Identifying Key Areas for Delivery System Research

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Contents

Executive Summary

The health care reform law (the Patient Protection and Affordable Care Act of 2010) focuses on two areas: (1) providing nearly all Americans with insurance and (2) delivery system reform. The former has received the most media attention, but the latter is equally important. The discoveries of basic scientific and clinical research do not help patients unless they are effectively used in the delivery system.

The importance of delivery system research as a form of comparative effectiveness research (or Patient-Centered Outcomes Research, as it is often called) has recently been emphasized by the reports of the Institute of Medicine (IOM) Committee on Comparative Effectiveness Research Prioritization (see Appendix A) and by the Federal Coordinating Council for Comparative Effectiveness Research.

This paper addresses two broad questions: What do we need to know about the delivery system to change it in ways that will benefit patients? Where should foundations and funding agencies like the Agency for Healthcare Research and Quality (AHRQ) focus their efforts? This paper suggests four key areas for delivery system research.

The paper begins by offering a definition of delivery system research and its relationship to comparative effectiveness research. It then presents a simple conceptual model of a generic delivery system organization, which it uses to provide a "long list" of potential delivery system research topics organized into broad topic areas. It suggests criteria for selecting key areas and proposes a short list of key areas for research, including some key questions in each area, providing examples of completed research, and noting areas in which research is particularly lacking. The paper concludes by locating AHRQ's recent American Recovery and Reinvestment Act (ARRA) Comparative Effectiveness Delivery System Research grants within the analytic scheme presented.

What Is Delivery System Research?

Delivery system research may be broadly defined as research that focuses on organizations which provide health care *and/or research on inter-relationships among these organizations.* Delivery system research may focus on the structure of these organizations; on the processes they use to provide and improve medical care; and on relationships among organizations' structures, the processes used, and the cost and quality of care provided. It may also focus on the incentives given to provider organizations by payors and on how these incentives affect organizations' structure, their care processes, and the outcomes of care generated by these structures and processes. Incentives are based on measurement of performance, so research that focuses on performance measures should also be considered to be delivery system research.

Conceptual Model

Figure 1 provides a simple model that can be used to think about an individual delivery system organization or the interface between organizations. The model is based on the familiar structure-process-outcomes relationships attributed to Donabedian. The model adds the critical factor of the external incentives faced by the organization. These incentives have a very strong influence on the structure adopted by the organization and on the processes it uses to provide and improve

care. The model also adds organizational culture and leadership. Culture and leadership also strongly influence the processes used to provide care and probably influence organizational structure as well. The emergence of culture and leadership is not well understood, but both are probably influenced by the external incentives the organization faces and by its structure. Appendix B gives examples of important structures, external incentives, processes, and outcomes.

"Long List" of Delivery System Research Areas and Topics

Appendix C presents a long list of research topics organized by the categories in the conceptual model just discussed and also suggests sample research questions for each topic.

Criteria for Selecting Priority Areas for Delivery System Research

The fundamental criterion for selecting priority areas for delivery system research should be: will this research help patients—either directly or by helping providers to provide better care? The reports of the IOM and the Federal Coordinating Council for Comparative Effectiveness Research stress that the areas studied should have a major impact, either on the population as a whole or on subgroups of patients; that research should include age groups ranging from infancy to the elderly, as well as racial/ ethnic minority groups; and that research should seek to fill important gaps in knowledge. This paper suggests three additional, more specific criteria.

First, it will be important to have research that focuses on areas of delivery system reform emphasized by the health care reform law (the Patient Protection and Affordable Care Act).[1] These include new models of organization (Accountable Care Organizations, Patient-Centered Medical Homes, Healthcare Innovation Zones), new models of paying for care (e.g., bundled payments and pay for performance), and public reporting of provider performance.

Second, the paper suggests that the best way to improve the quality and to contain the cost of health care—that is, to increase its value—may be to get physicians, hospitals, and other providers into high-performing organizations and to give them incentives to continually improve care for the population of patients for whom they are responsible. Hence, research should focus on (1) identifying the types of organizations that are high performing; (2) identifying the types of incentives that induce these organizations to continually improve care; and (3) identifying the types of incentives likely to lead to the creation of more high-performing organizations and to physicians and other providers becoming members of high-performing organizations.

Third, research should routinely evaluate both the intended and the unintended consequences of the structure, process, or incentive being studied. It should seek to learn the effects on racial, ethnic and socioeconomic disparities in care, as well as the effects on areas of care that are not directly addressed by the structure, process, or incentive.

Suggested Key Areas for Delivery System Research

The paper suggests four key areas for delivery system research at the present time, working from the premise that it is better to be specific and to be wrong than to be excessively general:

1. Analyses of the demographics of the delivery system—i.e., of each component of the conceptual model—and relationships among the components of the model.

2. Seeking ways to structure incentives so that they are likely to induce desirable change in the demography of delivery system organizations (toward the types of organization that research indicates provide better care) and to induce these organizations to continually try to improve the value of the care they provide.
3. Seeking ways to improve the measurement of provider performance.
4. Analyses of interprovider/interorganizational processes for improving care.

AHRQ's Recent ARRA Comparative Effectiveness Delivery System Initiative

In February 2010, AHRQ used ARRA funds to issue two Requests for Applications (RFAs) to support expanded delivery system research:

- The Comparative Effectiveness Delivery System Evaluation Grants (R01) sought "rigorous comparative evaluations of alternative system designs, change strategies, and interventions that have already been implemented in healthcare and are likely to improve quality and other outcomes."
- The Comparative Effectiveness Delivery System Demonstration Grants (R18) sought "demonstrations of (1) broad strategies and/or specific interventions for improving care by redesigning care delivery or (2) strategies and interventions for improving care by redesigning payment."

Through these two RFAs, AHRQ funded six evaluation grants and four demonstration grants. From the point of view of this paper, the grants selected for funding are encouraging: four of the six evaluation grants and all four of the demonstration grants arguably fall within the list of key areas suggested in this paper.

Identifying Key Areas for Delivery System Research

Overview

The health care reform law (the Patient Protection and Affordable Care Act of 2010) focuses on two areas: (1) providing nearly all Americans with insurance and (2) delivery system reform. The former has received the most media attention, but the latter is equally important. Congress recognized that insuring more people will put more money into the health care system, and that this will be like pouring water into a sieve unless the delivery system is reformed. But what do we need to know about the delivery system to change it in ways that will benefit patients? Where should foundations and funding agencies like the Agency for Healthcare Research and Quality (AHRQ) focus their efforts?

In this paper I will suggest four key areas of focus for delivery system research. I will begin by offering a definition of delivery system research and its relationship to comparative effectiveness research. I will then present a simple conceptual model of a generic delivery system organization, which will be useful in organizing a "long list" of potential delivery system research topics into broad topic areas. I will then suggest criteria for selecting key areas and propose a short list of key areas for research, including some key questions in each area. I will provide citations for examples of research studies in each of the key areas and will highlight areas in which there is a particular lack of research to date. I will conclude by locating AHRQ's recent American Recovery and Reinvestment Act (ARRA) Comparative Effectiveness Delivery System Research grants within the analytic scheme presented.

What Is Delivery System Research?

There is no generally accepted definition of delivery system research. I suggest that delivery system research may be broadly defined as research that focuses on organizations which provide health care (such as medical groups, hospitals, long-term care facilities, and home health agencies) *and/or on inter-relationships among these organizations.* Delivery system research may focus on these organizations' structures and on the processes they use to provide and improve medical care, as well as on relationships among organizations' structures, the processes used, and the cost and quality of care the organizations provide. Delivery system research may also focus on the incentives given to provider organizations by payors (Medicare, Medicaid, and health insurance companies) and regulators and on how these incentives affect organizations' structure, the care processes they use, and the outcomes of care generated by these structures and processes. Incentives are based on measurement of performance, so research that focuses on performance measures should also be considered to be delivery system research.

