WORKING
PAPER

Providing Performance Feedback to Individual Physicians: Current Practice and Emerging Lessons

Final Report

STEPHANIE S. TELEKI, REBECCA SHAW,
CHERYL L. DAMBERG, ELIZABETH A. MCGLYNN

WR-381-CHCF

July 2006

HEALTH

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Interest in the performance of individual physicians as a driver for improving the quality and efficiency with which health care is delivered is increasing, and so, too, is the capability to assess that performance. Activities to measure, report, and improve physician performance are being undertaken by a wide variety of stakeholders in the health care system, including medical groups, professional medical societies, purchasers/employers, private sector companies, health plans, and the federal government. The efforts aimed at reporting performance data to individual physicians vary in terms of objectives, but they often share the underlying goal of making physicians aware of their performance and encouraging improvement in specific aspects of care delivery—such as clinical quality, patient experience, patient safety, and resource use—when performance is lacking.

Physician-level performance measurement and feedback are relatively new, and the experiences that organizations have had in measuring performance and providing feedback to individual physicians are fairly limited. Moreover, the lessons learned are often considered proprietary or have not been published. In consequence, important lessons learned in applied settings often remain unknown to other organizations with an interest in using physician performance results to change physician behavior.

This report describes a RAND Corporation study whose goal was to gather and synthesize lessons being learned about individual physician performance feedback. As part of this study, telephone interviews were conducted in November and December 2005 with 12 key informants from a purposive sample (drawn from across the country) of seven medical groups, four health plans, and one health care quality coalition. All respondents were known to have produced individual physician feedback reports in the ambulatory care setting. In addition, a literature scan was carried out to find information that may be relevant to the content and format of individual physician-level feedback reports, as well as to the process used to develop and disseminate them.

Key Findings

Overall, we found that very few physician-level "report cards" currently in use have been formally tested or evaluated. Therefore, our findings represent the distilled experiences and suggestions of the organizations we interviewed that are currently engaged in providing performance feedback to individual physicians. We have also taken into account key themes that emerged on this topic from our literature scan.

What information should be presented? The interests and goals of the report sponsor—which vary by sponsor—are what drive report content. Report sponsors should be honest and direct about why the information is being presented (e.g., for information only, to reduce costs, to improve quality). Where goals may conflict (e.g., improving clinical quality may not save money), sponsors should discuss the possible conflict and how it relates to any actions they would like the intended audience to take. Once a sponsor's goals are clearly established, the challenge is to determine how best to communicate the performance information so that physicians will be likely to use it.

Both the respondents and the literature stressed that peer comparisons are important in performance reports if the goal is to change physician behavior, the reason being that physicians report that they are motivated by such comparative information. The inclusion of actionable items and clear steps that a physician can take is also important. For example, some interview respondents said they present information (such as a list of specific patients due for care) in an appendix, companion report, or registry to provide the physician with guidance on specific ways to improve his or her performance (e.g., contacting patients on the list who are due for a mammogram). Additionally, it is important that any performance benchmarks or thresholds included in reports be set at achievable levels so as not to be perceived as unreasonable and thus ignored. Finally, the respondents indicated two other significant concerns—the accuracy and timeliness of the measures and data used to score physician performance—both of which fell outside the scope of our study, which did not address data management or specific performance measures.

How should reports be formatted to stimulate use? There is no definitive guidance on how best to format feedback reports for physicians: the empirical literature in this area is limited, and entities that have produced such reports typically have not formally tested the options and/or disseminated their findings. Consistent with the literatures on cognitive science and consumer reporting that we reviewed, the respondent organizations suggest that physician reports be designed to provide a readily understandable snapshot of performance (i.e., that data be presented in a manner that enables quick and accurate interpretation). Examples of formats that may be suitable for achieving this end are

- Rank-ordering of peers and/or indicators by scores so that high and low scores are obvious
- Strategic use of typography (e.g., font style and size) to highlight important information
- Use of adequate white space so the report is not visually cluttered.

The respondent organizations are employing many of these strategies and believe they are effective. However, because minimal formal testing of layout and graphics has been carried out with physician audiences, the comparative effectiveness of the approaches in communicating performance information to this audience is unknown.

What is the best medium for sharing feedback information with physicians? Producers of physician-level reports have used a variety of media: printed hard copies; electronic static copies; and flexible, interactive web-based versions. Consistent with the literature we reviewed, these producers noted that interactive web formats allow users to tailor information to their preferred level of detail and are especially appropriate for presenting increasingly specific levels of data (i.e., "drill down" information). Web-based formats are also valued because they permit frequent information updates without associated printing and distribution costs. However, it was noted that many physicians do not have convenient access to the Internet, are resistant to using this medium, and/or may not be accustomed to accessing information this way on a routine basis. Many of the physician-level report producers advised that an assessment be

conducted to determine the type(s) of media preferred by the target audience and/or that reports be prepared in a variety of media to accommodate the audience's different preferences and capabilities.

What process should be used to involve individual physicians in the design and sharing of feedback reports? According to many of the respondent organizations and the reviewed literature on physician behavior change, an interactive, transparent, honest, and respectful reporting process is critical to the success of a physician-focused reporting endeavor, especially if behavior change is a key goal. Our respondents expressed a strong belief that physicians should be involved early and often in feedback-report development and implementation in order to build their ownership of the process and the end product and to ensure that the report reflects their needs and interests. Many respondents also advised that physicians be given the opportunity to question data presented in the feedback reports and to make changes to errors uncovered before the information is released to others. As in the literature, those involved in physician-level reporting activities cautioned that the passive provision of information alone is not sufficient to bring about behavior change. The approaches they have found to be more effective are multi-faceted, such as interactive educational sessions coupled with the use of local opinion leaders/physician champions and/or feedback reports. Although the optimal approach for sharing information is not known, passive sharing of information is not likely to lead to physician behavior change. Based on our interviews, the process used to feed information back to individual physicians appears to be a key determinant in achieving behavior change.

Conclusion and Areas for Future Research

Reporting on performance at the individual physician level is a relatively new activity in the United States but is expected to become more common as policymakers continue to push for improvements in quality of health care and reductions in the growth of health care expenditures. Little is known about how best to communicate performance information to physicians to promote changes in behavior that will lead to improvements in quality and more-effective use of resources. Although we gleaned important guidance on these issues from our interviews and literature scan, many questions remain. Organizations seeking to report performance data to individual physicians would benefit from greater sharing of methods by experienced organizations, well-executed evaluations of the impact of reporting efforts, and the transfer of knowledge when both successful and unsuccessful strategies are identified.

In particular, those trying to produce effective feedback reports for individual physicians need answers to the following questions:

- In the areas of clinical care, patient experience, efficiency, and safety, which performance metrics and what unit of analysis (e.g., patient vs. population, individual measures vs. composites) are the most actionable for physicians and the most likely to lead to behavior change?
- Which reports are more compelling and effective: consolidated reports or those that deal with a single issue?

- What are the most effective formats to use in individual physician feedback reports? For example, what types of media are the most appropriate for ensuring that physicians are able to access information? Which types of graphical displays are the most effective for promoting understanding?
- What combination of engagement and feedback is the most effective for achieving physician behavior change?
- What are the key barriers inhibiting the use of performance reports by individual physicians, and how might these barriers be overcome?

I. INTRODUCTION

Interest in the performance of individual physicians as a way to drive improvement in the quality and efficiency of health care delivery is increasing, and so, too, is the capability for assessing that performance. Activities to measure, report, and improve physician performance are being undertaken by a wide variety of stakeholders in the health care system, including medical groups, professional medical societies, purchasers/employers, private sector companies, health plans, and the federal government. For example, the Ambulatory Care Quality Alliance (AQA) and the Centers for Medicare and Medicaid Services (CMS) have taken steps to measure and report the performance of individual physicians in ambulatory care settings.[1–3] (See Appendix for additional examples and further detail.) Efforts to feed performance data back to individual physicians vary in terms of objectives, but many of these efforts share the underlying goal of making physicians aware of their performance and encouraging improvement in specific aspects of care delivery—such as clinical quality, patient experience, patient safety, and resource use—when performance is lacking.[4–7]

Physician-level performance measurement and feedback are relatively new, and experiences that organizations have had in measuring and providing feedback to individual physicians are fairly limited. Moreover, the lessons learned are often considered proprietary or have not been published. In consequence, the important lessons that are being learned in applied settings are often remaining unknown to other organizations with an interest in using physician performance results to change behavior.

In this study, we aimed to gather and synthesize the lessons being learned about individual physician performance feedback by

- Examining activities that have been undertaken and strategies that have been used by organizations currently engaged in individual physician feedback reporting.

- Scanning the published literature for lessons learned about the communication of performance data to individual physicians to inform them of their performance levels and encourage improvement when necessary.

Based on our review, we provide guidance to other organizations interested in this type of reporting, as is possible to do at this juncture. We also highlight areas that require future research.

Our focus was solely on efforts to provide performance data to individual physicians (not physician groups) in the ambulatory care setting. Additionally, we addressed only the content and format of feedback reports and the process used to develop and disseminate them (not the methodological aspects of performance measurement at the individual physician level).

II. STUDY METHODS

A. Key Informant Interviews

Using a structured protocol of open-ended questions, we conducted 12 one-hour telephone interviews with individuals at entities currently reporting performance information to individual physicians in ambulatory care settings. Our purposive sample consisted of seven medical groups, four health plans, and one health care quality coalition, drawn from across the country, that were known to have produced individual physician feedback reports. To determine which organizations to include and which individual within each organization to interview, we consulted with and received recommendations from those in the field who are aware of physician-level reporting activities (e.g., business coalitions, researchers, professional contacts working in health care delivery systems). Only organizations reporting performance data at the individual physician level were included in our sample. Our goals were to gather information about these reporting efforts, to find out what strategies are being used to report performance data to individual physicians, and to learn which—if any—of these tactics have been found to be effective in bringing about physician awareness and behavior change.

B. Literature Scan

We focused our literature search on individual physician feedback reports. Because a key goal of reporting performance information to individual physicians is behavior change, we also scanned the literature on this topic. We searched MEDLINE/PubMed, ABInform, PsycINFO, and Cochrane databases for publications addressing the communication of performance data to individual physicians. Search terms used in various combinations included physician/doctor, behavior change/modification, feedback, audit, report(s), perform/performance, evaluation, clinical quality/effectiveness, patient experience/satisfaction, efficiency/cost, patient safety, and quality improvement. Once relevant publications were identified, we examined their reference lists for additional sources. We also searched the publications listings of the following foundations: the California HealthCare Foundation, the Robert Wood Johnson Foundation, The Commonwealth Fund, and the Kaiser Family Foundation. Additionally, we examined key publications related to reporting performance data to consumers, our reasoning being that some lessons learned through this research might apply to physicians as well. RAND researchers familiar with this consumer-focused literature identified these publications for us, many of which were produced by members of the CAHPS® (Consumer Assessment of Healthcare Providers and Systems) consortium, of which RAND is a part. In conducting all of our searches, we focused on the period 1995–2005 but also included earlier publications that had been identified as seminal by experts. Although we reviewed commentaries appearing in the literature, our primary focus was on empirical studies.

This literature scan was not meant to be an exhaustive review of all publications in the areas mentioned above or a meta-analysis. Our aim was to cull from a selection of

representative sources the general lessons learned about communicating performance data to individual physicians in order to improve behavior.

C. Environmental Scan

To complement our interviews and literature scan, we conducted an environmental scan of the activities of professional societies and other organizations in the area of individual physician-level reporting. This additional scan was not an exhaustive Internet search; it was a purposive examination of the websites of key medical specialty societies, private sector companies, and other relevant organizations identified by experts. In some cases, details about organizations or initiatives were confirmed with telephone calls. We did not include activities by health plans, medical groups, or health care consortia because these types of entities had been included in our interviews. Results of this scan are presented in the Appendix.

III. FINDINGS

This section presents findings from our interviews and literature scan. We first discuss what we learned from those we interviewed and the literature about the history and intended purpose of physician feedback endeavors. We then present findings from our interviews and literature scan on report content, format, and process. These findings are organized according to the questions most likely to be seen as key by those using feedback to improve the performance of individual physicians. Finally, we present the thoughts of those we interviewed about the future direction of reporting individual physician performance information.

