CHAPTER 4

Strategies to improve care: Pay for performance and information technology

RECOMMENDATIONS

4A The Congress should establish a quality incentive payment policy for hospitals in Medicare.

COMMISSIONER VOTES: YES 16 • NO 0 • NOT VOTING 0 • ABSENT 1

4B CMS should require hospitals to identify which secondary diagnoses were present on admission on their claims forms.

COMMISSIONER VOTES: YES 16 • NO 0 • NOT VOTING 0 • ABSENT 1

4C The Congress should establish a quality incentive payment policy for home health agencies in Medicare.

COMMISSIONER VOTES: YES 15 • NO 0 • NOT VOTING 1 • ABSENT 1

4D The Secretary should develop a valid set of measures of home health adverse events, including adequate risk adjustment.

COMMISSIONER VOTES: YES 16 • NO 0 • NOT VOTING 0 • ABSENT 1

4E The Congress should establish a quality incentive payment policy for physicians in Medicare.

COMMISSIONER VOTES: YES 15 • NO 0 • NOT VOTING 1 • ABSENT 1

4F CMS should require those who perform laboratory tests to submit laboratory values, using common vocabulary standards.

COMMISSIONER VOTES: YES 14 • NO 2 • NOT VOTING 0 • ABSENT 1

4G CMS should ensure that the prescription claims data from the Part D program are available for assessing the quality of pharmaceutical and physician care.

COMMISSIONER VOTES: YES 16 • NO 0 • NOT VOTING 0 • ABSENT 1

4H The Congress should direct CMS to include measures of functions supported by the use of information technology in Medicare initiatives to financially reward providers on the basis of quality.

COMMISSIONER VOTES: YES 16 • NO 0 • NOT VOTING 0 • ABSENT 1

CHAPTER 4

Strategies to improve care: Pay for performance and information technology

In this chapter

- Pay for performance in Medicare
- Hospitals
- Home health agencies
- Physicians
- Implementation issues
- Accelerate adoption of health information technology
- Provide financial incentives
- Help providers navigate the IT market and implement systems
- Promote sharing of information across providers and patients

Medicare payment systems are neutral and sometimes negative toward quality. The Congress should adopt pay-for-performance programs for hospitals, home health agencies, and physicians. We earlier recommended pay-for-performance programs for Medicare Advantage plans and dialysis providers. The amount of payment should be small at first, but increase over time. Quality measurement can begin for hospitals—with process, structural, and outcomes measures; for home health agencies—with outcomes measures; and for physicians—with structural and, after a transition, process measures. We recommend several approaches to broaden measure sets for these programs, including reporting lab values. The measure sets should evolve over time. To accelerate adoption of information technology (IT), pay-for-performance programs should include measures of quality-enhancing activities supported by IT. A standard vocabulary to report lab values would increase electronic sharing of clinical data.

Although the United States health care system is often said to be among the best in the world, many researchers have documented serious shortcomings (IOM 2000, McGlynn et al. 2003, AHRQ 2003b, Jencks 2003, MedPAC 2004a). The Institute of Medicine (IOM) report *Crossing the Quality Chasm* outlined a framework for improving the nation's health care quality and called on all payers to align payment policies to encourage and support quality improvement (IOM 2001). It also found that information technology (IT) can be critical to improving care. The report identified six goals for a quality health care system. Care should be effective, safe, patient centered, timely, efficient, and equitable. Like others, many Medicare beneficiaries receive care that is less than optimal, and in some cases unsafe.

As Medicare beneficiaries are key stakeholders in the nation's health care system, the Commission has examined strategies to improve care and concluded that Medicare must lead efforts to improve quality through financial incentives (MedPAC 2003). The Commission also found that provider use of information technology has the potential to improve patient care, in part by making it easier for providers to assess and report on their performance. Subsequent discussion of IT has also recognized its potential to improve efficiency and, by connecting clinicians, facilitate coordination of care.

Medicare already uses a variety of strategies to improve quality for beneficiaries—conditions of participation, the quality improvement organization (QIO) program, public reporting initiatives, and a variety of demonstration projects aimed at tying payment to quality and encouraging physicians to adopt IT. MedPAC supports these efforts and believes that CMS, along with its accreditor and provider partners, has acted as an important catalyst in creating the ability to measure and improve quality nationally. CMS's prior quality investments provide a foundation for initiatives tying payment to quality and encouraging the diffusion of information technology.

Most of these efforts, however, are grafted onto a payment system with few incentives for delivering high-quality care. Medicare, the largest single payer in the system, pays all of its health care providers without differentiation based on quality. Providers who improve quality are not rewarded for their efforts. In fact, Medicare often pays more when a serious illness or injury occurs or recurs while patients are under the system's care. The incentives of this system are neutral or negative toward improving the quality of care.

