will require major cultural and operational adjustments. In addition, the secondary uses of data will become more prominent: predictive analytics, bioprofiling, pharmacogenetics, and financial effectiveness.
- **Creation of patient-centered "medical homes."**
For the creation of a one-stop, comprehensive, patient-centered "medical home," data must be consolidated from hospital care, ambulatory care, pharmacy, third-party payer, and other existing data-collection systems. Health information exchanges, possibly in the form of cloud applications, might offer an integrated solution to link data reporting and reflect new care-delivery models. The ultimate goal is for consistent, cumulative health data to "follow" the patient through all access points of the health care system.
- **Changes in IT business models.**
Anticipated changes in the IT business strategies include moving to utility models that use backend solutions. Software would be provided under a service/subscription model, in which customers (users) simply log in to a Web site, with no need for outlays of capital. There will be an increased emphasis on informatics rather than on IT proper, with IT vendors and solutions companies bringing together people, process, and products. On the regulatory side, several issues require resolution, such as oversight of the clinical content captured by algorithms. Data-governance policies and procedures also must be developed and applied to health care data systems, just as in the financial and insurance industries.
- **Potential changes in healthcare delivery.**
Low-performing health facilities and practices are likely to be absorbed into high-performing systems. In addition, more than 50% of physicians now work for hospitals versus individual practices. The trend appears to be toward evolution of large health systems into a collection of networked facilities that specialize in a condition or in type of care (walk-in, urgent, minute clinics), and some even offer remote care (telemedicine). Continued investments in networked infrastructure will move us toward ultimate value-based purchasing, in which payments will be appropriate for fee-for-service, per-episode, per-condition, and per-lifespan care.

Bridging the gap: leveraging enterprise data stores in support of quality, safety, and research

Speaker: Jeff Ferranti, MD, MS, Associate Chief Information Officer, Enterprise Analytics and Patient Safety, Duke University Health System

Overview

Our ability to gather and store electronic health record (EHR) data has outpaced our ability to analyze and use the information to improve the quality of health care. The learning health care system represents the next step in quality systems architecture.

Discussion topics

- Data are an extremely valuable enterprise asset. As technology continues to evolve, the goals for using data to improve quality should embrace not only metrics and performance tracking but also predictive analytics, bioprofiling of global health, pharmacogenetics, and financial effectiveness.
- Duke Medical Center has the Decision Support Repository (DSR), which has collected financial, clinical, operations, and research data since 1996. It contains 3.82 million patient records (24 million encounters), representing information on 79% of all residents of Durham county residents. It also incorporates data from the Social Security Death Index, tumor registries, and other sources of longitudinal data. Drivers for development and use of the DSR included compliance requirements, patient care/safety concerns, desire to identify revenue-generating opportunities, and research goals, as described below.
- Compliance. In the beginning, 70% of the 50 measures collected were being captured manually. With increased internal, local, regional, and federal requirements for data collection and reporting, this could not be sustained. ARRA funding provides for design and implementation of systems, along with training of users. Further, the federal “meaningful use” requirements call for data capture by 2011, the use of data to advance care processes by 2013, and their use to improve outcomes by 2015. The DSR positions Duke to satisfy these requirements in an efficient manner.
- Patient care/safety. A safety data warehouse enables targeted interventions, supports the translation of discoveries to the bedside, and empowers medical directors with dynamic access to aggregate information. At Duke, the system was used to identify multivariate predictors of necrotizing enterocolitis (NEC) in very small neonates (<1500 g). The resulting changes (holding blood transfusion during feedings, and using donated breast milk instead of formula) are saving 100 infants and \$350,000 per year, in addition to inspiring a basic-science study on SNO hemoglobin levels in transfused blood. An intervention at another center prevented 158 cases of *Clostridium difficile* infection in 1 year.
- Revenue generation. Databases can be queried to identify lost opportunities, prevent billing problems and inconsistencies, and understand variations in cost based on historical data. In one example at Duke, modeling of expected payments for the intensive care unit revealed incorrect billing of charges for critical care nursing. This process-level correction changed a projected \$2.1 million deficit into a \$400,000 profit in 4 months, allowing creation of the Neonatal-Perinatal Research Institute. Such modeling is now performed every year.
- Research. The Duke Enterprise Data Unified Content Explorer (DEDUCE) began development in 2008 with support from Duke’s Clinical and Translational Science Award. It has a user-friendly interface to enterprise data stores, enabling cohort generation based on clinical, demographic, and financial variables. Its partner application, the Duke Integrated Subject Cohort Enrollment Research Network (DISCERN), notifies research staff of possible candidate subjects, according to the variables defined in DEDUCE, in real time. These systems continue to speed enrollment for many studies at Duke.

Moving forward: next steps on a quality agenda

- Moderator:** Katherine Grichnik, MD, Associate Dean for CME, Duke University School of Medicine; Professor of Anesthesia, Duke University Medical Center
- Panelists:** Michael S. Cuffe, MD, MBA, Vice President, Medical Affairs, Duke University Health System; Vice Dean, Medical Affairs, Duke University School of Medicine
Seth Glickman, MD, MBA, Assistant Professor of Emergency Medicine, University of North Carolina at Chapel Hill (UNC); Assistant Research Professor, Duke University Fuqua School of Business
Kevin A. Schulman, MD, MBA, Director, Fuqua School of Business Health Sector Management Program, Fuqua School of Business; Director, Center for Clinical and Genetic Economics; Associate Director, Duke Clinical Research Institute

Overview

The health care environment is evolving rapidly in response to legislative, technological, and economic influences. How to define and measure quality in future care-delivery scenarios was the focus of this discussion.

Discussion topics

- **Current business models are unsustainable.**
The current, hospital-based business model is not cost-effective and does not reflect reality. Other constructs deliver care much more effectively and inexpensively, including clinics within pharmacies, urgent-care centers, and even telemedicine applications. It will be a challenge to develop quality metrics for practice models that are unimaginable at present, but Duke has the advantage in that its patients are employees and citizens of Durham. Such a “closed” model of care facilitates networking and quality tracking, and it allows care options that other models cannot achieve easily.
- **Flexibility, proactivity will be keys to success.**
Health care systems must identify operational aspects that do not add value and remove them. At the same time, they must remain open to taking risks and experimenting, which increase the likelihood of finding good solutions. Such risks might include using venture capital to acquire a biotechnology company, or experimenting with a new business model, depending on the system’s strategic goals and mission. The most successful HCOs will be those that make investments for future success and do not become complacent.
- **Education in the 21st century.**
In the past, health care providers could focus on clinical skills alone. These are no longer sufficient; today, they must understand technology, data management, quality improvement, cost-effectiveness, and leadership. Education related to these skill sets must be incorporated into all training programs for HCO employees, so that all levels of an organization can take ownership of the mission.
- **Quality indicators in the future.**
In keeping with the IOM’s “patient-centric” criterion for health care quality, future measures will continue to evolve from process outcomes to clinical outcomes. Measurement of surrogates will be unacceptable unless it has been shown to correlate definitively with a clinical outcome of interest (length of stay, mortality, complications, etc.). Given the increasingly ambulatory nature of health care delivery, performance standards are also likely to be set for individual clinicians, not just HCOs as a whole. Transparency and public reporting will encourage these trends.