A. History and Intended Purpose of Individual Physician Feedback Reports

The respondent organizations have been producing individual physician reports over the past one to 20 years. Most of these organizations, particularly those with the longest histories of producing reports, initially created individual physician feedback reports with the goals of reducing costs and managing utilization.

Recently, the improvement of health care quality has become a primary motivating factor for reporting; the respondents cited three major reasons for this shift. First, those organizations with a long history of producing reports were often at financial risk under their managed care contracts, so their initial reporting focused on cost and utilization. Second, only recently have quality measures begun to emerge that enable assessment at the individual physician level. Third, the fairly recent and expanding data collection capacity of many health care organizations—through the use of electronic billing systems, electronic medical records, and other health information technologies—has enabled them to produce more-complex and more-sophisticated reports and to efficiently use the same data for multiple purposes (e.g., tracking provider productivity, performance, credentialing, accreditation). The respondents said that the data collection capacity at their organizations has improved in recent years; they also noted, however, that these data systems are still imperfect, there is still a high reliance on claims data, and the promise of electronic medical records is elusive.

Some respondents said their organizations are producing individual physician-level feedback reports as part of pay-for-performance efforts. Others said their organizations have plans to tie reporting to financial incentives but will not do so until they ensure their measurement and reporting processes are reliable and valid. Some organizations also tie feedback reports to non-financial incentives or recognition programs. For example, physicians with high performance ratings may be highlighted in directories intended for patients to use in selecting a provider.[8, 9] Other financial incentives include the use of performance reports for contracting purposes (e.g., setting performance goals for payment withholds), to develop tiered networks, and to narrow provider lists.

B. Report Content, Format, and Process

Our interviews and literature scan offered some lessons about ways to structure and share feedback information with individual physicians. One theme that emerged was that multiple pieces (e.g., content, format, process) must be in place to change behavior, and that information by itself is unlikely to do so.

The body of literature on changing physician behavior is significant. Much of it originates from interest beginning in the 1980s in evidence-based medicine, in the use of clinical practice guidelines, and in how managed care strategies impact physician behavior. While most of this literature does not directly evaluate the type of comprehensive, ongoing measurement and feedback programs being implemented now, some of the lessons are relevant, especially those on strategies for effective physician engagement and report dissemination. These lessons are noted below.

The specific information in the literature about the format of individual physician feedback reports is scant. However, much has been studied and written about the design and provision of performance "report cards" for consumers that aim at changing behavior.[10–15] In particular, the CAHPS® consortium, under the direction of the federal Agency for Healthcare Research and Quality (AHRQ), has invested significant resources to learn how best to report performance data to consumers to inform health care decisionmaking and improve quality.[10, 11] Additionally, although the impact is largely untested, many entities (e.g., employers, business collaboratives, health plans) have years of experience providing health care–related information to consumers to inform their choices.[4, 7, 16] While these consumer-related studies and experiences do not directly address how best to present performance results to individual physicians to effect behavior change, some of the basic lessons learned may transfer given that fundamental cognitive principles of reporting likely apply to all human beings.

a. What information should be presented?

The interests and goals of the performance report's sponsor—which vary by sponsor—drive the report's content. Once a sponsor's goals are clearly established, the challenge is to determine how best to communicate the performance feedback so that physicians will be likely to use it. There will always be trade-offs when producing reports, trade-offs made necessary because of differing goals, financial and space limitations, and the information-processing capabilities of the intended audience. These trade-offs should be made purposefully, rather than inadvertently.[11] The following list is what we learned about report content:

- ***Clear Objectives:*** The consumer reporting literature that we reviewed emphasizes how important it is for report designers to be clear about the objectives of the report and to design the report with these objectives in mind.[11] The goals should drive the report content and should be stated in the report itself so that the target audience understands the purpose. An audience that understands why the information is being presented is more likely to be engaged in the report content. For the most part, the respondents agree that these are

important considerations. They underscored the need for the report sponsor to be both honest and direct about the purpose of the information presented (e.g., for information only, to effect behavior change, to reduce costs, to improve quality). Some also underscored the need to explain the reasoning behind the report's focus and to note limitations where they exist in order to lend credibility to the report's objectives. Where goals may conflict (e.g., improving clinical quality may not save money), report sponsors should discuss the conflict and its relationship to the report's goals. In cases where external reporting sponsors (such as health plans, purchasers, or the government) dictate reporting content, it is important that the sponsor producing the report make known both this fact and the fact that it must comply whether or not it thinks the information presented is useful and/or consistent with its internal goals. Additionally, sponsors should be explicit about items for which the physician will be held accountable, as well as realistic in their expectations (i.e., about whether individual physicians have the ability to respond successfully to information in the report or there are other pieces of the health care system—outside the physician's control—that must be in place to achieve a given goal). In any case, clear identification of the report's purpose(s) and the desired behavior change(s) is vital to any performance reporting strategy if audience engagement is a key objective.

- ***Characteristics of the Data*:** Physicians must believe in the accuracy and completeness of the information presented about their own performance (i.e., they must trust the measures and believe that the data represent them and their patients) if they are to find the reporting process credible and thus rely on the performance results as the basis for behavior change.[17–20] Credibility and validity are enhanced by

    - Transparency of the measurement and scoring processes, such as clearly defined data sources and technical specifications for performance measures, and the use of complete and accurate data to generate measures

    - A sample size adequate for producing reliable performance estimates so that the chance of misclassification is minimized

    - Case-mix adjustment

    - Clear attribution methods

    - Full disclosure of the entity that collected the data, the known limitations of the data measurement process, and the intended reporting purpose.[21–23]

    Profiles of a sample of the patients included in the scoring of measures may also be useful in convincing physicians that the results represent their patients; such patient-specific data are likely to be more compelling to individual physicians

than are population-based performance scores. In practice, those producing reports often face limitations on the type of data they can share. For example, for many clinical quality measures, claims data—designed and collected for billing purposes, not quality measurement—are the only inexpensive and readily available source of information. Furthermore, claims data are held separately by multiple, competing payers, making it difficult to pool data to obtain sample sizes adequate for improving reliability and validity. Measure sets, too, are limited in terms of the conditions and medical specialties they address. And many practices do not have the data systems in place to generate patient lists. Those producing reports note that there will always be some data limitations and that, to gain physician trust, such limitations are best addressed in a transparent discussion of the methods.

- ***Comparative Performance Information:*** The literature we reviewed indicates that peer comparisons are an effective way to motivate behavior change and are the comparison type that physicians find most meaningful.[19, 20, 24] And "unblinded" peer comparisons (i.e., those that identify physicians by name) seem to provide greater motivation for behavior change than do "blinded" (confidential) peer comparisons because they leverage the natural competitive instincts of many physicians.[25] That said, the reality of the U.S. health care system is that there are many loosely integrated settings in which the institutional relationships do not support unblinded comparisons—e.g., Independent Practice Associations (IPAs) and Preferred Provider Organizations (PPOs). In such cases, sharing performance scores of unnamed colleagues can still be compelling. All of our respondent organizations produce reports containing comparative information. In line with the findings in the literature, the respondents said their organizations have found that peer comparisons—especially within the same specialty, medical group, and local area—are the comparisons most useful to and requested by physicians. They have not found that national-level comparisons, even within the same specialty, are of as much interest to most physicians or promote behavior change. They postulated that this is because physicians are competitive by nature and that comparing them to their immediate peers most effectively taps into this dynamic. Additionally, some noted that physicians find local-level data more relevant because they reflect the practice patterns of the physicians' own geographic area. Finally, comparisons to a physician's own past performance are very common and appear to be an uncontroversial component of individual physician reports.

- ***Realistic Performance Goals***: Striving for achievable goals, as opposed to perfection, has been found to be a compelling strategy with physicians.[26, 27] For example, one randomized controlled trial determined that the use of achievable benchmarks significantly enhanced the effectiveness of physician performance feedback and improved care.[28] Consistent with the literature, many of the respondents said their organizations recognize the value of achievable benchmarks and prefer to compare performance to such benchmarks. Some include comparisons to absolute thresholds or predetermined targets in their reports; others feel that identifying target performance levels is difficult and

sometimes, depending on what is being measured, inappropriate. The inclusion of an achievable but high performance goal may be necessary to motivate the majority of physicians who are performing at an average level but are capable of doing better.

- ***Actionable Feedback***: Research has shown that the information presented in reports to physicians must be actionable—that is, must clearly lead the physician to a specific action he/she should and can take to improve.[12, 18, 19, 21, 27, 29–31] Many respondents underscored the need to include clear, actionable statements in physician reports. Their experience is that if physicians are told what they are doing wrong but not how to fix it, the report will generate frustration and will not be effective in changing behavior. An example of non-actionable feedback from one respondent organization is reporting to a physician that his/her overall quality of care score is "low." To make this information actionable, the physician could be provided with, for instance, his/her actual immunization rate along with a list of the patients who did not receive their needed immunizations. This would enable the physician to assess the accuracy of the result and then to schedule visits with those patients requiring immunizations. Another example of non-actionable feedback that was shared with us is telling a physician that his/her score on a patient experience/satisfaction measure addressing physician-patient communication is in the bottom quartile of his/her medical group. Actionable feedback in this case might include suggestions about how to improve, such as specific information about an available communication-improvement course offered by the medical group and how to enroll. In practice, actionable information often is not available because of such limitations as the absence of data systems and the lack of resources to extract and present the relevant information to physicians in a meaningful and timely way.

- ***Performance Measures:*** Given the relative novelty of individual physician reports, we did not find assessments in the literature about the selection of specific measures to report. When we asked the respondents about the measures their organizations report to individual physicians, the two most commonly mentioned were effectiveness/clinical quality and efficiency/cost. Among the less-frequently mentioned were patient satisfaction/experience and patient safety. In general, deciding which measures to include depends on various factors, including reporting goals, available data, and any requirements of such external reporting sponsors as health plans, purchasers, and the government. Details of the specific measures currently reported by those interviewed are as follows:

    - *Effectiveness/Clinical Quality:* The respondent organizations that report on effectiveness/clinical quality most frequently use either the National Committee for Quality Assurance (NCQA) Health Plan Employer Data and Information Set (HEDIS) measures modified to relate to individual physicians or their own "homegrown" measures, which are generated from data gathered from one or more of the following data sources: administrative/claims, pharmacy, lab, self-reported registry, and medical

records (both paper and electronic). Reports containing this information are provided with varying frequency (monthly, quarterly, annually, biannually, or as needed). Additionally, some organizations produce targeted physician-level reports as part of periodic, focused, quality improvement initiatives that they conduct around rotating clinical issues. Typically, data collection and/or reporting on clinical quality are done internally, by affiliated organizations (e.g., a health plan collecting information about a contracted medical group and reporting it to that group) and/or a vendor. As underscored in the literature we reviewed, clinical indicators should be clinically meaningful[21] and should relate to specific services for which a physician is responsible and that he or she has the opportunity to influence.

- *Efficiency/Cost:* The respondent organizations that report on efficiency/cost most often use claims-based homegrown measures and/or episode treatment groups (ETGs™). The frequency of producing this information varies (e.g., monthly, quarterly, or annually). Data collection for and report production using such measures are most often carried out internally but may also be done by affiliated health care organizations and vendors. How these organizations define efficiency/cost varies. Some define it solely as utilization (e.g., number of hospital days per patient, number of generic prescriptions); others use a more complex definition (e.g., they pair it with effectiveness or productivity). Most respondents stated that a broad range of measures (i.e., not just efficiency/cost alone) must be considered to fully comprehend and judge physical performance.

- *Patient Satisfaction/Experience*: The respondent organizations that report patient satisfaction/experience measures collect this information either through patient surveys produced by many different vendors or through their own, internal data collection efforts. If vendors are involved, they are usually also engaged in the data collection and reporting efforts. As with the clinical quality and cost measures, the frequency of reporting patient satisfaction/experience data varies, and standardized tools are currently not being used. Several respondents noted that one reason these data tend not to be reported is the difficulty involved in translating the measures into actionable recommendations for individual physicians.

- *Patient Safety:* The respondent organizations that track and report patient safety information at the individual physician level collect their own data from medical records. However, patient safety is rarely included in individual physician reports because it is viewed as a system issue and because, in most cases, attributing a specific event (e.g., an adverse event or near miss) to a single physician is viewed as inappropriate. Additionally, many organizations believe there are few good measures available that allow for attribution of a patient safety problem to a specific physician.