What is the relationship between delivery system research and comparative effectiveness research (CER)—or, as it is now often called, Patient Centered Outcomes Research? Traditionally, CER compares the effectiveness of drugs, devices, and medical or surgical procedures—traditional CER clearly is not delivery system research, at least not according to the definition suggested in this paper. The findings of traditional CER can only have an impact, however, if they are used by the delivery system, so the delivery system should be a major consumer of CER and a key to the effectiveness of CER.[2] In addition, comparative effectiveness research/Patient Centered Outcomes Research focused on the delivery system itself is very important. It is likely that some organizational structures and processes lead to higher quality,

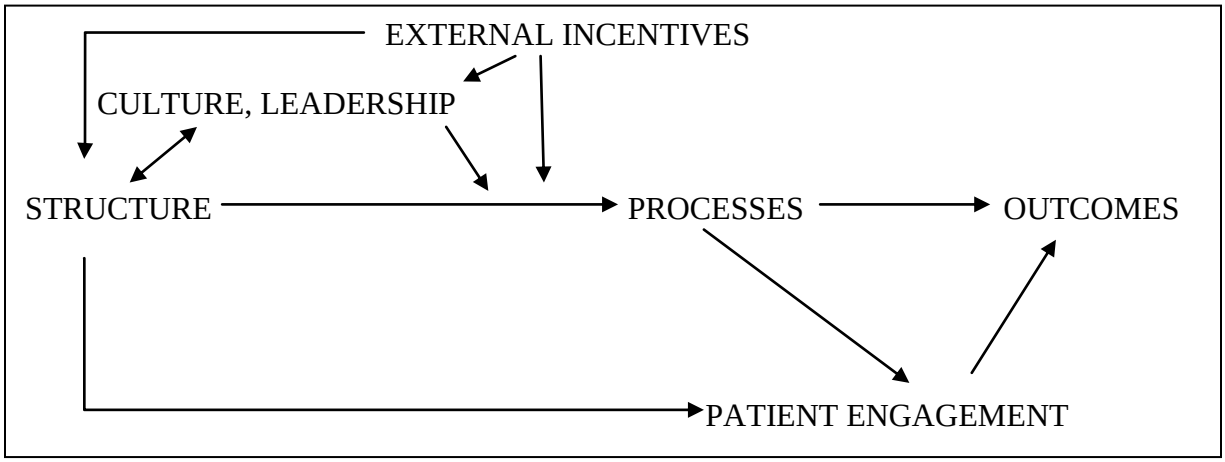
lower cost care than others. Delivery system CER is needed to identify these structures and processes (and the incentives that make these structures and processes more likely to be used).

The Federal Coordinating Council for Comparative Effectiveness Research listed "delivery system strategies" as a critically important area in which there is a major lack of CER to date.[3] The Institute of Medicine (IOM) Committee on Comparative Effectiveness Research Prioritization stated that delivery system-related research areas were the most commonly listed of the 100 key priorities the Committee selected.[4] However, the IOM definition of delivery system-related research was much broader than the definition suggested in this paper—it included what I would define as clinical research, for example, comparing robotic assistance surgery to conventional surgery for common operations, such as prostatectomies. Nevertheless, at least 31 of the 100 IOM priority topics fit the definition of delivery system research suggested here (see Appendix A). Twenty-seven of these 31 topics focus on one area of the conceptual model to be presented in the next section of this paper: they focus on processes for improving care to individuals or for improving care for an organization's population of patients. Critically, the IOM emphasized that when the [delivery system] design, intervention, or strategy under study introduced changes that are directly relevant to policy decisions, a comparator may be the status quo.

Conceptual Model

Figure 1 provides a simple model of a generic delivery system organization—it could be a medical group, a hospital, a nursing home facility, etc. The model could also be used for the interface between two delivery system organizations; e.g., what are the structure, culture, external incentives, etc. of the interface between a medical group and a hospital in dealing with inpatient-outpatient transitions? The model can also be used to think about structure-process-outcome relationships for a particular organization or type of organization and/or for a specific disease, such as congestive heart failure. Finally, the model could be used to think about a health care market. For example, what is the structure of the market in McAllen, Texas? How might the culture and leadership of the delivery system in the market be characterized? What processes of care are prevalent in the market, and what are the outcomes of care in the market?

Figure 1. Generic model of an organization and its external incentives



Note: Appendix B gives examples of important structures, external incentives, processes, and outcomes.

External incentives, such as the way the organization is paid (e.g., via fee for service or capitation), antitrust regulation, and pay for performance (P4P) influence the structure that organizations take. For example, global capitation (more accurately, capitation that approached global capitation) in California in the late 1980s and 1990s led to the formation of very large, multispecialty medical groups, to hospital employment of primary care physicians, and to the growth of independent practice associations (IPAs).[5-8] Structure no doubt is also influenced by other factors not shown in the model, such as patient and physician preferences and inertia (existing organizations may be slow to disappear or to change their structure, even when incentives change). We have very little understanding of how and why some delivery system organizations develop effective cultures and leadership and others do not, but culture and leadership are likely to be influenced by an organization's structure and the external incentives that it faces.

An organization's structure, culture, and leadership, as well as the external incentives that it faces, shape the processes that the organization implements to provide and improve medical care. For example, a large medical group with strong leadership, a culture of quality improvement, and financial incentives to reduce avoidable hospital admissions (such incentives are currently rare for physicians) is likely to create a nurse care manager program to help patients with congestive heart failure. It is unlikely that such a program would be created by a hospital paid per admission or by a small medical practice with limited resources, relatively few congestive heart failure patients, and no financial incentive to reduce unnecessary admissions.

The model postulates that the processes an organization uses to provide and improve medical care strongly influence outcomes—that is, the total cost of patient care, the quality of care that patients receive, and patient experience. Processes affect outcomes both because of what providers do (e.g., prescribe a medication appropriately) and through their effects on what patients do (i.e., through their effects on patient engagement). Patient engagement is also likely to be affected by the provider organization's structure (e.g., are patients more engaged, generally speaking, when cared for by large vs. small organizations?) and culture (arrow not drawn in the model).

Although all relevant arrows are not shown in the model, it is likely that the organization's structure, culture, and external incentives also influence outcomes directly and not just through their impact on care processes. For example, the culture of some organizations may be that physicians go the extra mile for patients—staying late to see a patient in the office, for example, rather than sending the patient to the emergency department. Structure—for example, the size of a medical group—may directly affect outcomes in many ways. For example, it may be that patients, physicians, and staff know each other better in small practices than in large medical groups, and that this mutual knowledge may lead to a patient with subtle signs (over the telephone) of serious illness being seen by his/her physician quickly in a small practice, whereas in a large group the patient might be triaged to an appointment a few days later or to a same day appointment with a physician other than his or her usual physician.

"Long List" of Delivery System Research Areas and Topics

Appendix C presents a long list of research topics organized by the categories in the conceptual model just discussed; it also suggests sample research questions for each topic. This list of topics is intended to reasonably represent the range of topics that may be considered delivery system research, but no doubt other topics could be added, as well as many additional research questions for each topic.[9] Each research area in the list can be studied in the context of: (1) a specific type of delivery system organization; and/or (2) a specific disease or area of preventive care. For each area, key questions are:

1. What are alternative forms of the thing in question (e.g., alternative medical group structures or alternative forms of nurse care management for patients with chronic illness)?
2. What are the demographics and geographic distribution of the alternative forms (i.e., What is the prevalence of each alternative? Where are these alternatives located? How if at all is the prevalence changing?)?
3. What are the factors (e.g., external incentives, regulation) that affect the prevalence of the alternative forms?
4. What are the effects, intended and unintended, of alternative forms on the outcomes of care?

Criteria for Selecting Priority Areas for Delivery System Research

The fundamental criterion for selecting priority areas for delivery system research should be: will this research help patients—either directly or by helping providers to provide better care?[10] The Federal Coordinating Council for Comparative Effectiveness Research and the IOM Committee on Comparative Effectiveness Research Prioritization developed additional, somewhat more specific criteria for selecting high-priority areas for comparative effectiveness research.[3,4] The IOM stressed that the medical conditions studied should have a major impact, either on the population as a whole or on subgroups of patients; that research should include age groups ranging from infancy to the elderly, as well as racial/ethnic minority groups; and that research should seek to fill important gaps in knowledge. The Federal Coordinating Council criteria were similar.

While useful, these criteria are quite broad. I suggest three additional criteria to complement the IOM criteria for the purpose of suggesting key areas for delivery system research:

First, it will be important to have research that focuses on areas of delivery system reform emphasized by the health care reform law (the Patient Protection and Affordable Care Act).[1] These include new models of organization (Accountable Care Organizations, Patient-Centered Medical Homes, Healthcare Innovation Zones), new models of paying for care (e.g., bundled payments and pay for performance), and public reporting of provider performance.

Second, the best way to improve quality and contain the cost of health care—that is, to increase the value of health care—may be to get physicians, hospitals, and other providers into high-performing organizations and to give them incentives to continually improve care for the population of patients for whom they are responsible.[11,12] Thus, more research should focus on (1) identifying the types of organizations that are high performing; (2) identifying the types of incentives that induce these organizations to continually improve care; and (3) identifying the types of incentives likely to lead to the creation of more high-performing organizations and to physicians and other providers becoming members of high-performing organizations. Findings on the types of organizations likely to provide better care could inform decisions about payment and regulatory policies. Additionally, information on the types of organizations likely to provide better care may help patients make better decisions about where to seek care and help physicians and non-physician staff make better decisions about where to work. To the extent that characteristics of high-performing organizations are easily observable—for example, if it turns out that such organizations are large, integrate physicians and a hospital, and/or are multispecialty—these characteristics can be used by patients and physicians to aid their decisions.

The third and final criterion that this paper will suggest for priorities for delivery system research is that this research should routinely evaluate both the intended and the unintended consequences of the structure, process, or incentive being studied. For example, research should ask the following types of questions: (1) What effects, if any, does the structure, process, or incentive have on areas for care not directly related to it? For example, do large organizations score better on typical measures of quality but not on areas of quality that are not typically measured (e.g., timely diagnosis)? Does attention to measured and rewarded areas of quality spill over into improved quality in other areas, or does it lead to reduced quality in other areas? (2) What effects does the structure, process, or incentive have on health care disparities?[13] For example, do P4P programs give more bonus money to providers located in economically advantaged areas, thus increasing the resource gap between "rich" and "poor" providers? Do large medical groups provide higher quality care but refuse to treat Medicaid patients?

Suggested Key Areas for Delivery System Research

Even with criteria as specific as those I have just suggested—and I recognize that very different criteria could very plausibly be proposed—there is a lot of room for decisions in selecting key areas for delivery system research. Additionally, as the medical care system changes over time, key areas for study are likely to change as well. But I believe that, in suggesting these areas, it is better to be specific and to be wrong than to be excessively general. Specific suggestions are more likely to provoke useful (perhaps outraged) discussion. Below, I suggest four key areas for delivery system research. These are:

1. Analyses of the demographics of the delivery system—i.e., of each component of the conceptual model—and relationships among the components of the model.
2. Seeking ways to structure incentives so that they are likely to induce desirable change in the demography of delivery system organizations (toward the types of organizations that research indicates provide better care) and to induce these organizations to continually try to improve the value of the care they provide.
3. Seeking ways to improve the measurement of provider performance.
4. Analyses of interprovider/interorganizational processes for improving care.

Appendix D lists some important research (by no means a comprehensive list) done in each of the four areas and their subareas and highlights subareas where there is a particular lack of research to date. Clinical information technology is not listed as a key area for study, although this is obviously an important area that will be intensively studied. If the arguments advanced in this paper are correct, it would be helpful if much research on the implementation and effects of clinical information technology focused on the key areas suggested in this paper.

Analyses of the demographics of the delivery system and relationships among the components of the model

It is not really possible to understand what is happening in U.S. health care and why it is happening, or to formulate policies to change what is happening, without knowing the demographics of the delivery system—that is, the prevalence of various kinds of organizations and the structures these organizations take. But there is very little reliable information about the demographics of the U.S. delivery system and very little funding by Federal agencies or foundations to support obtaining this information. Knowing the demographics is an essential first step, which would make it possible to study in a generalizable way the inter-relationships outlined in the conceptual model between structure, incentives, processes, and outcomes. More specifically, research should:

1. Provide definitive data on the demographics of the delivery system, for example:

    a. What percentage of physicians work in medical groups of various sizes and specialty types?
    b. What percentage of physicians, by specialty, are employed by hospitals?
    c. How many independent practice associations exist, and what are their characteristics?
    d. What percentage of physicians work in practices that function as patient-centered medical homes? What percentage are in organizations that could function as accountable care organizations?
    e. How many hospital-physician "integrated delivery systems" exist, and what are their characteristics?
    f. How can a "gold-standard," frequently updated database of the population of U.S. medical groups, including the physicians within the groups (necessary for using Medicare claims data to study group performance) be created and maintained? Lacking such a database, researchers have to invent the wheel—unsatisfactorily—every time they want to study medical groups. A few private organizations try to create such a database, but because they cannot compel physician cooperation, they are unable to do so in a way that is adequate and updated, and in any case, their databases are not publicly available. This database would be a public good. Assuming

that it had the mandate and resources to do so, the Centers for Medicare & Medicaid Services (CMS) would be in the best position to supply this good. Ideally, CMS could collect the information annually as a condition of physician and hospital participation in Medicare.[14]

g. What are the demographics of other clinical staff—nurse practitioners, physician assistants, RNs, LVNs, and medical assistants—in medical groups of various sizes and specialty mixes?

2. Track change over time in the demographics of the delivery system, and attempt to determine the relationship of these changes to changes in the external incentives given to provider organizations, for example:

   a. Is the percentage of physicians employed by hospitals changing? If so, why?
   b. Are physicians more likely to be employed by hospitals (and/or by large medical groups) in areas where P4P is prevalent?

3. Show the structure-process-outcome relationships among components of the model for different forms of organization,[15] for example:

   a. Which types of medical groups perform better—small, medium, or large? Single specialty or multispecialty? Hospital or MD owned?
   b. Which type of organization performs better: independent practice associations (IPAs) vs. large medical groups vs. integrated delivery systems vs. "accountable care organizations"?
   c. Do organizations that have more external incentives to improve performance use more processes (e.g., nurse care managers) to improve performance, and do they actually perform better?

   We lack the most basic information about these questions. For example, it has been assumed by many reformers for decades that large multispecialty medical groups—or, better, integrated delivery systems—provide higher quality care at a lower cost. But there is very little evidence for or against this hypothesis.[16,17] Recently, there has been a small amount of funding for research seeking to discover structure-process-outcome relationships for different forms of organization, but it has not been sufficient to adequately address these questions, and researchers are handicapped by lack of a gold standard census of medical groups and integrated delivery systems.

4. Bring theoretical concepts, research methods, and substantive findings from fields outside health service research to the study of the delivery system[18]; for example, knowledge that has been gained in other fields about organizational culture, about leadership, and about change within organizations.[9,19] Case studies of successful medical groups, hospitals, and integrated systems suggest that leadership and culture are very important (leaders often suggest that "culture eats strategy for lunch everyday"),[20] but we know relatively little about how to measure leadership or culture in health care,[21,22] and there has been very little research in health care into what types of leadership and culture exist, what their effects are on the quality/ cost of care,[23,24] and what factors influence the types of leadership and culture that develop.

Analyses of ways of structuring incentives so that they are likely to induce desirable change in the demography of delivery system organizations (toward the types of organization that research indicates provide better care) and to induce these organizations to continually try to improve the value of the care they provide

There are many ways in which incentives can be structured. A research literature is developing on P4P and public reporting, but we are far from having definitive answers about the effects of these incentives.[25,26] Moreover, the incentives themselves and the context in which they are offered keep changing. We have surprisingly little information about the effects of capitation or of bundled payment, and even less about the effects of these payment methods when combined with P4P and/or public reporting. There is also very little information about the effects of regulations – e.g. anti-trust enforcement against physicians, hospitals, and health plans – on the demography of delivery system organizations and on the processes these organizations use. Research should:

1. Compare the effects of different payment methods – not only on the quality and costs of care, but also on the demography of the delivery system and on the extent of organizations' efforts to improve care:

    a. Capitation for most inpatient and outpatient services, plus public reporting and/or quality bonuses

        - Real vs. virtual capitation (that is, prospectively giving the provider organization the funds anticipated to be necessary to pay for medical services vs. the pay "keeping score" and settling accounts with the provider organization at the end of the year).

    b. Fee-for-service payment (diagnosis related groups for hospitals) plus "shared savings"[27] plus quality bonuses.
    c. Bundled/episode based payment:

        - For services that are primarily acute and inpatient, such as cardiac or orthopedic surgery.
        - For services that are chronic and outpatient, such as a year of diabetes care.