- *Miscellaneous Other Measures:* Some respondents noted that, in addition to the four types of measures discussed above, their organizations also collect and report individual physician-level data about issues such as access to care (e.g., whether the practice is open to new patients), formal patient complaints submitted to customer service, and the degree of health information technology that has been adopted (e.g., use of electronic prescribing systems, electronic claim submissions).

- ***Volume of Performance Measures***: Some researchers have suggested that behavior improvement requires that physicians view multiple types of data about themselves in a single report (e.g., clinical quality, patient satisfaction, cost) so that they can see the full picture of their performance. Instrument panels or other comprehensive charts presenting a wide variety of information on a continuous basis, comparable to what a pilot has available in real time on the dashboard of his/her airplane, have been noted as possible tactics.[32–35] However, the consumer behavior literature we reviewed indicates that more information is not always better and that individuals typically can efficiently process and use only about five to six variables at a time to come to a conclusion on an issue.[10, 36–38] Therefore, a lengthy performance report with a significant number of metrics is not necessarily the best option. Our respondents differ in the amount of information they present in a report. The amount sometimes depends on the report's purpose; other times, it is driven simply by the timing of data availability (i.e., if all data are available at the same time, they are included in one, consolidated report; if not, two or more single-issue reports are produced as data are released). Ultimately, as noted previously, the report's purpose should drive the content. A broad scope of metrics may be appropriate in some cases (e.g., to explain all components of an incentive program), while a narrow scope of actionable metrics may be more appropriate for a specific behavior intervention or for operations management purposes. More research is needed to determine the most-effective type and volume of information to present to a physician in one report.

b. How should reports be formatted to stimulate use?

Some respondents agreed to provide practical examples in the form of de-identified versions of their organizations' individual physician performance reports; others were unable to do so because of proprietary restrictions. From the reports we were able to review and verbal descriptions we were given, we put together some information about the types of report formats currently being employed to relay performance information to individual physicians. The following list contains findings from our literature scan, our interviews, and consideration of documents currently in use, all organized by formatting topic.

- ***Typography:*** According to the literature we reviewed, the strategic use of typography (e.g., font size, font color) helps to highlight the importance and relationship among pieces of information.[38] It also may signal an intended

action; for example, underlined blue text typically indicates a web link. To ensure that the typography selected speaks to the intended audience, researchers recommend testing it with that audience. Our respondents did not indicate that typographical decisions were a significant part of their design process (i.e., in terms of attention and resources) and did not have strong recommendations one way or the other.

- ***Graphical Displays***: The consumer reporting literature we reviewed suggests that tables are the better display choice when showing specific numeric values, and that graphs are better for displaying information for comparative purposes—especially when they are labeled clearly—because they allow "visual chunking" of information.[38] At this point, the consumer research does not clarify which symbols (e.g., stars vs. bars vs. arrows) are optimal for use in tables and graphs.[10] For physician reports, testing is needed to see whether physicians, who are more accustomed to using tabular and graphical data displays, differ from general consumers. All of our respondent organizations used some graphical displays in their reports. Many used a combination of text and graphics, but none provided text-only reports. Some single-issue reports presented data in a spreadsheet format (e.g., an Excel™ file), along with supporting text and no other graphics. Reports addressing a more comprehensive set of topics tended to use extensive graphics. The graphical displays typically used are bar and pie charts and traditional tables. The complexity of the graphs also varied from report to report—even for reports developed by the same organization—with some graphics being very simple, and others combining multiple variables in a single display. Contrary to recommendations in the literature, the respondent organizations did not do much testing of graphics prior to report release. Although all of these organizations elicited input from physicians as part of the report development process, their typical strategy was real-time trial-and-error—that is, adjustments were made in subsequent releases based on anecdotal physician feedback rather than on testing prior to report release.

- ***Length***: The consumer behavior literature we reviewed indicates that consumers say they want more information than they actually use and that, in terms of usability, a report's organization is probably more important than its overall length.[10] The reports produced by our respondent organizations varied greatly in terms of page length, depending on topics covered and level of detail provided. Paper versions of reports addressing one or more topics in a comprehensive way tended to be at least ten pages or longer. These reports occasionally included supporting information, such as instructions on how to navigate the report, interpret the information, and act upon it, as well as explanations of changes from previous versions (e.g., new measures added or dropped). The length of electronic reports, in terms of number of screens, also varied. Some reports were a single screen, sent via e-mail; others were part of password-protected, secure websites with many interactive screens and ongoing additions and updates.

- ***Number of Reports:*** The respondent organizations usually produce multiple reports on different topics. For example, an organization may produce separate monthly reports on efficiency/cost and on effectiveness/clinical quality information. Other organizations may produce separate reports throughout the year plus one comprehensive, consolidated report at year's end. The main reasons given for producing separate reports were that different types of data demand different types of reports and/or reporting formats, that the timeliness of providing feedback should dictate the report release date, and that providing one report covering multiple topics has the potential to dilute the report's impact. Those producing a single report said they feel that piecemeal reports do not give physicians a true picture of their performance.

- ***Spatial Organization***: According to the literature reviewed, the spatial organization of information—through the use of headings, lists, and paragraphs—is critical to assisting readers in finding information.[38] Having enough "white space" to prevent the document from being overly cluttered is also advised.[10] According to the cognitive science literature, when an individual receives information about performance in a document, regardless of whether the document is in a paper or electronic format, he/she is more likely to scan the document than to read it thoroughly. Therefore, it is critical to present information in a way that allows the reader to find and understand the desired information quickly (e.g., clear page layout and design features).[38] To ensure that the report format is usable by the intended audience, it should be tested on that audience and revised accordingly prior to release. For the most part, the respondents did not pay attention to spatial organization; and in some cases, they included a significant amount of information on a page, leaving little or no white space. Whether this type of presentation is effective for a physician audience is not known.

- ***Ease of Interpretation:*** According to the consumer behavior literature and to those we interviewed, the format of a report should make the information presented easy to evaluate (i.e., "evaluable"), so that the user can interpret the data quickly and accurately.[12, 14, 15] For example, a brief and direct data display in which performance information is shown in rank order tends to be better understood than does a display showing information in alphabetical order by the provider's last name.[13, 14] More specifically, for a physician report, a rank-order listing by performance score on each indicator or topic area would pinpoint the areas needing improvement, and a rank-ordered listing of each physician by name and performance score would highlight the top and bottom performers. (A specific challenge related to "evaluability" that should be noted here is that physicians may receive multiple—and potentially conflicting—reports from different sources, such as medical groups and the different health plans with which medical groups contract. Confusion for the physician and threats to a report's credibility may ensue if another report addressing similar performance areas conflicts. Until reporting entities work together to produce comparable or perhaps joint reports, this challenge is likely to remain.)

Although the respondents acknowledged the utility of effective formatting, many of them emphasized their belief that a report's content and the processes used to develop and disseminate it are far more important for achieving behavior change (see below).

c. What is the best medium for sharing feedback information with physicians?

According to the literature, a flexible medium (such as a web-based application) allows report users to organize the information in the way they prefer and enhances the effect of the information.[38] Web formats have been found to be particularly useful for presenting data from the general to the specific, which helps in information processing. However, researchers caution that the type of media chosen should match the preferences and capabilities of the intended audience (i.e., cognitive, technical, and technological).

The respondent organizations provide reports in print and/or electronic form (e.g., online, via e-mail, or on CD-ROM). Many of these organizations would prefer to use electronic reporting exclusively, because of its reduced costs and more flexible, interactive format. However, they have found that many physicians do not have convenient access to the Internet, are resistant to using this medium, and/or may not be accustomed to routinely accessing information this way. Some of the organizations initially provide only a web version of the report but are willing to send a hard copy upon request.

Overall, an interactive, web-based format has the benefit of being able to accommodate the needs of a variety of users. However, given that many physicians have only limited access to the web and/or a limited comfort level with accessing information this way, a more traditional, paper format is likely still necessary, at least as a complement to a web-based report. Organizations we interviewed that produce both paper and electronic reports said they would continue to make paper versions available as long as physicians indicate a desire and/or need for this format. However, they also noted that they are encouraging physicians to use the electronic format. It is important to note that even when care is taken to select a medium appropriate for the target audience, the fact that performance reporting has not been integrated into the common business processes in which physicians regularly engage remains. In other words, even if the most user-friendly medium were used, capturing the attention of physicians would still be difficult.

d. What process should be used to involve individual physicians in the design and sharing of feedback reports?

Both those we interviewed and the literature we reviewed underscored that the process by which a report is developed and disseminated is critical to the success of the reporting endeavor. How a report is created, packaged, and marketed is likely to determine whether the information is reviewed and acted upon by physicians. The following list presents actions taken in practice and findings from the literature related to the process of sharing performance information with individual physicians:

- ***Transparent Process with Direct Physician Involvement*:** The literature we reviewed suggests that physicians respond best to a transparent process, which means that it is important to involve them early in the planning and to establish a clear connection between the desired change and the reasons for that change.[19,

[29, 39–46] For example, a report containing clinical quality data should note the deficiencies in this area, as documented by research, as well as the consequences of those deficiencies;[47] and data on patient experience should be accompanied by information about the known outcomes of dissatisfied patients (e.g., reduced compliance with treatment recommendations).[48] If a goal is to reduce costs in light of budget constraints, that goal, too, should be clearly identified. Additionally, the consumer reporting literature we reviewed supports the notion that, for a report to achieve maximal impact, it is important to develop a promotion plan from the beginning; and if awareness of and receptivity to the report are to be encouraged, the intended audience should be primed for the report's release (e.g., through oral presentations and written communications announcing the upcoming report's release).[11]

All of our respondent organizations involve physicians in decisions about report content and format. In line with the reviewed literature, these organizations have found that physician involvement in the development process is vital to obtaining physician buy-in and to the ultimate success of the reporting program. These organizations consult physicians individually or through a committee process. In some cases, physicians are part of a proactive process by which they provide input as the report is being developed. In other cases, a primarily non-physician committee develops report prototypes and then obtains feedback from physicians. Input from physicians is viewed as particularly important on clinical measures, given physicians' expertise and ability to advise about the report's relevance to clinical practice. Regardless of the initial source of ideas for the content and format of their reports, most of the organizations strive to make their reporting process physician driven.

Many of the respondents underscored the initial uphill battle that reporting efforts often face. Typically, when an organization launches a reporting program at the individual physician level, it meets with significant resistance and anger from the physicians. However, many have found that if physicians are engaged early on as partners and treated with respect, they are likely to reach a stage of acceptance and—because they co-own the process—may become ardent supporters. This is especially true if the focus of the reporting program is on improving clinical quality of care (i.e., aimed at addressing areas of over-, under-, and misuse), rather than solely on reducing costs or utilization.

- ***Testing:*** According to the consumer reporting literature, a comprehensive reporting strategy should include ongoing testing and evaluation of the report with the intended audience in order to increase the report's likelihood of being used.[11] This process—which may involve focus groups, surveys, and/or cognitive interviews—is used to refine the reporting enterprise so that improvements can be made before a report's release and subsequent reports can be more successful by building on lessons learned. Testing the content and format of a report at several stages throughout the development process can help identify potential problem areas; it also offers the opportunity for further customization of the report for the intended audience. Most of the organizations

we interviewed did very little, if any, testing of the report format prior to the report's release. The reason given was often a lack of resources or staff, but occasionally it was also the lack of recognition that testing is important to the reporting process.

- ***Organizational Commitment:*** As noted in the literature we reviewed, behavior change is most likely achieved when the goals of the settings in which physicians work are aligned toward common ends (e.g., there are minimal or no conflicting signals, misaligned incentives/payment methods).[41, 49–53] In other words, the desired changes need to be part of organization-wide efforts rather than promoted in isolation,[45] and the focus on them needs to be sustained.[17, 25, 54–57] In particular, physicians may need ongoing financial support to collect and use data for quality improvement, since many physicians—especially those in small practices—cannot do this on their own.[58] Some of our respondents stressed the need for a long-term commitment by the organizations undertaking the reporting endeavor, especially as it relates to improving quality of care. They believe there must be a serious pledge to provide staff and resources, invest in technologies that enable data collection and reporting, and engage physicians continuously and frequently with respect to the content, format, and intended use of the reports. The challenge is that organizations often want a quick solution, which, given that achieving behavior change is a lengthy and iterative process, is unlikely. Those we interviewed maintain that without a long-term commitment by the management of the organization undertaking the reporting, it is difficult to prove to physicians that the effort is serious and that they should invest resources in response to it.