2. Determine whether it is feasible and desirable to provide incentives at the individual physician level, or whether these incentives should be given at the level of the provider organization.[28]
3. Compare the effectiveness of:

    a. P4P vs. public reporting vs. neither.
    b. P4P ± public reporting vs. improvement collaboratives done without financial or public reporting incentives.

    Note that the observational data from research into changes in the delivery system (see above) will yield some information of interest to these questions.

4. Include inquiry into unintended consequences of incentives; for example, do P4P and/or public reporting lead to:

    a. Increased resource disparities between hospitals and medical groups in rich and poor areas?
    b. "Crowding out" of important unmeasured quality by measured quality?
    c. Avoiding of high-risk patients by provider organizations?
    d. Possibly undesirable changes in the demography of provider organizations (e.g., disappearance of small practices)?

5. Seek to learn more about the effects of regulations (e.g., antitrust enforcement against physicians, hospitals, and health plans) on structure, process, and outcomes in the delivery system.
6. Learn what it takes to gain private health insurance plan cooperation in creating useful incentives.

Improving performance measurement

Performance measurement is critical for organizations that are trying to improve the value of the care that they provide and for the use of incentives intended to reward organizations for improving. However, reliably and validly measuring important areas of performance is not easy in health care, and experience from other industries (e.g., education) shows that inadequate performance measurement can lead to undesirable unintended consequences, particularly when measurement is linked to incentives.[29] In health care, quite a lot of effort, and some Federal agency and foundation funding, has been and continues to be directed toward performance measurement, but the drive to measure is so strong that problems with measurement—reliability, validity, the possibility of unintended consequences, and the difficulty of measuring more rather than less important things—are perhaps not always given the attention they deserve.[30-33] It would be very helpful to have more:

1. Careful thinking and research about what measures of important areas of value (quality and cost) can effectively be used, at what levels of the delivery system (e.g., individual physician, medical group, accountable care organization), given consideration of:

    a. Statistical reliability.
    b. Ability to change the delivery system to high-performing organizations that focus continually on improving value (not just on improving scores on a limited number of process measures).
    c. Possible unintended consequences.

2. Research into the feasibility (e.g., in terms of cost) and effectiveness of using measures of patient experience (e.g., the CAHPS[i] Clinician and Group Survey) as important components of public reporting and pay for performance measures for providers.
3. Research into how electronic medical records can be used to better measure quality.

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[i] CAHPS is the Consumer Assessment of Healthcare Providers and Systems family of surveys available from AHRQ at https://cahps.ahrq.gov/.

Analyses of interprovider/interorganizational processes for improving care

Most research on processes to date has focused on processes that can be used to improve care *within* an organization—for example, within a hospital or a medical practice—with the goal of learning what processes are effective in improving quality and/or controlling costs (see Appendix B for examples of such processes). While this goal appears self-evidently important—and is important—it may not be as important as it might seem. First, the effectiveness of a process to improve care depends very heavily on the way the process is implemented and on the context within which it is implemented.[19,34] Since both implementation and context vary greatly across organizations, the results of any particular study on the effectiveness of a process may not be very generalizable.

Second, most attempts to improve care include multiple processes/components, making it difficult to learn which components are most important and amplifying the problems with lack of generalizability caused by variations in implementation and in context across organizations.

Third, even if it could be shown that a specific process is likely to be effective across a broad range of organizational contexts, few organizations will actually adopt this process unless they have a business case—that is, adequate incentives—for doing so. So it will be important to learn what types of organizations, with what types of incentives, are likely to implement processes to improve the quality of care they provide. Very few studies to date provide this kind of information.

Although intraorganizational processes are of course worthy of study, much more research should focus on critical interorganizational or interprovider processes, such as transitions of care *across settings,* particularly with the aim of reducing unnecessary readmissions to hospitals. Recently, there has been an increase in interest in this type of research, which I believe should continue receiving high priority. More specifically, research should focus on:

1. Improving transitions in care, not just from inpatient to outpatient, or between nursing home and hospital, but also from outpatient to inpatient, as well as referrals from physician to physician. I suggest that one strong sign that a health care system is functioning well is that there is frequent phone communication between physicians about specific patients—including patients who wind up not actually being referred. Anecdotal evidence suggests that these conversations have become less frequent in recent years in the United States.
2. Processes aimed at reducing readmissions.
3. Resource sharing to support implementation of value-improving processes among small practices (e.g., small practices sharing a nurse care manager for patients with serious chronic illnesses).

AHRQ'S Recent ARRA Comparative Effectiveness Delivery System Initiative

AHRQ has funded an impressively large and diverse body of delivery system research. It would be a major task to try to adequately categorize the types of research funded, but overall I believe it would be accurate to say that the foci of this research and the gaps in it are consistent with the points made so far in this paper; i.e., it has focused more on evaluating processes of care, and

particularly on intraorganizational processes, than on other components of the conceptual model presented in this paper or on the inter-relationships among them.

In February 2010, AHRQ used ARRA funds to issue a Request for Application (RFA) for Comparative Effectiveness Delivery System Evaluation Grants (R01), seeking proposals for "rigorous comparative evaluations of alternative system designs, change strategies, and interventions that have already been implemented in healthcare and are likely to improve quality and other outcomes." The Agency also used ARRA funds to issue an RFA for Comparative Effectiveness Delivery System Demonstration Grants (R18) seeking proposals "from organizations to conduct demonstrations of (1) broad strategies and/or specific interventions for improving care by redesigning care delivery, or (2) strategies and interventions for improving care by redesigning payment."

Through these two RFAs, AHRQ funded six evaluation grants and four demonstration grants. From the point of view of this paper, the grants selected for funding are encouraging: four of the six evaluation grants and all four of the demonstration grants arguably fall within the list of key areas suggested in this paper. The others focus on studying processes of care—such as care coordination—and devote less attention to the organizational context or to other elements of the conceptual model. The following classification of these grants in terms of the model in Figure 1 necessarily omits mention of many other, distinctive contributions of the studies' research plans, designs, and methods.

Evaluation grants

Dowd, et al., sought to determine the association between the Medicare Physician Quality Reporting Initiative (PQRI) and the performance of physicians overall, as well as by race, ethnicity, and sex of the patient. This grant can be characterized as focused on the effects of incentives on outcomes; however, it will provide limited information about the effects of incentives on physician organizations or the processes physician organizations use. Interviews to be conducted with physicians and CMS managers may provide some information about these things.

Swigonski, et al., sought to determine the extent to which child health outcomes are associated with pediatric practices' scores on the Medical Home Index (created specifically for pediatric practices) and the National Committee for Quality Assurance Physician Practice Connections-Patient Centered Medical Home index. This grant can be characterized as studying forms of measurement that may have the ability to change the delivery system toward high-performing organizations. In addition, because it will include information about practice characteristics, it addresses the question of which types of medical groups perform better. It has the potential to analyze relationships among practice structure, medical home processes used, and outcomes.

Malouin, et al., examined the effectiveness in improving outcomes of payment vs. facilitated support interventions from health insurance plans to medical homes. This grant can be characterized as studying the key area of comparing different types of incentive/assistance to each other.

Fischer, et al., evaluated the comparative effectiveness of different Medicaid policies for containing the cost of cardiovascular drugs. I have categorized this as addressing the key area of

the effects of incentives/policies, although the grant's lack of focus on organizational context does not fit well with the emphasis of the key areas.

The other two evaluation grants funded focus primarily on processes. Gilmer, et. al., examined use of a comprehensive care model, with particular emphasis on providing housing for patients with chronic severe mental illness, such as schizophrenia. Smith, et. al., evaluated the effectiveness of the Virginia Coordinated Care program within the traditional safety net delivery system.

Demonstration grants

Rodriguez, et al., compared the effectiveness of office-based panel management to management by community health workers. This was primarily a study of care processes but included analyses of organizational characteristics, such as readiness to change and structural capabilities.

Williams, et al., compared the effectiveness of a new bundled payment method (primarily for inpatient care) to current payment methods in California, an objective that fits directly with one of the key areas recommended for study in this paper.

Holtrop, et al., compared the effectiveness of disease management done through primary care practices to disease management done by health plans with careful attention to the organizational context. This grant fits into a key area because it evaluated the effectiveness of a process—disease management—when used by different types of organization; in addition, it used formative evaluation.

Magill, et al., studied primary care redesign within a system that had already implemented many medical home features. This project evaluated: (1) the effects of a newly created care management program for patients with severe chronic illnesses and (2) new efforts to better manage transitions from one care setting to another. This program can be characterized as, among other things, focused on the recommended key area of care transitions. It also engaged in a number of formative evaluation activities.

Conclusion

The discoveries of basic scientific and clinical research have no impact on patients' health unless they are used effectively by the health care delivery system. During the past two decades, there has been a good deal of research focused on the U.S. health care delivery system; this research has been funded almost entirely by AHRQ and foundations. This paper presents a simple conceptual model for thinking about the delivery system in terms of individual organizations or of relations among organizations. The paper argues that research has been heavily focused on intraorganizational processes; these are important, but not enough attention has been paid to interorganizational processes and to other components of the model—structure, culture/leadership, and incentives. These other components strongly influence the processes that are used and how effective these processes are. Most of AHRQ's recent ARRA grants for comparative effectiveness research include attention to these other components, though for the most part the focus remains on processes.

Although a method rather than an area of research, "formative evaluation" will be very important in the types of research advocated in this paper.[35] A formative evaluation component should be an important part of many—probably most—research projects. To evaluate the findings of a project and to draw practical lessons from it, it will be critical for policymakers and leaders of provider organizations to learn what was actually done, what barriers arose, what were ways of overcoming these barriers, how did participants think that the program being evaluated could be improved, etc. This means that researchers should be prepared to use (and funders to fund) mixed methods: quantitative analysis of primary and/or secondary data sources as well as interviews and surveys.

References

1. Guterman S, Davis K, Stremikis K, et al. Innovation in Medicare and Medicaid will be central to health reform's success. Health Aff (Millwood) 2010;29(6):1188-93.
2. Masica AL, Ballard DJ. The protean role of health care delivery organizations in comparative effectiveness research. Mayo Clin Proc 2009;84(12):1062-4.
3. Federal Coordinating Council for Comparative Effectiveness Research. Report to the President and the Congress. Washington, DC: June 30, 2009.
4. Committee on Comparative Effectiveness Research Prioritization, Institute of Medicine. Initial national priorities for comparative effectiveness research. Washington, DC: National Academies Press; 2009.
5. Robinson JC. The corporate practice of medicine: competition and innovation in health care. Berkeley, CA: University of California Press; 1999.
6. Robinson JC, Casalino L. The growth of medical groups paid through capitation in California. New Engl J Med 1995;333(25):1684-7.
7. Casalino L. Canaries in a coal mine: California physician groups and competition. Health Aff (Millwood) 2001;20(4):97-108.
8. Casalino L, Robinson JC. The evolution of medical groups and capitation in California. Oakland, CA: California Healthcare Foundation; 1997.
9. Shortell SM. Increasing value: a research agenda for addressing the managerial and organizational challenges facing health care delivery in the United States. Med Care Res Rev 2004;61(3; Suppl):12S-30S.
10. Hughes R, Clancy CM. So what? The challenge of doing "need to know" vs. "would like to know" research. Appl Nurs Res 2007;20(4):210-3.
11. Lawrence DM. Chronic disease care: rearranging the deck chairs. Ann Intern Med 2005;143(6):458-9.
12. Crosson FJ. The delivery system matters. Health Aff (Millwood) 2005;24(6):1543-8.
13. Chin MH, Goldmann D. Meaningful disparities reduction through research and translation programs. JAMA 2011;305(4):404-5.
14. Jost TS, Casalino LP. Value-based purchasing opportunities in traditional Medicare: a proposal and legal evaluation. In: Elhauge ER, ed. The fragmentation of U.S. health care: causes and solutions. New York: Oxford University Press; 2010.
15. Dudley RA, Landon BE, Rubin HR, et al. Assessing the relationship between quality of care and the characteristics of health care organizations. Med Care Res Rev 2000;57(Suppl 2):116-35.
16. Casalino LP. Which type of medical group provides higher-quality care? Ann Intern Med 2006;145(11):860-1.
17. Weeks WB, Gottlieb DJ, Nyweide DJ, et al. Higher health care quality and bigger savings found at large multispecialty medical groups. Health Aff (Millwood) 2010;29(5):991-7.
18. Ovretveit J. The contribution of new social science research to patient safety. Social Sci Med 2009;69(12):1780-3.
19. Alexander JA. Methods and metrics issues in delivery system research. AHRQ Expert Meeting on the Challenge and Promise of Delivery System Research; 2011 Feb 16; Sterling, VA. Available at: http://www.ahrq.gov/professionals/systems/system/delivery-system-initiative/alexander/alexander.html. Accessed January 7, 2014.
20. Rundall TG, Shortell SM, Wang MC, et al. As good as it gets? Chronic care management in nine leading U.S. physician organizations. BMJ 2002;325:958-61.
21. Kralewski J, Wingert T, Barbouche M. Assessing the culture of medical group practices. Med Care 1996;34:377-88.
22. Kralewski J, Dowd BE, Kaissi A, et al. Measuring the culture of medical group practices. Health Care Manage Rev 2005;30(3):184-93.
23. Kralewski JE, Dow BE, Heaton A, et al. The influence of the structure and culture of medical group practices on prescription drug errors. Med Care 2005;43(8):817-25.
24. Ovretveit J. Improvement leaders: what do they and should they do: a summary of a review of research. Qual Saf Health Care 2010;19(6):490-2.
25. Conrad DA, Perry L. Quality-based financial incentives in health care: can we improve quality by paying for it? Annu Rev Public Health 2009;30:357-71.
26. Fung CH, Lim Y-W, Mattke S, et al. Systematic review: the evidence that publishing patient care performance data improves quality of care. Ann Intern Med 2008;148(2):111-23.

27. Iglehart JK. Assessing an ACO prototype: Medicare's physician group practice demonstration. New Engl J Med 2011;364(3):198-200.
28. Nyweide DJ, Weeks WB, Gottlieb DJ, et al. Relationship of Primary care physician's patient caseload with measurement of quality and cost performance. JAMA 2009;302(22):2444-50.
29. Ho AD. The problem with "proficiency": limitations of statistics and policy under No Child Left Behind. Educ Res 2008;37(6):351-60.
30. Landon BE, Normand S-L. Performance measurement in the small office practice: challenges and potential solutions. Ann Intern Med 2008;148(5):353-7.
31. Adams JL, Mehrotra A, Thomas JW, et al. Physician cost profiling - reliability and risk of misclassification. New Engl J Med 2010;362:1014-21.
32. Chien AT, Chin MH. Incorporating disparity reduction into pay-for-performance. J Gen Intern Med 2008;24(1):135-6.
33. Werner RM, Asch DA. The unintended consequences of publicly reporting quality information. JAMA 2005;293(10):1239-44.
34. Shekelle PG, Pronovost PJ, Wachter RM. Assessing the evidence for context-sensitive effectiveness and safety of patient safety practices: developing criteria. Rockville, MD: Agency for Healthcare Research and Quality; December 2010.
35. McGowan JJ, Cusack CM, Poon EG. Formative evaluation: a critical component in EHR implementation. J Am Med Inform Assoc 2008;15(3):297-301.

Appendix A: Priority Topics From Institute of Medicine Document

Priority topics from the IOM Initial National Priorities for Comparative Effectiveness Research *report that fit the definition of delivery system research suggested in this paper*

The IOM listed 100 priority topics, with the first quartile having highest priority within this list of 100, and the fourth quartile lowest priority. The order of listing within a quartile does not indicate priority within the quartile.