- ***Assurance of Data Accuracy*:** According to those we interviewed and consistent with the literature we reviewed, ensuring the accuracy of the data displayed in reports is vital to report development.[59, 60] Employing a process based on honesty and open acknowledgment of the shortcomings of data and measures is also critical to securing and maintaining physician buy-in.

  All of the respondent organizations have mechanisms in place to verify the accuracy of the data (e.g., internal analytic teams, validity checks by external auditors or vendors, physician data review committees). Some of the organizations have also developed processes by which physicians may inquire about the specifics of their scores (e.g., phone or face-to-face consultations); obtain additional, more detailed data (e.g., a list of patients included in a given measure); and have inaccurate data corrected prior to the release of the report to others. Organizations that provide performance data electronically sometimes give physicians complete access to all relevant data, affording them the opportunity to drill down to patient-level data to investigate potential inaccuracies. All of the respondents whose organizations offer these types of verification services said that although few physicians ever inquire about the data, it is important to the endeavor's credibility to offer them the opportunity. Some respondents noted that when their organizations began tying financial incentives to performance reports, the number of inquiries increased. Some

expect this pattern to continue if pay-for-performance at the individual physician level takes hold in their communities.

One significant challenge that these organizations have faced in ensuring data accuracy is securing adequate resources to do the job well (e.g., staff to answer physician inquiries, time to thoroughly verify data before report release). To provide adequate support, one full-time employee or more (depending on program size) is often needed. The larger medical groups and health plans tend to have more resources to devote to verifying and correcting data than do the smaller organizations.

- ***Multi-faceted, Active Engagement of Physicians:*** According to a substantial amount of the literature we reviewed, the passive provision of information alone (e.g., written clinical-practice guidelines mailed to providers, didactic continuing medical education [CME] courses) is not sufficient to change physician behavior.[17, 27, 39, 61–80] While educational materials are a necessary first step, interactive learning strategies (e.g., discussion groups, role-playing, interactions with opinion leaders) are required to support and sustain behavior change.[27, 39, 50, 63, 81, 82] Many researchers have examined the impact of using a combination of intervention strategies to achieve physician behavior change—such as some mix of audit/feedback, financial incentives, educational sessions, reminders, and academic detailing. In some cases, multi-faceted strategies have led to behavior change.[19, 50, 83–92] In other cases, however, such strategies were observed to have from minimal to no effect on physician behavior.[93–98] Overall, the literature we reviewed tends to support the notion that a combination of strategies is more effective than a single intervention.[5, 17, 29, 50, 57, 62, 63, 67, 69, 70, 76, 78, 82, 99–106] However, currently there is no solid, empirical evidence that a specific combination of interventions will be successful at altering physician behavior. More research is needed to determine the relative impact of the different elements of a multi-modal intervention, as well as which ones work, why, and in what settings.[80, 92, 107, 108] The following is a list of information from our literature scan on physician engagement strategies:

    - *Performance Audit and Feedback*: The tactic of auditing physician practices and feeding the resulting information back to physicians has been found to produce only modest gains.[67, 69, 70, 72, 79] Where an impact has been found, it typically has occurred when baseline adherence to a desired practice pattern is low and/or when this tactic was used in conjunction with other intervention strategies.[109]

    - *Academic Detailing*: Academic detailing (also known as educational outreach), which is the process of educating physicians in-person and one-on-one using objective information, has been found to be compelling for physician behavior change—especially within the context of pharmaceutical education.[62, 69, 72, 78, 79, 100, 110, 111] In particular, interactive reinforcement and repetition with a clear purpose that is especially geared to the needs of the intended population are effective.[74, 82]

- *Opinion Leaders*: In general, the literature we reviewed indicates that local opinion leaders or physician champions (i.e., identified and active proponents of a particular behavior or set of behaviors within an organization or physician community) may be useful in pushing for and reinforcing physician behavior change.[17, 25, 27, 29, 39, 41, 67, 69, 70, 72, 79, 100, 112-114] However, the compelling characteristics of an opinion leader that are required for success remain unclear, as does the ability to replicate successful models.[115, 116]

- *Point-of-Care Reminders*: Timely and actionable reminders at the point of care have been found to be important drivers of physician behavior.[29, 62, 63, 67, 69, 70, 74, 102, 105, 117-119] Such reminders—which range from handwritten Post-it™ notes, to typed checklists placed in medical charts, to computer-generated alerts—are likely to become more common with the spread of health information technology (e.g., computerized physician order entry and electronic medical records). The success of such reminders is in keeping with other findings in the behavior change literature that performance feedback be actionable.

- *Repeated Exposure:* As the cognitive science literature we reviewed underscores, those who are familiar with performance information are more likely to pay attention to it in the future. Exposure to information leads readers to develop mental schemata to structure it, which in turn enhances the likelihood of future use.[38] Repeated exposure to performance reports appears to increase the potential audience's awareness and perceived value of the information.[12] Assuming this phenomenon is applicable to physicians, the more physicians are exposed to performance reports, the more likely they are to accept this sort of feedback and to appreciate it—especially if they have an opportunity to provide input. It is likely that it will take some time for physicians to pay attention to and trust feedback reports; thus, patience and a long-term commitment to consistent, repeated measuring and reporting are required.

- *Decision Support:* The consumer reporting literature we reviewed suggests that decision support tools encourage use of reports and improve comprehension of the information contained in them. Decision support may range from providing some basic direction (e.g., explaining how to navigate the report, interpret the report's information, and take action based on the information) to offering interactive tools that lead users through a step-by-step decisionmaking process.[10] Point-of-care reminders, one type of decision support tool, have been found to be effective in getting physicians to take action. Additional research is needed to determine what other types of decision support may be useful to physicians.

- *Public Reporting*: The public reporting of individual physicians' scores on a variety of performance measures is a new idea that has not been implemented. It is not yet clear how public reporting may affect physician behavior. Proponents postulate that public information of this nature will drive physicians to compete on quality,[120] but concerns have also been raised. Some people believe that public reporting may cause physicians to avoid sick patients, may encourage the achievement of target rates even when they are not appropriate for patients, or may result in the discounting of patients' preferences and/or professional judgment, the withholding of care, and/or the gaming of data.[77, 120-122] At present, most physicians appear to be opposed to public reporting.[56, 123]

Contrary to what is advocated in the literature, the respondent organizations tend to provide physicians with passive performance feedback. In most cases, the report is created and distributed without further follow-up or use of complimentary engagement strategies. This often occurs because resources are lacking, the importance of a multi-faceted approach is not understood, and/or the impetus for reporting is a third party that does not have the management responsibility for local physician practices. Occasionally, the results are discussed with low-performing physicians, if a physician requests a meeting, or as part of an annual review process. Organizations that share their reports with someone other than the individual physician tend to provide them to medical directors, other high-level managers/administrators, quality improvement directors, and/or members of quality, peer review, or credentialing committees. While these types of individuals may have access to individual physicians' performance ratings, those we interviewed said that strong physician opposition almost always kept them from disclosing identifiable performance information more broadly within their organization. Although there is increasing interest on the part of private and public purchasers of care, public reporting of individual physician performance is rare.

- ***Dissemination:*** The consumer reporting literature we reviewed underscores the importance of developing a dissemination plan from the very beginning of the reporting endeavor.[11] A dissemination plan in this context is understood to cover not only the distribution of the physical or electronic report, but also the actions taken to prepare the audience for the report's arrival. In practice, the picture regarding dissemination is somewhat muddled—in terms of both what is done and what should be done. If reports are developed by an external, third-party sponsor, end users (or those representing end users) are not likely to have much control. The report sponsors we interviewed said they try to be strategic in their dissemination efforts. For example, in some cases the envelope is stamped with a notice (e.g., "confidential") to draw attention and signify the inclusion of sensitive information. For organizations that tie performance reports to financial incentives, the incentive check is often enclosed with the report. However, some organizations have found that including the check does not guarantee that the physician will pay more attention to the report. For several of the organizations, particularly those with a longer history of producing reports, dissemination

plans were somewhat "low key"—not because of a lack of interest or perceived importance, but because the reports had become an integrated, regular part of practice, and physicians were used to receiving them. A few organizations that are newer to reporting host annual dinners or other events at which high performers are recognized. More research and practical experience with various dissemination strategies are needed to identify tactics effective in getting the attention of the intended audience.

- ***Evaluation of Report Use and Impact:*** The consumer reporting literature we reviewed suggests that it is important to evaluate report use and impact in order to make improvements going forward.[11] However, based on our interviews, it appears that formal monitoring and systematic evaluation of the use of feedback reports and their impact on physician behavior are largely not occurring at present. This situation stems primarily from a lack of resources (e.g., staff, time), but it also stems from the belief that this information should be made available regardless of its measurable impact. Some organizations have made minor efforts to track whether physicians receive reports and/or physicians' web-report viewing patterns, but most of these activities are not part of a formal evaluation process. Additionally, while some organizations have monitored physician performance over time and have seen improvements across the board, they have not empirically examined whether the feedback reports contributed to these improvements.

C. Future Direction of Physician Reporting

We asked those we interviewed to comment on the future of individual physician-level reporting, especially with respect to challenging areas. They noted the following issues:

- ***Health Information Technology***: Many of the respondents believe that advances in health information technology hold great promise for better performance reports and/or support organizational capacity to promote behavior change; and many have already reaped some benefits from the health information technology systems they now have in place. Some examples of current or anticipated benefits are more-accurate and more-comprehensive data; real-time/point-of-care feedback; more sophisticated, interactive, user-friendly, and customized data displays; more timely release of data; and lower production costs. Some respondents noted the importance of recognizing that health information technology systems vary greatly in quality, components, and robustness, and that—at least in the short term—this technology may not be able to meet the existing high expectations for measurement and tracking of physician performance.

- ***Pay-for-Performance:*** Some of the respondents' organizations are already linking performance scores to payment, and there is growing interest to expand these efforts. They believe this activity will drive increased reporting of physician performance in the future. Others, while interested, prefer first to focus on getting the measurement and reporting aspects right (i.e., valid, reliable) before

tying compensation to performance at the individual physician level. However, all agree that health care is moving in this direction and that it is only a matter of time before such links between performance and payments are standard.

- ***Public Reporting:*** While the organizations acknowledge a strong market demand by purchasers and consumer groups for public reporting of identifiable, physician-level performance data, many remain reluctant to engage in this type of reporting. As with pay-for-performance, there is a desire to make sure the measurement and reporting are right before releasing such information publicly. These organizations also note the strong resistance of physicians to public reporting (because of fears of data inaccuracies, concerns about risk selection, loss of market share, and law suits, for example), as well as the need to devise ways to address this resistance respectfully before launching public reporting programs.

- ***Non-integrated Health Systems:*** Several organizations stressed the challenges of reporting when working within loosely affiliated health care systems (e.g., PPOs, small/solo practices). In such cases, disparate data systems and a lack of electronic data make analyses cumbersome and expensive, the task of identifying opinion leaders to help launch the reporting effort is difficult, and the required investment in administrative coordination and technical support is significant for small practices. Additionally, the inability or unwillingness to pool data across multiple payers leads to small sample sizes, limiting the analyses that can be done. Given the continued presence of PPOs and small practices throughout the country, these challenges are expected to remain.

- ***Return on Investment (ROI) to Report Sponsor:*** Some respondents noted the pressure their organizations feel to justify their reporting programs in response to management demands to see a clear ROI—i.e., to see that funds spent on reporting have yielded such results as an improvement in quality or a reduction in costs. This is especially true if pay-for-performance is part of the reporting effort. These organizations say it is extremely difficult to link the reports to outcomes because there are multiple factors in play that may affect physician behavior, as well as larger system changes. Additionally, an ROI for one organization or particular program focus may not translate into an ROI for another organization or area. As such, ROI remains a challenging and elusive topic. Nonetheless, most organizations agree that positive returns or not, measurement and reporting at the physician level are likely to continue given the increasing marketplace demand for public accountability on cost and quality.

We also noted several physician-level measurement challenges that, although outside the scope of our study, are significant. The first of these is the attribution of different elements of care to an individual physician, which is especially relevant for reporting the performance of specialists. One way in which organizations are attempting to meet this challenge is by using an emerging class of software that can identify the components of a single episode of care and attribute them to a single health care provider. However, such software has been examined more in the context of efficiency than quality. Other data-

related challenges include a lack of: developed and tested measures for individual physicians and, particularly, specialists; adequate sample sizes to report robust scores on individual performance; a consistent set of metrics for tracking changes over time; and aggregated data to assess the full scope of a physician's performance.

D. Summary of Findings

Despite the useful information we identified in our literature scan, much is still not understood about how best to report performance information to individual physicians to improve behavior. The majority of studies we reviewed only evaluated the impact of behavior change strategies related to one or two metrics (e.g., an increase in mammography or immunization rates), rather than to a more comprehensive improvement program, which is the goal of many physician performance efforts being launched today. Thus, it is not possible to know whether a promising tactic identified in the literature would be successful if it focused on more measures and/or had broader goals (e.g., improving clinical quality and patient satisfaction, as well as lowering costs). The majority of studies identified have also been carried out in very limited time frames, as opposed to today's focus, which is on establishing ongoing measurement programs.

With very few exceptions, the studies we found that used individual physician feedback reports did not discuss report format or content in any detailed way that is instructive to those trying to create their own reports. As noted, this is because the details of the reporting programs are proprietary or the producers of these types of reports have not published their findings. Where possible, we have drawn on lessons learned from the consumer reporting literature to help fill some of the gaps. However, it is important to keep in mind that physicians and consumers are different audiences and have different decisionmaking frameworks, which means that the way in which information is bundled and provided to physicians may need to be tailored to their specific needs. Thus, there is a need for additional research that focuses specifically on individual physicians and on reporting strategies that optimize desired behavior change.

In practice, many of the respondent organizations use strategies supported by the literature when producing performance reports for individual physicians, such as providing comparative data and tailoring report design to the needs and preferences of the intended audience. In particular, these organizations are aware that the process of report development and dissemination is integral to the reporting endeavor's success. They know that without physician engagement early in the reporting process, even the most well-designed, highly evaluable report is not likely to garner trust, be read, and change behavior. Additionally, they recognize the importance of using multi-faceted approaches if behavior change is the desired outcome.

However, this knowledge does not necessarily translate into action. For example, if budgets are constrained, it is difficult to simultaneously fund multiple approaches to increase physician engagement, establish an infrastructure to respond to physicians' inquiries, or conduct an evaluation of the reporting effort. If physicians lack access to computers, interactive, web-based reports are not feasible. If the structure in which the reporting effort takes place is not integrated (e.g., is not a large medical group), it is difficult to determine who should be considered a physician's peer for the purpose of making meaningful comparisons or who would be appropriate opinions leaders, and the critical infrastructure for data collection and tracking is likely lacking. Thus, in efforts to report performance information to individual physicians to improve behavior, the respondent organizations currently face some areas of continued uncertainty, as well

as areas in which they know what would be ideal to do but cannot do it. Many of the respondents noted that as physician-level reporting advances and becomes more commonplace, they anticipate that more research will be conducted to inform the process, and more resources will be made available to improve current reporting efforts.

IV. STUDY LIMITATIONS

Because of the small sample size and purposive sampling strategy of our interviews, the generalizability of the results is limited. We tried to mitigate this limitation by interviewing different types of organizations in different parts of the country. In addition, because the interview data were voluntarily self-reported, there is the possibility of missing, incomplete, and/or biased answers.

For our literature and environmental scans, we attempted to be as comprehensive as possible within the scope and limits of the study's goals, timeline, and budget. Toward that end, we consulted experts to ensure that important publications and information were not overlooked. However, it is possible that we may not have identified all relevant publications and information. Particularly in the case of the environmental scan, details about initiatives were sometimes not readily available via websites, and limited resources ruled out in-depth follow-up (e.g., telephone interviews). Moreover, even if contacted, some of these entities (notably the private sector vendors) consider the details of their reporting efforts proprietary and thus will not discuss them.

V. GUIDANCE AND DIRECTIONS FOR FUTURE RESEARCH

This report outlines current activities in the area of individual physician performance feedback reports, along with findings we identified in the literature related to this topic. Although ongoing, comprehensive measurement and reporting at the physician level are very much in their infancy, early lessons drawn from the literature and the early adopters we interviewed may be useful to other organizations engaged in producing feedback reports to improve physician performance. Additionally, some of these lessons point to areas for future research.

A. Key Findings and Guidance

In setting off on the path of producing performance feedback reports for individual physicians in order to change behavior, the following key points about report production and dissemination should be kept in mind:

What information should be presented? The content of the report will be driven by the specific interests and goals of the report sponsor. Report sponsors should be honest and direct about the purpose of the information presented (e.g., for information only, to reduce costs, to improve quality). Where goals may conflict (e.g., improving clinical quality may not save money), sponsors should discuss this conflict and how it relates to any actions they would like the intended audience to take. Once the goals are clearly established, the sponsor will have to face the challenge of how best to communicate the performance feedback so that physicians will be likely to use it. Those we interviewed and the literature we reviewed stressed that because physicians say they are motivated by peer comparisons, it is important to use peer comparisons in performance reports if the goal is to change physician behavior. It is also important to include actionable items or clear steps that a physician can take. For example, some report producers with whom we spoke said they present information—such as a list of specific patients due for care—in an appendix, companion report, or registry. The physician thus receives guidance on specific ways to improve his or her performance (e.g., by contacting patients on the list who are due for a mammogram). Additionally, any performance benchmarks or thresholds included in the report should be set at achievable levels so as not to be perceived as unreasonable and thus ignored. Finally, the respondent organizations indicated two other items of significant concern—the accuracy and timeliness of the measures and data used to score a physician's performance—both of which were beyond the scope of our study, which did not address data management or specific performance measures.

How should reports be formatted to stimulate use? There is no definitive guidance on how best to format feedback reports for physicians: the empirical literature in this area is limited, and entities that have produced reports typically have not formally tested the options and/or disseminated their findings. Consistent with the literatures on cognitive science and consumer reporting, those we interviewed suggest that physician reports be designed in ways that produce a readily understandable snapshot of performance—in other words, data should be provided in a manner that allows it to be interpreted quickly and accurately. Examples of formats that may help to achieve this end are

- Rank-ordering of peers and/or indicators by scores so that high and low scores are obvious

- Strategic use of typography (e.g., font style and size) to highlight important information

- Use of adequate white space so the report is not visually cluttered.

Those interviewed for this study are employing many of these strategies and believe they are effective. However, because the formal testing of layout and graphics that has been carried out with physician audiences ranges from minimal to none, it is unknown what approaches are most effective in communicating performance information to this audience.

What is the best medium for sharing feedback information with physicians? Producers of physician-level reports have used a variety of media: printed hard copies; electronic static copies; and flexible, interactive web-based versions. Consistent with the literature, the report producers noted that interactive web formats allow users to tailor information to their preferred level of detail and are especially appropriate for presenting increasingly specific levels of data (i.e., "drill down" information). Web-based formats are also valued because they permit frequent information updates without incurring printing and distribution costs. However, it was noted that many physicians do not have convenient access to the Internet, are resistant to using this medium, and/or may not be accustomed to accessing information in this way on a routine basis. Many of the producers of physician-level reports advised that an assessment be conducted to determine the type(s) of media preferred by the target audience and/or that reports be offered in a variety of media to accommodate the different preferences and capabilities of the intended audience.

What process should be used to involve individual physicians in the design and sharing of feedback reports? According to many we interviewed and further substantiated by the literature we reviewed on physician behavior change, employing an interactive, transparent, honest, and respectful reporting process is critical to the success of a physician-focused reporting endeavor, especially if behavior change is a key goal. Those interviewed expressed a strong belief that physicians should be involved early and often in the development and implementation of feedback reports in order to build physician ownership of the process and the end product, as well as to ensure that the report reflects the physicians' needs and interests. Many of those we interviewed also advised that physicians be given the opportunity to question data presented in the reports and to make changes if errors are uncovered before the information is released to others. As in the literature, those involved in physician-level reporting activities cautioned that the passive provision of information alone is not sufficient to bring about behavior change. They have found multi-faceted approaches to be more effective—such as interactive educational sessions coupled with the use of local opinion leaders/physician champions and/or feedback reports. Although the optimal approach for sharing information is not known, passively sharing information is not likely to lead to physician behavior change.

Based on our interviews, the process used to feed information back to individual physicians appears to be a key determinant in achieving behavior change.

B. Conclusion and Areas for Future Research

Reporting on performance at the individual physician level is a relatively new activity in the United States but is expected to become more common as policymakers continue to push for improvements in quality of health care and reductions in the growth of health care expenditures. Little is known about how best to communicate performance information to physicians to promote changes in behavior that will lead to improvements in quality and more-effective use of resources. Although we gleaned important guidance on these issues from our interviews and literature scan, many questions remain. Organizations seeking to report performance data to individual physicians would benefit from greater sharing of methods by experienced organizations, well-executed evaluations of the impact of reporting efforts, and the transfer of knowledge when both successful and unsuccessful strategies are identified.

In particular, those trying to produce effective feedback reports for individual physicians need answers to the following questions:

- In the areas of clinical care, patient experience, efficiency, and safety, which performance metrics and what unit of analysis (e.g., patient vs. population, individual measures vs. composites) are the most actionable for physicians and the most likely to lead to behavior change?
- Which reports are more compelling and effective: consolidated reports or those that deal with a single issue?
- What are the most effective formats to use in individual physician feedback reports? For example, what types of media are the most appropriate for ensuring that physicians are able to access information? Which types of graphical displays are the most effective for promoting understanding?
- What combination of engagement and feedback is the most effective for achieving physician behavior change?
- What are the key barriers inhibiting the use of performance reports by individual physicians, and how might these barriers be overcome?

APPENDIX: FINDINGS OF THE ENVIRONMENTAL SCAN

Our environmental scan found increasing and varied activity in the use of individual physician feedback reports. As noted earlier, we did not include activities by health plans, medical groups, or health care consortia because these entities are represented in the interview results.

A. Medical/Specialty Societies

A variety of medical/specialty societies are active in the area of individual physician-level reporting and performance improvement. Although there is growing interest on the part of payers and consumer groups to report individual physician performance data publicly, at this time these societies are focused on helping physicians use performance information for internal, confidential quality improvement purposes. The following is a list of these societies and their activities:

- ***American Academy of Family Practice*:** AAFP is involved in a variety of collaborative initiatives aimed at improving the collection and reporting of physician performance data for quality improvement purposes—for example, the Ambulatory Care Quality Alliance (AQA) and the American Medical Association's Physician Consortium for Performance Improvement. AAFP has also developed and adopted a set of physician profiling guidelines. These guidelines state that physician profiles should do the following: aim to assess and improve the quality of patient care and clinical outcomes; clearly define what is being measured; select measurement goals that are actionable; involve physicians in the development of performance measures and the feedback process; explicitly describe data sources for measures; clearly report on the validity, accuracy, reliability, and limitations of data utilized; use criteria for comparison purposes that are based on valid peer groups, evidence-based statistical norms, and/or evidence-based clinical policies; and identify individual patients who are not receiving indicated clinical interventions and provide interventions to improve physician performance relative to stated measurement goals.

- ***American Board of Internal Medicine*:** The ABIM affects health care quality through its development of standards for knowledge, skills, and attitudes for internists. It is responsible for creating the examinations that internists must pass in order to receive board certification in this field. The ABIM offers two feedback services for individual physicians. First, through the ABIM's Practice Improvement Modules, a physician can confidentially evaluate the way he/she addresses a specific medical condition. Upon electronically submitting data to the ABIM using a computer-based tool, the physician receives a summary intended to assist him/her in making practice improvements. Second, through the ABIM's Peer and Patient Feedback module, a physician can collect peer and patient feedback and obtain a confidential report to use in developing an improvement plan. The ABIM also offers several other self-evaluation modules that test a physician's knowledge of specific clinical areas. In addition, in

conjunction with other certifying boards, the ABIM will provide modules that use the ambulatory CAHPS® (A-CAHPS) survey, AHRQ's newly developed physician-level patient experience survey.