Of the 31 topics in the list below, 27 focus on processes for improving care to individuals or to populations of patients; that is, they focus on the process category of the conceptual model presented in this paper. Only four topics (in italics below) focus on other categories included in the conceptual model.

Note: The text of the topics has been taken from the IOM document verbatim and has not been edited. The report is available at http://www.nap.edu/catalog.php?record_id=12648, accessed January 8, 2014.

First Quartile

1. Compare the effectiveness of comprehensive care coordination programs, such as the medical home, and usual care in managing children and adults with severe chronic disease, especially in populations with known health disparities.
2. Compare the effectiveness of interventions (e.g., community-based multi-level interventions, simple health education, usual care) to reduce health disparities in cardiovascular disease, diabetes, cancer, musculoskeletal diseases, and birth outcomes.
3. Compare the effectiveness of literacy-sensitive disease management programs and usual care in reducing disparities in children and adults with low literacy and chronic disease (e.g., heart disease).

Second Quartile

4. *Compare the effectiveness of the co-location model (psychological and primary care practitioners practicing together) and usual care (identification by primary care practitioner and referral to community-based mental health services) in identifying and treating social-emotional and developmental disorders in children ages 0-3.*
5. Compare the effectiveness of diverse models of comprehensive support services for infants and their families following discharge from a neonatal intensive care unit.
6. Compare the effectiveness of shared decision making and usual care on decision outcomes (treatment choice, knowledge, treatment-preference concordance, and decisional conflict) in children and adults with chronic disease such as stable angina and asthma.
7. Compare the effectiveness of strategies for enhancing patients' adherence to medication regimens.
8. Compare the effectiveness of patient decision support tools on informing diagnostic and treatment decisions (e.g., treatment choice, knowledge acquisition, treatment-preference concordance, decisional conflict) for elective surgical and nonsurgical procedures—

especially in patients with limited English-language proficiency, limited education, hearing or visual impairments, or mental health problems.

9. Compare the effectiveness (including resource utilization, workforce needs, net health care expenditures, and requirements for large-scale deployment) of new remote patient monitoring and management technologies (e.g., telemedicine, Internet, remote sensing) and usual care in managing chronic disease, especially in rural settings.
10. Compare the effectiveness of diverse models of transition support services for adults with complex health care needs (e.g., the elderly, homeless, mentally challenged) after hospital discharge.
11. *Compare the effectiveness of accountable care systems and usual care on costs, processes of care, and outcomes for geographically defined populations of patients with one or more chronic diseases.*
12. Compare the effectiveness of coordinated care (supported by reimbursement innovations) and usual care in long-term and end-of-life care of the elderly.
13. Compare the effectiveness of pharmacologic treatment and behavioral interventions in managing major depressive disorders in adolescents and adults in diverse treatment settings.
14. Compare the effectiveness of an integrated approach (combining counseling, environmental mitigation, chronic disease management, and legal assistance) with a non-integrated episodic care model in managing asthma in children.
15. *Compare the effectiveness of birthing care in freestanding birth centers and usual care of childbearing women at low and moderate risk.*

Third Quartile

16. Compare the effectiveness and cost-effectiveness of conventional medical management of type 2 diabetes in adolescents and adults, versus conventional therapy plus intensive educational programs or programs incorporating support groups and educational resources.
17. Compare the effectiveness of alternative redesign strategies—using decision support capabilities, electronic health records, and personal health records—for increasing health professionals' compliance with evidence-based guidelines and patients' adherence to guideline-based regimens for chronic disease care.
18. Compare the effectiveness of different quality improvement strategies in disease prevention, acute care, chronic disease care, and rehabilitation services for diverse populations of children and adults.
19. Compare the effectiveness of formulary management practices and usual practices in controlling hospital expenditures for products other than drugs including medical devices (surgical hemostatic products, radiocontrast, interventional cardiology devices, and others).
20. Compare the effectiveness of comprehensive, coordinated care and usual care on objective measures of clinical status, patient-reported outcomes, and costs of care for people with multiple sclerosis.
21. Compare the effectiveness of different strategies to engage and retain patients in care and to delineate barriers to care, especially for members of populations that experience health disparities.

Fourth Quartile

22. Compare the effectiveness of different disease management strategies in improving the adherence to and value of pharmacologic treatments for the elderly.

23. Compare the effectiveness of care coordination with and without clinical decision supports (e.g., electronic health records) in producing good health outcomes in chronically ill patients, including children with special health care needs.
24. Compare the effectiveness of coordinated, physician-led, interdisciplinary care provided in the patient's residence and usual care in managing advanced chronic disease in community-dwelling patients with significant functional impairments.
25. Compare the effectiveness of diagnostic imaging performed by non-radiologists and radiologists.
26. Compare the effectiveness of different disease management strategies for activating patients with chronic disease.
27. Compare the effectiveness of different delivery models (e.g., home blood pressure monitors, utilization of pharmacists or other allied health providers) for controlling hypertension, especially in racial minorities.
28. Compare the effectiveness of hospital-based palliative care and usual care on patient-reported outcomes and cost.
29. Compare the effectiveness of different treatment approaches (e.g., integrating mental health care and primary care, improving consumer self-care, a combination of integration and self-care) in avoiding early mortality and comorbidity among people with serious and persistent mental illness.
30. *Compare the effectiveness of traditional training of primary care physicians in primary care mental health and co-location systems of primary care and mental health care on outcomes including depression, anxiety, physical symptoms, physical disability, prescription substance use, mental and physical function, satisfaction with the provider, and cost.*
31. Compare the effectiveness of different treatment strategies (e.g., psychotherapy, antidepressants, combination treatment with case management) for depression after myocardial infarction on medication adherence, cardiovascular events, hospitalization, and death.

Appendix B: Examples of Some Components of the Conceptual Model in Figure 1

Examples of Delivery System Structures

- Organizational structures (e.g., of a medical group, independent practice association [IPA], hospital):
    - Size.
    - Specialty mix.
    - Ownership (e.g., owned by physicians vs. owned by a hospital; for profit vs. not for profit).
    - Whether the organization is a network or a single entity (e.g., an IPA vs. a medical group, or a physician-hospital organization vs. a hospital and its employed physicians).
- Market structures:
    - Market concentration vs. fragmentation (e.g., among hospitals, health insurance plans, or physicians).

Examples of External Incentives

- Payment methods from payors (primarily commercial health insurance plans, Medicare, Medicaid), for example:
    - Fee for service.
    - Capitation (full or partial).
    - Bundled payments.
    - Episode-based payments.
    - Pay for performance.
- Public reporting of performance.
- Does negotiating leverage provide benefits to organizations that have it, e.g.:
    - Is negotiating leverage between health insurance plans and provider organizations important (e.g., can larger and/or more prestigious medical groups and hospitals negotiate higher payment rates)?
- Regulation—e.g.:
    - Antitrust laws.
    - Stark law.
    - Civil monetary penalties.

Examples of Processes

- Processes aimed at discrete events, such as a surgical procedure or the generation of a prescription, for example:

- Decision support.
- Surgical checklists.
- Electronic prescribing.
- Disease-specific care pathways.
- Innovative approaches to hospital discharge.

- Processes aimed at improving care of an organization's population of patients, for example:

  - Creation and use of registries of patients with chronic illnesses.
  - Care coordination—e.g., use of nurse care managers for patients with chronic illnesses.
  - Use of alternative providers—e.g., of pharmacists for hypertension management.
  - Programs intended to increase colon cancer screening.

- Internal incentives (within the provider organization), for example:

  - Basic internal payment method.
  - Bonuses (e.g., internal pay for performance).
  - Internal "public reporting" of individual physician performance.

- Use of clinical information technology to support the other processes used by the organization, for example:

  - Electronic medical records.
  - Patient portals.
  - Communication among providers.

- Other quality improvement processes.

Examples of Outcomes

- Quality of care.
- Cost of care.
- Patient experience and patient reported outcomes.
- Impact on disparities (socioeconomic and racial/ethnic).

It will be most desirable to measure outcomes for an organization's population of patients, for organizations large enough so that reliable measurement can be made of things like ambulatory sensitive admissions, readmissions, emergency department visits, and total cost of care per patient (risk adjusted).