- ***American Board of Internal Medicine Foundation*:** The ABIM Foundation, in collaboration with Commonwealth Fund, launched the "Stepping Up To the Plate" initiative in January 2005. This initiative aims to promote quality of care improvements through greater involvement of organized medicine and more grassroots physician engagement. As part of this endeavor, tools and measures to improve quality and efficiency are being developed that can be used by physicians to make changes in their clinical practices. The ABIM Foundation is also involved in several projects focused on using physician feedback to improve the quality of health care—for example, "Putting Quality into Practice (PQIP)." "Improving Performance in Practice" is developing a consortium focused, in part, on practice improvement.

- ***American College of Cardiology:*** The ACC's National Cardiovascular Data Registry (ACC-NCDR®) currently operates three national registries that collect and report data for cardiac and vascular labs that pay a fee to be part of the registries. Third-party software vendors collect and report the data, and the reports generated provide participating labs with information about patient, facility, and provider characteristics, as well as quality information (including adverse events). The data are used for benchmarking, peer comparisons, and meeting CMS reimbursement requirements. Although the reports provided by ACC-NCDR® only include lab-level data, many of the software vendors are also able to provide labs and individual physicians with information about individual providers.

- ***American College of Physicians:*** ACP is a supporter of ACPNet, a practice-based research network formerly known as QNet. As Qnet, this network conducted audit-feedback studies on five medical conditions. Participating physicians submitted data on their own clinical practices and qualitative information about barriers to following evidence-based practices; in return, they received individualized reports comparing their performance to that of other physicians in the study plus an analysis of all barriers. ACPNet is now in the process of evaluating a web-based diabetes management program for physicians that aims to improve the quality of diabetes care through individual physician feedback reports.

- ***American College of Radiology:*** ACR enables reporting on individual radiologists' performance through its RADPEER™ program. RADPEER™ is a confidential peer-review program in which radiology facilities submit images to be reviewed by peers (via hard copy or through an online system known as eRAPDEER™). For facilities participating in this program, the radiology chair or medical director receives quarterly reports that include the following information: summary statistics and comparisons for each participating

radiologist and for each facility by modality, and summary data across all participating facilities by modality.

- ***American Medical Association*:** The AMA, which represents physicians nationally, is the lead organization for the Physician Consortium for Performance Improvement. To improve health care quality and accountability, this consortium is developing physician-level, evidence-based clinical performance measures, as well as outcome-reporting tools. Several physician groups have integrated the performance measures into their electronic health records and are generating physician-level performance reports using the data.

- ***American Society of Clinical Oncology*:** ASCO currently operates the Quality Oncology Practice Initiative (QOPI), which seeks to improve cancer care by supporting oncology practices with tools for measurement, feedback, and quality improvement. The activities of the initiative include developing a set of quality measures, a strategy to identify charts for entry into a secure data system, automated data analysis and reporting, and a network of resources for improvement. Using data entered via a web-based system, results are produced for the participating oncology practices to use in quality improvement and other activities. Participating practices can receive performance information at any level desired, including the individual physician level.

B. Private Sector

A number of vendors—such as (but not limited to) Quality Data Management, Inc., Health Dialog, Resolution Health, Health Benchmarks, and ActiveHealth—are now offering a wide range of data aggregation, analytic, and reporting services to support organizations that are evaluating care at the individual physician level. Most vendors construct performance measures related to quality/effectiveness or cost/efficiency using claims data provided by the organization purchasing the services. Although each vendor offers a slightly different set of measures, there is considerable overlap in the content of the measurement sets because many draw on leading publicly available sets such as HEDIS and the AHRQ Quality Indicators. Most of the vendors offering these services have another, complementary business offering (e.g., disease management). Because the products these vendors offer are proprietary, it is difficult to obtain much detailed information from their websites about what they measure, how they measure, and how information is provided to physicians.

Health plans are the primary purchasers of the services these vendors offer. In general, health plans have responded to demands from their major clients (e.g., large employers) to provide products or programs that evaluate physician performance and that make such information available in a way that can change where patients seek care or how well physicians deliver needed services. The organization of these services affects the type and timing of feedback, and the line between feedback and other management services is frequently blurred. For example, some performance information is used to construct tiered networks, and the feedback from the health plan to the physician is the tier into which the physician has been placed. Other performance information may be

used to trigger reminders to physicians to offer or deliver a service that appears indicated (e.g., beta blockers after a heart attack). Still another use is to coach patients on obtaining needed care for a chronic disease. The data used to drive these activities may also be assembled to produce more static reports over a fixed period.

C. Federal Government

The federal government is engaged in physician-level measurement, reporting, and performance improvement. For example:

- ***Centers for Medicare and Medicaid Services*:** CMS is engaged in physician-level measurement and feedback through two programs. First, it supports physician feedback through the Doctor's Office Quality Information Technology (DOQ-IT) demonstration project. This project promotes the introduction and integration of electronic medical records and other health information technology into physicians' offices to enable the collection of health care quality data. Based on the data submitted, CMS provides primary care practices with feedback reports on their performance and ways to improve it. Second, CMS recently launched the Physician Voluntary Reporting Program, which, beginning in January 2006, began enrolling physicians who voluntarily agree to submit data about the quality of care given to Medicare patients. With these data, CMS will identify effective ways to use quality measures in routine practice and to support physicians in improving quality of care. It will also provide feedback to assist physicians in improving their data accuracy, reporting rate, and clinical care; and it will seek their input about how to improve the ease of reporting and the usefulness of the quality measures. Eventually, public reporting of individual physician performance is likely.

- ***Veterans Health Administration*:** The VHA is involved in extensive data collection in many areas, including quality of care, access to care, patient satisfaction, patient function, community health, and cost-effectiveness. With implementation of electronic information systems and investment in an audit program, the VHA is able to report on the clinical performance of individual physicians. Additionally, the VHA's computerized patient record system (CPRS) allows for instant access to patient information, clinical decision support, and treatment reminders at the point of care. In 2006, the VHA launched a pay-for-performance program at the physician level.

REFERENCES

1. National Quality Forum. 2005, http://www.qualityforum.org/.
2. Ambulatory Care Quality Alliance, *Improving Clinical Quality and Consumer Decisionmaking*. 2005, http://www.ahrq.gov/qual/aqaback.htm.
3. Centers for Medicare and Medicaid Services (press release). 2005, http://www.cms.hhs.gov/media/press/release.asp?Counter=1699.
4. Centers for Medicare and Medicaid Services. 2005, http://www.cms.hhs.gov.
5. Institute for Healthcare Improvement. 2005, http://www.ihi.org/ihi.
6. The Leapfrog Group. 2005, http://www.leapfroggroup.org/.
7. Consumer-Purchaser Disclosure Project. 2005, http://healthcaredisclosure.org/.
8. Bridges to Excellence. 2005, http://www.bridgestoexcellence.org/bte/.
9. NCQA Physician Recognition Program. 2005, http://www.ncqa.org/PhysicianQualityReports.htm.
10. Teleki, S.S., Shaw, R.N., Spranca, M., Kanouse, D.E., Vaiana, M.E., and de Vries, H., *Lessons Learned About Designing, Disseminating, and Using Reports on Health Care Quality*. 2005 (under review), AHRQ: Rockville, MD.
11. Kanouse, D.E., Spranca, M., and Vaiana, M.E., Reporting About Health Care Quality: A Guide to the Galaxy. *Health Promotion Practice*, 2004. **5**(3): pp. 222–231.
12. Hibbard, J., Engaging Health Care Consumers to Improve the Quality of Care. *Medical Care*, 2003. **41**(1): pp. I61–I70.
13. Hibbard, J., Peters, E., Slovic, P., Finucane, M.L., and Tusler, M., Making Health Care Quality Reports Easier to Use. *Joint Commission Journal on Quality Improvement*, 2001. **27**(11): pp. 591–604.
14. Hibbard, J., Slovic, P., Peters, E., and Finucane, M.L., Strategies for Reporting Health Plan Performance Information to Consumers: Evidence from Controlled Studies. *Health Services Research*, 2002. **37**(2): pp. 291–313.
15. Hibbard, J.H., Harris-Kojetin, L., Mullin, P., Lubalin, J., and Garfinkel, S.A., Increasing the Impact of Health Plan Report Cards by Addressing Consumers' Concerns. *Health Affairs*, 2000. **19**(5): pp. 138–143.
16. Pacific Business Group on Health. 2005, http://www.pbgh.org/.
17. Eisenberg, J.M., Physician Utilization. The State of Research About Physicians' Practice Patterns. *Medical Care*, 1985. **23**(5): pp. 461–483.
18. de Brantes, F., *Measuring Provider Efficiency Version 1.0*. 2004, The Leapfrog Group, Bridges to Excellence.
19. Greene, R.A., Beckman, H., Chamberlain, J., Partridge, G., Miller, M., Burden, D., and Kerr, J., Increasing Adherence to a Community-Based Guideline for Acute Sinusitis through Education, Physician Profiling, and Financial Incentives. *American Journal of Managed Care*, 2004. **10**(10): pp. 670–8.
20. Dimoulas, E. and Hall, A., *Literature Review on Provider Profiling*. 2004, The University of Florida, Center for Medicaid and the Uninsured.
21. Lasker, R.D., Shapiro, D.W., and Tucker, A.M., Realizing the Potential of Practice Pattern Profiling. *Inquiry*, 1992. **29**(3): pp. 287–97.
22. Landon, B.E., Normand, S.L., Blumenthal, D., and Daley, J., Physician Clinical Performance Assessment: Prospects and Barriers. *Journal of the American Medical Association*, 2003. **290**(9): pp. 1183–9.

23. Exworthy, M., Wilkinson, E.K., McColl, A., Moore, M., Roderick, P., Smith, H., and Gabbay, J., The Role of Performance Indicators in Changing the Autonomy of the General Practice Profession in the UK. *Social Science & Medicine*, 2003. **56**(7): pp. 1493–504.
24. Lighter, D.E. and Tylkowski, C.M., Case Study: Using Control Charts to Track Physician Productivity. *Physician Executive*, 2004. **30**(5): pp. 53.
25. Main, E.K., Reducing Cesarean Birth Rates with Data-Driven Quality Improvement Activities. *Pediatrics*, 1999. **103**(1 Suppl E): pp. 374–83.
26. Hopkins, J.R., Financial Incentives for Ambulatory Care Performance Improvement. *Joint Commission Journal on Quality Improvement*, 1999. **25**(5): pp. 223–38.
27. Rubenstein, L.V., Mittman, B.S., Yano, E.M., and Mulrow, C.D., From Understanding Health Care Provider Behavior to Improving Health Care: The QUERI Framework for Quality Improvement. Quality Enhancement Research Initiative. *Medical Care*, 2000. **38**(6 Suppl 1): pp. I129–41.
28. Kiefe, C.I., Allison, J.J., Williams, O.D., Person, S.D., Weaver, M.T., and Weissman, N.W., Improving Quality Improvement Using Achievable Benchmarks for Physician Feedback: A Randomized Controlled Trial. *Journal of the American Medical Association*, 2001. **285**(22): pp. 2871–9.
29. Greco, P.J. and Eisenberg, J.M., Changing Physicians' Practices. *New England Journal of Medicine*, 1993. **329**(17): pp. 1271–3.
30. Gilmet, G.P., Mallon, R.P., Griffin, B.T., and Lewandowski, J.J., The Use of an Integrated Clinical Laboratory and Pharmacy Diabetes Database to Provide Physician Performance Feedback in an IPA-Model HMO. *Journal of Ambulatory Care Management*, 1998. **21**(1): pp. 12–23.
31. Fidler, H., Lockyer, J.M., Toews, J., and Violato, C., Changing Physicians' Practices: The Effect of Individual Feedback. *Academic Medicine*, 1999. **74**(6): pp. 702–14.
32. Nelson, E.C., Batalden, P.B., Plume, S.K., Mihevc, N.T., and Swartz, W.G., Report Cards or Instrument Panels: Who Needs What? *The Joint Commission Journal on Quality Improvement*, 1995. **21**(4): pp. 155–66.
33. Nelson, E.C., Mohr, J.J., Batalden, P.B., and Plume, S.K., Improving Health Care, Part 1: The Clinical Value Compass. *Journal of Quality Improvement*, 1996. **22**(4): pp. 243–258.
34. Cudney, A.E., Cox, J., and Baugh, K., Comparing Clinical Resources and Outcomes to Understand Best Practices. *Journal of Healthcare Management*, 2002. **47**(5): pp. 287.
35. Nelson, E.C., Batalden, P.B., and Ryer, J.C., eds., *Clinical Improvement Action Guide*. 1998, Joint Commission on Accreditation of Healthcare Organizations: Oakbrook Terrace, IL.
36. Hibbard, J., Slovic, P., and Jewett, J., Informing Consumer Decisions in Health Care: Implications from Decision-Making Research. *Milbank Quarterly*, 1997. **75**(3): pp. 395–414.
37. Hibbard, J., Jewett, J., Legnini, M.W., and Tusler, M., Choosing a Health Plan: Do Large Employers Use the Data? *Health Affairs*, 1997. **16**(6): pp. 172–80.