Appendix C: "Long List" of Delivery System Research Areas

This list is structured to correspond to the conceptual model suggested in the paper. It is intended to be illustrative and reasonably, but certainly not completely, comprehensive.

Each research area in the list can be studied in the context of: (1) a specific type of delivery system organization; and/or (2) a specific disease or area of preventive care.

Specific types of delivery system organizations include (this list is not intended to be comprehensive):

- Medical groups.
- Community health centers.
- Hospitals.
- Specialty hospitals.
- Integrated delivery systems (physicians + hospital(s) ± health plan ± …).
- Accountable care organizations.
- Long-term care facilities.
- Rehabilitation facilities.
- Home health care agencies.
- Retail clinics.

For each area, key questions are:

1. What are alternative forms of the thing in question (e.g., alternative medical group structures, or alternative forms of nurse care management for patients with chronic illness)?
2. What are the demographics of the alternative forms (i.e., What is the prevalence of each alternative? Where are these alternatives located? How if at all is the prevalence changing?)?
3. What are the factors (e.g., external incentives, regulation) that affect the prevalence of the alternative forms?
4. What are the effects, intended and unintended, of alternative forms on the outcomes of care?

Research Area	Sample Research Questions
Structure	
Size	Is the percentage of physicians who work in small medical practices/groups changing? Does it matter? Do large medical groups provide higher quality/lower cost care than small or medium-sized medical groups?
Specialty or staff mix	Do multispecialty medical groups provide higher quality/lower cost care than single specialty groups? Are new large multispecialty or single specialty medical groups being formed? What are the factors promoting or impeding group formation?
Ownership	Is physician employment by hospitals increasing? Do hospital-employed physicians provider higher quality/lower cost care than physician-owned medical practices?
Network or "single entity"	Do integrated delivery systems provide higher quality/lower cost care? Do large medical groups provide higher quality/lower cost care than independent practice associations (IPAs)?
Patient-centered medical home	To what extent are practices that have constituted themselves as patient-centered medical homes continuing to function as medical homes vs. abandoning the effort? What are the factors that influence this?
Accountable care organization	What types of organizations are constituting themselves as accountable care organizations? How does the quality/cost of care vary among the organizational types?
Culture	
Type of culture	How can organizational culture be measured in health care delivery organizations? What are the distinct types of organizational culture and their prevalence? Do some types result in higher quality/lower cost care? What are the external and internal factors that promote particular types of organizational culture?
Leadership	
Type of leadership	Analogous questions as for culture.

Research Area	Sample Research Questions
External Incentives	
Payment methods from payors	Are payments to medical homes sufficient to give practices a "business case" for investing in becoming a medical home? What are the effects of capitation payment plus a bonus for quality on provider organization performance compared to the effects of fee-for-service payment with bonuses for quality and for cost savings? What are unintended consequences of pay for performance programs? How can P4P programs be designed to minimize unintended consequences, such as increasing resource disparities between provider organizations located in advantaged vs. disadvantaged socioeconomic areas?
Public reporting of performance	What are the relative effects of pay for performance and public reporting on the quality and cost of care provided by different types of provider organization? Are both necessary? What are the factors promoting or impeding the use of public reporting information by patients and by physicians?
Negotiating leverage	Gaining increased negotiating leverage can result in higher payments from health plans for provider organizations. To what extent do attempts to gain increased leverage affect the structure of provider organizations? What are the effects of increased provider negotiating leverage on the quality and cost of health care?
Regulation	How do various regulations affect the structure of physician-hospital relationships? Do IPAs and physician-hospital organizations that are clinically integrated provide higher quality/lower cost care than those that are not?
Measurement issues	Can the quality and cost of care be reliably measured for individual primary care physicians? For physicians in other specialties? How large must a provider organization be for reliable measurement to be made of important measures of quality and cost (e.g., ambulatory-sensitive admissions are likely more important than process measures such as diabetic retinal exams; total cost of care is likely more important than attempts at measuring efficiency)? How can electronic medical records be used to complement or substitute for administrative claims data to make it possible to measure important areas of quality? How can patient experience surveys be structured to obtain information about important areas of quality?

Research Area	Sample Research Questions
Processes	
Care of individuals, for example: • Disease-specific care pathways • Surgical checklists • Use of alternative providers, e.g., pharmacists for hypertension management	How prevalent is the use of the process? What are its effects on the quality/cost of care? What factors encourage or discourage the use of the process? Are there unintended and undesirable consequences of the process?
Innovative approaches to hospital discharge	To what extent can discharge programs operated by hospitals, without involvement of outpatient physicians, reduce readmission rates?
Processes intended to improve patient safety—for example, to minimize falls in the hospital	How prevalent is the use of the process? What are its effects on the quality/cost of care? What factors encourage or discourage the use of the process? Are there unintended and undesirable consequences of the process?
Care of an organization's population of patients, for example: • Chronic disease registries • Nurse care managers for patients with severe chronic illness • Programs intended to increase colon cancer screening • Use of mobile devices for patient monitoring	How prevalent is the use of the process? What are its effects on the quality/cost of care? What factors encourage or discourage the use of the process?
Use of clinical information technology, for example: • Electronic medical records • Decision support • Electronic prescribing • Communication among providers • Communication with patients	What are the effects of the process on the quality/cost of care? What factors encourage or discourage the use of the process? What, if any, unintended consequences of the process are occurring? How might these be mitigated?

Research Area	Sample Research Questions
Internal incentives (within the provider organization), for example:	
• Base internal payment method • Bonuses (internal pay for performance)	What external factors (e.g., payment methods from payors) drive organizations' internal incentives? What are the effects of different internal incentives on the quality/cost of care?
• Internal "public" reporting of individual performance to peers	Is internal reporting of individuals' performance to peers sufficient to improve performance, or is internal pay for performance needed as well? What are unintended consequences of internal pay for performance and internal reporting of individuals' performance?
Patient Engagement	
Types of patient engagement	How can types of patient engagement be categorized? What are the effects of different types of patient engagement on the quality/costs of care?
Factors promoting patient engagement	What organizational structural, cultural, and process factors promote patient engagement?
Inter-Relationships Among Key Elements of the Conceptual Model	
	How do the parts of the conceptual model interact? For example, what organizational structures and cultures are likely to result in the use of better processes for providing care and to result in better outcomes? How do external incentives affect organizational structures, cultures, and processes?

Appendix D: Four Suggested Key Areas for Delivery System Research (With Illustrative Studies)

Note: The table includes references to empirical articles or reviews of empirical articles and is intended to present examples rather than a comprehensive list of publications. If no references are given, I have not been able to find useful empirical articles for that topic. However, even when references are given, the data available on the topic area are in all cases far from sufficient. AHRQ's recent American Recovery and Reinvestment Act (ARRA) Comparative Effectiveness Research Delivery System Research funded proposals are listed in italics in the "Research Studies/ARRA Grants" column. The grantee's name links to a description of the research.

Research Area	Research Studies/ARRA Grants
1. Analyses of the Demographics of the Delivery System and Relationships Among the Components of the Model	
Delivery system demographics, for example:	
Percentage of physicians in groups of various sizes and specialty types	Cunningham R. Professionalism reconsidered: physician payment in a small-practice environment. Health Aff (Millwood) 2004;23(6):36-47. Hing E, Cherry DK, Woodwell DA. National Ambulatory Medical Care Survey: 2004 summary. Adv Data 2006 Jun 23;374:1-33. Available at: http://www.cdc.gov/nchs/data/ad/ad374.pdf. Accessed January 9, 2014.
Percentage of physicians, by specialty, employed by hospitals	Casalino LP, November EA, Berenson RA, et al. Hospital-physician relations: two tracks and the decline of the voluntary medical staff model. Health Aff (Millwood) 2008;27(5):1305-14.
Percentage of physicians in patient-centered medical home practices	Rittenhouse DR, Casalino LP, Gillies RR, et al. Measuring the medical home infrastructure in large medical groups. Health Aff (Millwood) 2008;27(5):1246-58.
Percentage of physicians in organizations that could function as accountable care organizations	
Number of integrated delivery systems and their characteristics	
Gold standard database of U.S. physician organizations	

Research Area	Research Studies/ARRA Grants
Analyses of the Demographics of the Delivery System and Relationships Among the Components of the Model	
Change over time in delivery system demographics, especially in relation to changes in external incentives, for example:	
Is the percentage of physicians employed by hospitals changing? If so, why?	Casalino LP, November EA, Berenson RA, et al. Hospital-physician relations: two tracks and the decline of the voluntary medical staff model. Health Aff (Millwood) 2008;27(5):1305-14. Isaacs SL, Jellinek PS, Ray WL. The independent physician — going, going… New Engl J Med 2009;360(7):655-7.
Are physicians more likely to be employed by hospitals (and/or by large medical groups) in areas where pay for performance (P4P) is prevalent?	
Structure-process-outcome relationships among components of the conceptual model for different forms of organization, for example:	
Which types of medical groups perform better?	Solberg LI, Asche SE, Pawlson LG, et al. Practice systems are associated with high-quality care for diabetes. Am J Manag Care 2008;14(2):85-92. ARRA Grant: *Swigonski*
Which types of organizations perform better: independent practice associations (IPAs) vs. medical groups of various sizes vs. integrated delivery systems vs. accountable care organizations?	Rittenhouse DR, Casalino LP, Gillies RR, et al. Measuring the medical home infrastructure in large medical groups. Health Aff (Millwood) 2008;27(5):1246-58. Friedberg MW, Coltin KL, Pearson SD, et al. Does affiliation of physician groups with one another produce higher quality primary care? J Gen Intern Med 2007;22(10):1385-92. Mehrotra A, Epstein AM, Rosenthal MB. Do self-identified integrated medical groups provide higher quality medical care than self-identified IPAs? Ann Intern Med 2006;145(11):826-33.

	Casalino L, Gillies RR, Shortell SM, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. JAMA 2003;289(4):434-41. Kerr EA, Gerzoff RB, Krein SL, et al. Diabetes quality care in the Veterans Affairs health care system and commercial managed care: the TRIAD study. Ann Intern Med 2004;141(4):316-8. ARRA Grant: *Holtrop*
What is the relationship among structure-process-outcomes?	Friedberg MW, Coltin KL, Safran DG, et al. Association between structural capabilities of primary care practices and performance on selected quality measures. Ann Intern Med 2009;151(7):456-63. Hearld LR, Alexander JA, Fraser I, et al. Review: how do hospital organizational structure and processes affect quality of care? A critical review of research methods. Med Care Res Rev 2008;65(3):259-99. Stolzmann KL, Meterko M, Shwartz M, et al. Accounting for variation in technical quality and patient satisfaction: the contribution of patient, provider, team, and medical center. Med Care 2010;48(8):678-82. Landon BE, Normand SLT, Meara E, et al. The relationship between medical practice characteristics and quality of care for cardiovascular disease. Med Care Res Rev 2008;65(2):167-86. Damberg CL, Shortell SM, Raube K, et al. Relationship between quality improvement processes and clinical performance. Am J Manag Care 2010;16(8):601-6. ARRA Grant: *Swigonski*

Do organizations that have more external incentives to improve performance use more processes to do so, and do they actually perform better?	Casalino L, Gillies RR, Shortell SM, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. JAMA 2003;289(4):434-41. Shortell SM, Gillies R, Siddique J, et al. Improving chronic illness care: a longitudinal study of large physician organizations. Med Care 2009;47(9):932-9. Conrad DA, Perry L. Quality-based financial incentives in health care: can we improve quality by paying for it? Annu Rev Public Health 2009;30:357-71. ARRA Grant: *Dowd* (only for individual physicians)
Bring theoretical concepts, research methods, and substantive findings from fields outside health service research to the study of the delivery system, for example, knowledge that has been gained in other fields about organizational culture, about leadership, and about change within organizations.	
Leadership	
Culture	
Change within organizations	ARRA Grant: *Rodriguez*
2. How Can Incentives and Public and Private Policies Be Structured To Induce Change in the Demography of Delivery System Organizations (Toward the Types of Organizations That Research Indicates Provide Better Care) and To Induce These Organizations To Continually Try To Improve the Value of the Care They Provide?	
Compare the effects of different payment methods—not only on the quality and costs of care, but also on the demography of the delivery system and on the extent of organizations' efforts to improve care, for example:	ARRA Grant: *Fischer*
• Capitation plus public reporting and/or quality bonuses	

• Diagnosis related groups plus "shared savings" plus quality bonuses	
• Bundled payment for services that are primarily inpatient	Committee on Research. Bundled payment: AHA research synthesis report. Chicago, IL: American Hospital Association; 2010. ARRA Grant: *Williams*
• Bundled payment for services that are primarily outpatient	
Determine whether it is feasible and desirable to provide incentives at the individual physician level, or whether these incentives should be given at the level of the provider organization	
Compare the effectiveness of P4P vs. public reporting vs. improvement collaboratives without P4P or public reporting vs. usual care	Lindenauer PK, Remus D, Roman S, et al. Public reporting and pay for performance in hospital quality improvement. New Engl J Med 2007;356(5):486-96. ARRA Grant: *Dowd*; *Malouin*
Include inquiry into unintended consequences of incentives, for example, do P4P and/or public reporting lead to:	
Increased resource disparities between hospitals and medical groups in rich and poor areas	Werner RM, Goldman LE, Dudley RA. Comparison of change in quality of care between safety-net and non-safety-net hospitals. JAMA 2008;299(18):2180-7. Blustein J, Borden WB, Valentine M. Hospital performance, the local economy, and the local workforce: findings from a U.S. national longitudinal study. PLoS Medicine 2010 June;7(6): e1000297. Published online 2010 June 29. doi: 10.1371/journal.pmed.1000297. Doran T, Fullwood C, Kontonpantelis E, et al. Effect of financial incentives on inequalities in the delivery of primary clinical care in england: analysis of clinical activity indicators for the quality and outcomes framework. Lancet 2008;372(9640):728-36.
"Crowding out" of important unmeasured quality by measured quality	Campbell SM, Reeves D, Kontonpantelis E, et al. Effects of pay for performance on the quality of primary care in England. New Engl J Med 2009;361(4):368-78.

Avoiding of high-risk patients by provider organizations	Werner RM, Asch DA, Polsky D. Racial profiling: the unintended consequences of coronary artery bypass graft report cards. Circulation 2005;111(10):1257-63. Doran T, Fullwood C, Reeves D, et al. Exclusion of patients from pay-for-performance targets by English physicians. New Engl J Med 2008;359(3):274-84.
Possibly undesirable changes in the demography of provider organizations (e.g., disappearance of small practices)	
Seek to learn more about the effects of regulations (e.g., antitrust enforcement against physicians, hospitals, and health plans) on structure, process, and outcomes in the delivery system	
What are the effects of the Federal Trade Commission antitrust guidelines for physicians on the organization of physician practice and on physician-hospital relations?	
3. Measurement of Performance	
Careful thinking and research about what measures of important areas of value (quality and cost) can effectively be used, given considerations of:	
• Statistical reliability	Adams JL, Mehrotra A, Thomas JW, et al. Physician cost profiling - reliability and risk of misclassification. New Engl J Med 2010;362:1014-21. Nyweide DJ, Weeks WB, Gottlieb DJ, et al. Relationship of primary care physician's patient caseload with measurement of quality and cost performance. JAMA 2009;302(22):2444-50.
• Ability to change the delivery system to high-performing organizations that focus continually on improving value (not just on improving scores on a limited number of process measures)	ARRA GRANT: *Swigonski*

• Possible unintended consequences	
Research into using patient experience, including but not limited to patient-reported outcomes, to gain a more complete estimate of the value provided by an organization than can be gained by process and outcome measures	A great deal of research funding is being devoted to this area at present.
Research into how electronic medical records can be used to better measure quality	
4. Analyses of Interprovider/Interorganizational Processes for Improving Care	
Improving transitions in care, not just from inpatient to outpatient, or between nursing home and hospital, but also from outpatient to inpatient and referrals from physician to physician	ARRA GRANT: *Magill*
Processes aimed at reducing readmissions	Mor V, Besdine RW. Policy options to improve discharge planning and reduce rehospitalization. JAMA 2011;305(3):302-3.
Resource sharing to support implementation of value-improving processes among small practices	