38. Vaiana, M.E. and McGlynn, E.A., What Cognitive Science Tells Us About the Design of Reports for Consumers. *Medical Care Research and Review*, 2002. **59**(1): pp. 3–35.
39. Conway, A.C., Keller, R.B., and Wennberg, D.E., Partnering with Physicians to Achieve Quality Improvement. *Journal of Quality Improvement*, 1995. **21**(11): pp. 619–626.
40. Manning, M., Physician Profiling Can Help Build a Doctor-Centered Plan. *Managed Healthcare Executive*, 2001. **11**(4): pp. 43–4.
41. Lomas, J., Anderson, G.M., Domnick-Pierre, K., Vayda, E., Enkin, M.W., and Hannah, W.J., Do Practice Guidelines Guide Practice? The Effect of a Consensus Statement on the Practice of Physicians. *New England Journal of Medicine*, 1989. **321**(19): pp. 1306–11.
42. Weinberg, N., Using Performance Measures to Identify Plans of Action to Improve Care. *The Joint Commission Journal on Quality Improvement*, 2001. **27**(12): pp. 683–8.
43. The Founders Council, *Health Plans' Use of Profiling: Executive Summary*. 2002, The Advisory Board Company: Washington, DC.
44. Lowes, R.L., Groups Get Serious About Judging Their Doctors. *Medical Economics*, 1995. **72**(9): pp. 51.
45. Shortell, S.M., Bennett, C.L., and Byck, G.R., Assessing the Impact of Continuous Quality Improvement on Clinical Practice: What It Will Take to Accelerate Progress. *Milbank Quarterly*, 1998. **76**(4): pp. 593–624, 510.
46. Weiner, B.J., Shortell, S.M., and Alexander, J., Promoting Clinical Involvement in Hospital Quality Improvement Efforts: The Effects of Top Management, Board, and Physician Leadership. *Health Services Research*, 1997. **32**(4): pp. 491.
47. McGlynn, E.A., Asch, S.M., Adams, J., Keesey, J., Hicks, J., DeCristofaro, A., and Kerr, E.A., The Quality of Health Care Delivered to Adults in the United States. *New England Journal of Medicine*, 2003. **348**(26): pp. 2635–45.
48. Thom, D.H., Hall, M.A., and Pawlson, L.G., Measuring Patients' Trust in Physicians When Assessing Quality of Care. *Health Affairs (Millwood)*, 2004. **23**(4): pp. 124–32.
49. Cabana, M.D., Rand, C.S., Powe, N.R., Wu, A.W., Wilson, M.H., Abboud, P.C., and Rubin, H.R., Why Don't Physicians Follow Clinical Practice Guidelines?: A Framework for Improvement. *Journal of the American Medical Association*, 1999. **282**(15): pp. 1458–1465.
50. Balas, E.A., Boren, S.A., Brown, G.D., Ewigman, B.G., Mitchell, J.A., and Perkoff, G.T., Effect of Physician Profiling on Utilization. Meta-Analysis of Randomized Clinical Trials. *Journal of General Internal Medicine*, 1996. **11**(10): pp. 584–90.
51. Bodenheimer, T., Wang, M.C., Rundall, T.G., Shortell, S.M., Gillies, R.R., Oswald, N., Casalino, L., and Robinson, J.C., What Are the Facilitators and Barriers in Physician Organizations' Use of Care Management Processes? *Joint Commission Journal on Quality and Safety*, 2004. **30**(9): pp. 505–14.
52. Sicotte, C., Pineault, R., Tilquin, C., and Contandriopoulos, A.P., The Diluting Effect of Medical Work Groups on Feedback Efficacy in Changing Physician's Practice. *Journal of Behavioral Medicine*, 1996. **19**(4): pp. 367–383.
53. Stone, E.G., Morton, S.C., Hulscher, M.E., Maglione, M.A., Roth, E., Grimshaw, J.M., Mittman, B.S., Rubenstein, L.V., Rubenstein, L.Z., and Shekelle, P.G.,

Interventions That Increase Use of Adult Immunization and Cancer Screening Services: A Meta-Analysis. *Annals of Internal Medicine*, 2002. **136**: pp. 641–651.
54. Goebel, L.J., A Peer Review Feedback Method of Promoting Compliance with Preventive Care Guidelines in a Resident Ambulatory Care Clinic. *The Joint Commission Journal on Quality Improvement*, 1997. **23**(4): pp. 196–202.
55. Hall, W., Violato, C., Lewkonia, R., Lockyer, J., Fidler, H., Toews, J., Jennett, P., Donoff, M., and Moores, D., Assessment of Physician Performance in Alberta: The Physician Achievement Review. *Canadian Medical Association Journal*, 1999. **161**(1): pp. 52–7.
56. Audet, A.M., Doty, M.M., Shamasdin, J., and Schoenbaum, S.C., Measure, Learn, and Improve: Physicians' Involvement in Quality Improvement. *Health Affairs (Millwood)*, 2005. **24**(3): pp. 843–53.
57. Ornstein, S., Jenkins, R.G., Nietert, P.J., Feifer, C., Roylance, L.F., Nemeth, L., Corley, S., Dickerson, L., Bradford, W.D., and Litvin, C., A Multimethod Quality Improvement Intervention to Improve Preventive Cardiovascular Care: A Cluster Randomized Trial. *Annals of Internal Medicine*, 2004. **141**(7): pp. 523–32.
58. Audet, A.M., Doty, M.M., Shamasdin, J., and Schoenbaum, S.C., *Physician's Views on Quality of Care: Findings from the Commonwealth Fund Survey of Physicians and Quality of Care*. 2005, The Commonwealth Fund.
59. Beckman, H., Suchman, A., Curtin, K., and Greene, R., Physician Reactions to Quantitative Individual Performance Reports. *American Journal of Medical Quality*, 2006. **21**(3): pp. 192–9.
60. Teleki, S., Damberg, C., Pham, C., and Berry, S., Will Financial Incentives Stimulate Quality Improvement? Reactions from Frontline Physicians. *American Journal of Medical Quality*, 2006 (In press).
61. Evans, C.E., Haynes, R.B., Birkett, N.J., Gilbert, J.R., Taylor, D.W., Sackett, D.L., Johnston, M.E., and Hewson, S.A., Does a Mailed Continuing Education Program Improve Physician Performance? Results of a Randomized Trial in Antihypertensive Care. *Journal of the American Medical Association*, 1986. **255**(4): pp. 501–4.
62. Davis, D.A. and Taylor-Vaisey, A., Translating Guidelines into Practice. A Systematic Review of Theoretic Concepts, Practical Experience and Research Evidence in the Adoption of Clinical Practice Guidelines. *Canadian Medical Association Journal*, 1997. **157**(4): pp. 408–16.
63. Bero, L.A., Grilli, R., Grimshaw, J.M., Harvey, E., Oxman, A.D., and Thomson, M.A., Closing the Gap between Research and Practice: An Overview of Systematic Reviews of Interventions to Promote the Implementation of Research Findings. The Cochrane Effective Practice and Organization of Care Review Group. *British Medical Journal*, 1998. **317**(7156): pp. 465–8.
64. Subramanian, U., Fihn, S.D., Weinberger, M., Plue, L., Smith, F.E., Udris, E.M., McDonell, M.B., Eckert, G.J., Temkit, M., Zhou, X.H., Chen, L., and Tierney, W.M., A Controlled Trial of Including Symptom Data in Computer-Based Care Suggestions for Managing Patients with Chronic Heart Failure. *The American Journal of Medicine*, 2004. **116**(6): pp. 375–84.
65. Belcher, D.W., Implementing Preventive Services. Success and Failure in an Outpatient Trial. *Archives of Internal Medicine*, 1990. **150**(12): pp. 2533–41.

66. Lee, T.H., Pearson, S.D., Johnson, P.A., Garcia, T.B., Weisberg, M.C., Guadagnoli, E., Cook, E.F., and Goldman, L., Failure of Information as an Intervention to Modify Clinical Management: A Time-Series Trial in Patients with Acute Chest Pain. *Annals of Internal Medicine*, 1995. **122**(6): pp. 434–437.
67. Bauchner, H. and Chessare, J., Changing Physician Behaviour. *Archives of Disease in Childhood*, 2001. **84**: p. 459–462.
68. Kanouse, D.E. and Jacoby, I., *When Does Information Change Practitioners' Behavior?* 1987, RAND: Santa Monica, CA.
69. Davis, D., Does CME Work? An Analysis of the Effect of Educational Activities on Physician Performance or Health Care Outcomes. *International Journal of Psychiatry in Medicine*, 1998. **28**(1): pp. 21–39.
70. Davis, D.A., Thomson, M.A., Oxman, A.D., and Haynes, R.B., Changing Physician Performance. A Systematic Review of the Effect of Continuing Medical Education Strategies. *Journal of the American Medical Association*, 1995. **274**(9): pp. 700–5.
71. Lomas, J., Words without Action? The Production, Dissemination, and Impact of Consensus Recommendations. *Annual Review of Public Health*, 1991. **12**: pp. 41–65.
72. Freemantle, N., Harvey, E., Wolf, F., Grimshaw, J., Grilli, R., and Bero, L., Printed Educational Materials [Systematic Review]. *Cochrane Database of Systematic Reviews*, 2005. **3**.
73. Kosecoff, J., Kanouse, D.E., Rogers, W.H., McCloskey, L., Winslow, C.M., and Brook, R.H., Effects of the National Institutes of Health Consensus Development Program on Physician Practice. *Journal of the American Medical Association*, 1987. **258**(19): pp. 2708–13.
74. Avorn, J. and Solomon, D.H., Cultural and Economic Factors That (Mis)Shape Antibiotic Use: The Nonpharmacologic Basis of Therapeutics. *Annals of Internal Medicine*, 2000. **133**(2): pp. 128–35.
75. Calkins, D.R., Rubenstein, L.V., Cleary, P.D., Davies, A.R., Jette, A.M., Fink, A., Kosecoff, J., Young, R.T., Brook, R.H., and Delbanco, T.L., Functional Disability Screening of Ambulatory Patients: A Randomized Controlled Trial in a Hospital-Based Group Practice. *Journal of General Internal Medicine*, 1994. **9**(10): pp. 590–2.
76. Fihn, S.D., McDonell, M.B., Diehr, P., Anderson, S.M., Bradley, K.A., Au, D.H., Spertus, J.A., Burman, M., Reiber, G.E., Kiefe, C.I., Cody, M., Sanders, K.M., Whooley, M.A., Rosenfeld, K., Baczek, L.A., and Sauvigne, A., Effects of Sustained Audit/Feedback on Self-Reported Health Status of Primary Care Patients. *The American Journal of Medicine*, 2004. **116**(4): pp. 241–8.
77. Mannion, R. and Davies, H.T.O., Reporting Health Care Performance: Learning from the Past, Prospects for the Future. *Journal of Evaluation in Clinical Practice*, 2002. **8**(2): pp. 215–228.
78. Alvanzo, A.H., Cohen, G.M., and Nettleman, M., Changing Physician Behavior: Half-Empty or Half-Full? *Clinical Governance*, 2003. **8**(1): p. 69.
79. Trowbridge, R. and Weingarten, S., *Chapter 54: Educational Techniques Used in Changing Provider Behavior*, in *Making Health Care Safer: A Critical Analysis of Patient Safety Practices. Evidence Report/Technology Assessment: Number 43. AHRQ Publication No. 01-E058*. 2001, Agency for Healthcare Research and Quality.
80. Sondergaard, J., Andersen, M., Stovring, H., and Kragstrup, J., Mailed Prescriber Feedback in Addition to a Clinical Guideline Has No Impact: A Randomised,

Controlled Trial. *Scandinavian Journal of Primary Health Care*, 2003. **21**(1): pp. 47–51.

81. Davis, D., O'Brien, M.A., Freemantle, N., Wolf, F.M., Mazmanian, P., and Taylor-Vaisey, A., Impact of Formal Continuing Medical Education: Do Conferences, Workshops, Rounds, and Other Traditional Continuing Education Activities Change Physician Behavior or Health Care Outcomes? *Journal of the American Medical Association*, 1999. **282**(9): pp. 867–74.
82. Soumerai, S.B. and Avorn, J., Predictors of Physician Prescribing Change in an Educational Experiment to Improve Medication Use. *Medical Care*, 1987. **25**(3): pp. 210–21.
83. Amundson, G., Solberg, L.I., Reed, M., Martini, E.M., and Carlson, R., Paying for Quality Improvement: Compliance with Tobacco Cessation Guidelines. *Joint Commission Journal on Quality and Safety*, 2003. **29**(2): pp. 59–65.
84. Andrews, J.O., Tingen, M.S., Waller, J.L., and Harper, R.J., Provider Feedback Improves Adherence with AHCPR Smoking Cessation Guideline. *Preventive Medicine*, 2001. **33**(5): pp. 415–21.
85. Myers, R.E., Turner, B., Weinberg, D., Hyslop, T., Hauck, W.W., Brigham, T., Rothermel, T., Grana, J., and Schlackman, N., Impact of a Physician-Oriented Intervention on Follow-up in Colorectal Cancer Screening. *Preventive Medicine*, 2004. **38**(4): pp. 375–81.
86. Goff, D.C., Jr., Gu, L., Cantley, L.K., Parker, D.G., and Cohen, S.J., Enhancing the Quality of Care for Patients with Coronary Heart Disease: The Design and Baseline Results of the Hastening the Effective Application of Research through Technology (Heart) Trial. *American Journal of Managed Care*, 2002. **8**(12): pp. 1069–78.
87. Kim, C.S., Kristopaitis, R.J., Stone, E., Pelter, M., Sandhu, M., and Weingarten, S.R., Physician Education and Report Cards: Do They Make the Grade? Results from a Randomized Controlled Trial. *The American Journal of Medicine*, 1999. **107**(6): pp. 556–60.
88. Verstappen, W.H., van der Weijden, T., Sijbrandij, J., Smeele, I., Hermsen, J., Grimshaw, J., and Grol, R.P., Effect of a Practice-Based Strategy on Test Ordering Performance of Primary Care Physicians: A Randomized Trial. *Journal of the American Medical Association*, 2003. **289**(18): pp. 2407–12.
89. Barton, M.B. and Schoenbaum, S.C., Improving Influenza Vaccination Performance in an HMO Setting: The Use of Computer-Generated Reminders and Peer Comparison Feedback. *American Journal of Public Health*, 1990. **80**(5): pp. 534–6.
90. Hux, J.E., Melady, M.P., and DeBoer, D., Confidential Prescriber Feedback and Education to Improve Antibiotic Use in Primary Care: A Controlled Trial. *Canadian Medical Association Journal*, 1999. **161**(4): pp. 388–92.
91. Baker, A.M., Lafata, J.E., Ward, R.E., Whitehouse, F., and Divine, G., A Web-Based Diabetes Care Management Support System. *Joint Commission Journal on Quality Improvement*, 2001. **27**(4): pp. 179–90.
92. Hulscher, M.E., Wensing, M., Grol, R.P., van der Weijden, T., and van Weel, C., Interventions to Improve the Delivery of Preventive Services in Primary Care. *American Journal of Public Health*, 1999. **89**(5): pp. 737–46.

93. Hillman, A.L., Ripley, K., Goldfarb, N., Weiner, J., Nuamah, I., and Lusk, E., The Use of Physician Financial Incentives and Feedback to Improve Pediatric Preventive Care in Medicaid Managed Care. *Pediatrics*, 1999. **104**(4 Pt 1): pp. 931–5.
94. Curtis, J.R., Olivieri, J., Allison, J.J., Gaffo, A., Juarez, L., Kovac, S.H., Person, S., and Saag, K.G., A Group Randomized Trial to Improve Safe Use of Nonsteroidal Anti-Inflammatory Drugs. *American Journal of Managed Care*, 2005. **11**(9): pp. 537–43.
95. Fairbrother, G., Hanson, K.L., Friedman, S., and Butts, G.C., The Impact of Physician Bonuses, Enhanced Fees, and Feedback on Childhood Immunization Coverage Rates. *American Journal of Public Health*, 1999. **89**(2): pp. 171–5.
96. Borgiel, A.E., Williams, J.I., Davis, D.A., Dunn, E.V., Hobbs, N., Hutchison, B., Wilson, C.R., Jensen, J., O'Neil, J.J., and Bass, M.J., Evaluating the Effectiveness of 2 Educational Interventions in Family Practice. *Canadian Medical Association Journal*, 1999. **161**(8): pp. 965–70.
97. Freeborn, D.K., Shye, D., Mullooly, J.P., Eraker, S., and Romeo, J., Primary Care Physicians' Use of Lumbar Spine Imaging Tests: Effects of Guidelines and Practice Pattern Feedback. *Journal of General Internal Medicine*, 1997. **12**(10): pp. 619–625.
98. Kirkman, M.S., Williams, S.R., Caffrey, H.H., and Marrero, D.G., Impact of a Program to Improve Adherence to Diabetes Guidelines by Primary Care Physicians. *Diabetes Care*, 2002. **25**(11): pp. 1946–51.
99. Eisenberg, J.M., *Doctors' Decisions and the Cost of Medical Care*. 1986, Ann Arbor, MI: Health Administration Press.
100. Gross, P.A., Greenfield, S., Cretin, S., Ferguson, J., Grimshaw, J., Grol, R., Klazinga, N., Lorenz, W., Meyer, G.S., Riccobono, C., Schoenbaum, S.C., Schyve, P., and Shaw, C., Optimal Methods for Guideline Implementation: Conclusions from Leeds Castle Meeting. *Medical Care*, 2001. **39**(8, Supplement 2): pp. II-85–92.
101. Sturm, R. and Wells, K.B., Physician Knowledge, Financial Incentives and Treatment Decisions for Depression. *The Journal of Mental Health Policy and Economics*, 1998. **1**(2): pp. 89–100.
102. Yano, E.M., Fink, A., Hirsch, S.H., Robbins, A.S., and Rubenstein, L.V., Helping Practices Reach Primary Care Goals. Lessons from the Literature. *Archives of Internal Medicine*, 1995. **155**(11): pp. 1146–56.
103. Smith, W.R., Evidence for the Effectiveness of Techniques to Change Physician Behavior. *Chest*, 2000. **118**(2): pp. 8S–17S.
104. Nettleman, M.D., Trilla, A., Fredrickson, M., and Pfaller, M., Assigning Responsibility: Using Feedback to Achieve Sustained Control of Methicillin-Resistant Staphylococcus Aureus. *The American Journal of Medicine*, 1991. **91**(3B): pp. 228S–232S.
105. Mugford, M., Banfield, P., and O'Hanlon, M., Effects of Feedback of Information on Clinical Practice: A Review. *British Medical Journal*, 1991. **303**: pp. 398–402.
106. Preston, J.A., Scinto, J.D., Grady, J.N., Schulz, A.F., and Petrillo, M.K., The Effect of a Multifaceted Physician Office–Based Intervention on Older Women's Mammography Use. *Journal of the American Geriatrics Society*, 2000. **48**: pp. 1–7.

107. Thomson O'Brien, M., Oxman, A., Davis, D., Haynes, R., Freemantle, N., and Harvey, E., Audit and Feedback Versus Alternative Strategies [Systematic Review]. *Cochrane Database of Systematic Reviews*, 2005. **3**.
108. Watson, M., Gunnell, D., Peters, T., Brookes, S., and Sharp, D., Guidelines and Education Outreach Visits from Community Pharmacists to Improve Prescribing in General Practice: A Randomized Controlled Trial. *Journal of Health Services Research and Policy*, 2001. **6**(4): pp. 207–213.
109. Jamtvedt, G., Young, J., Kristoffersen, D., Thomson O'Brien, M., and Oxman, A., Audit and Feedback: Effects on Professional Practice and Health Care Outcomes. *Cochrane Database of Systematic Reviews*, 2003(3).
110. Soumerai, S.B., Principles and Uses of Academic Detailing to Improve the Management of Psychiatric Disorders. *International Journal of Psychiatry in Medicine*, 1998. **28**(1): pp. 81–96.
111. Soumerai, S.B. and Avorn, J., Principles of Educational Outreach ('Academic Detailing') to Improve Clinical Decision Making. *Journal of the American Medical Association*, 1990. **263**(4): pp. 549–56.
112. Lomas, J., Enkin, M., Anderson, G.M., Hannah, W.J., Vayda, E., and Singer, J., Opinion Leaders vs. Audit and Feedback to Implement Practice Guidelines. Delivery after Previous Cesarean Section. *Journal of the American Medical Association*, 1991. **265**(17): pp. 2202–7.
113. Soumerai, S.B., McLaughlin, T.J., Gurwitz, J.H., Guadagnoli, E., Hauptman, P.J., Borbas, C., Morris, N., McLaughlin, B., Gao, X., Willison, D.J., Asinger, R., and Gobel, F., Effect of Local Medical Opinion Leaders on Quality of Care for Acute Myocardial Infarction: A Randomized Controlled Trial. *Journal of the American Medical Association*, 1998. **279**(17): pp. 1358–63.
114. Farquhar, L., Keefe, C., Priester, F., Colenda, C., and Wadland, W., The Development of Resident "Report Cards" in the Context of Managed Care Education. *Academic Medicine*, 2001. **76**(11): pp. 1165–70.
115. Thomson O'Brien, M., Oxman, A., Haynes, R., Davis, D., Freemantle, N., and Harvey, E., Local Opinion Leaders: Effects on Professional Practice and Health Care Outcomes [Review]. *Cochrane Database of Systematic Reviews*, 2004. **4**.
116. Berner, E.S., Baker, C.S., Funkhouser, E., Heudebert, G.R., Allison, J.J., Fargason, C.A., Jr., Li, Q., Person, S.D., and Kiefe, C.I., Do Local Opinion Leaders Augment Hospital Quality Improvement Efforts? A Randomized Trial to Promote Adherence to Unstable Angina Guidelines. *Medical Care*, 2003. **41**(3): pp. 420–31.
117. Teich, J.M., Merchia, P.R., Schmiz, J.L., Kuperman, G.J., Spurr, C.D., and Bates, D.W., Effects of Computerized Physician Order Entry on Prescribing Practices. *Archives of Internal Medicine*, 2000. **160**(18): pp. 2741–7.
118. Falconnier, A.D., Haefell, W.E., Schoenenberger, R.A., Surber, C., and Martin–Facklam, M., Drug Dosage in Patients with Renal Failure Optimized by Immediate Concurrent Feedback. *Journal of General Internal Medicine*, 2001. **16**: pp. 369-375.
119. Tierney, W.M., Hui, S.L., and McDonald, C.J., Delayed Feedback of Physician Performance versus Immediate Reminders to Perform Preventive Care. Effects on Physician Compliance. *Medical Care*, 1986. **24**(8): pp. 659–66.

120. Werner, R.M. and Asch, D.A., The Unintended Consequences of Publicly Reporting Quality Information. *Journal of the American Medical Association*, 2005. **293**(10): pp. 1239–44.
121. Narins, C.R., Dozier, A.M., Ling, F.S., and Zareba, W., The Influence of Public Reporting of Outcome Data on Medical Decision Making by Physicians. *Archives of Internal Medicine*, 2005. **165**(1): pp. 83–7.
122. Dranove, D., Kessler, D., McClellan, M., and Satterthwaite, M., Is More Information Better? The Effects of "Report Cards" on Health Care Providers. *Journal of Political Economy*, 2003. **111**(3): pp. 555–88.
123. Massachusetts Medical Society, *MMS Guidelines for Measuring, Reporting, and Rewarding Physician Performance*. 2005, Massachusetts Medical Society.