We recommend that Medicare change the incentives of the system by basing a portion of provider payment on performance. Linking a portion of payment to quality will be an incentive for providers to improve the care they deliver. Last year, we found that Medicare Advantage plans and the facilities and physicians that care for kidney dialysis patients were settings where pay-for-performance strategies could be implemented. This year, we add hospitals, home health agencies, and physicians to that list. (See recommendations on pages 188, 193, and 196, respectively.)

We come to this year's recommendations by determining that quality measures can be used to distinguish among hospitals, home health agencies, and physicians. In each of these settings, there is some consensus on a core set of measures. Where necessary, adequate risk adjustment is available. Data needed to take these measurements can be collected without undue burden on providers or the program. Generally, there is room for improvement on the dimensions of quality we can measure. Expanded use of IT would also increase the ability to measure and reward good performance. In sum, adequate measurement tools are available to begin paying for performance in these three settings.

To implement these recommendations, the Congress must first give the Medicare program the ability to pay providers differentially based on performance. The goal of the program should be to improve care for as many beneficiaries as possible. The Congress should instruct the Secretary to design a pay-for-performance program that rewards both improvement and attaining or exceeding certain benchmarks. This approach will encourage all providers to respond. To minimize major disruptions, the program should be funded initially by setting aside a small portion of budgeted payments—1 percent or 2 percent. The program should be budget neutral. Our intention is for all monies set aside to be redistributed. The purpose is not to create a tool to take funds from payments. Further, we would expect the Secretary to define the specific parameters of this program, such as the weights assigned to different measures and the mechanism for distributing the funds among providers. Finally, the Secretary should establish a formal process composed of private and public sector participants to streamline, update, and improve

measures sets. This process should help decrease the burden of quality reporting by coordinating Medicare's efforts with other payers seeking similar information.

The Secretary may wish to consider using the following measures to begin the pay-for-performance program:

- For hospitals, the 10 process measures linked to receiving a full update in 2004, along with 12 additional measures developed as part of the Hospital Quality Alliance (HQA) voluntary initiative, are a reasonable starting point. Measures of hospital safe practices endorsed by the National Quality Forum (NQF) and used by the Leapfrog Group should also be considered for the set. Two common measures of mortality could be useful initially. Finally, measures of patient experience will be available later this year and should be considered. (See discussion beginning on page 188.)

- For home health agencies, outcomes measures from CMS's Outcome-Based Quality Improvement (OBQI) set are the most promising. Measures of how well home health agencies stabilize certain patients could also be included. (See discussion beginning on page 192.)

- For physicians, the lack of standardized data collection and the wide variety of services and types of specialists require that the initial set of measures focus both on measuring quality and building the infrastructure to obtain broader quality information on all types of physicians. Therefore, the starter set should measure functions and outcomes of IT use that improve patient care. Measures of these types of activities can be used to assess quality for nearly all physicians. In contrast, although claims-based process measures are available for a wide variety of conditions of importance to Medicare, they are not currently available on *every* type of patient or physician. Therefore, the program should start by evaluating physician performance on claims-based process measures and giving the information to physicians. To encourage specialty groups and others to develop more measures, the Congress should set a date certain in the near future, perhaps two to three years, when these process measures would be included in the set for payment for performance. Other potential measures include those in the Agency for Healthcare Research and Quality's (AHRQ) soon-to-be-released ambulatory care patient survey and measures that link physician performance with that of hospitals or other settings of care. (See discussion beginning on page 196.)

MedPAC recommends that the Congress and the Secretary also take steps to improve the program's ability to measure the quality of care. In hospitals, additional data on patients' conditions upon arrival would improve both mortality and patient safety information (page 191). In home health, better safety measures should be developed (page 195). For physicians, data on patient laboratory values—such as cholesterol levels and glucose levels—and prescriptions are needed to enhance claims-based measurement (page 201 and 202, respectively).

In all settings, more widespread use of IT would decrease the burden of reporting quality information and facilitate improvement efforts. However, few providers use IT for clinical (as opposed to administrative) functions. Financial incentives might be necessary to promote IT adoption. We recommend including measures that reflect uses of IT systems that are linked to quality improvement in pay-for-performance programs in all settings, beginning in physicians' offices. (See recommendation on page 211.)

Improving electronic communication among providers would also facilitate quality improvement. Without common vocabulary and messaging standards, even those providers who use IT and coordinate patients' care face difficulties sharing clinical data electronically. As a start toward encouraging further clinical data exchange, we recommend the standardization of laboratory values. (See discussion on page 217.) Our recommendations for promoting IT adoption and for improving electronic data exchange will complement activities already under way in the public and private sectors to accelerate the adoption of IT.

Taking these initial pay-for-performance steps, along with measuring resource use (as we discuss in Chapter 3), will lay the foundation for focusing the system's incentives on how efficiently providers use resources to deliver high-quality care. The definition of efficiency could be extended to include how the actions of providers, such as physicians and hospitals, may in one episode of care affect beneficiaries' health and use of services over time and across settings. We will build on this work to identify further strategies to bring value to Medicare purchasing.

Some providers may resist a pay-for-performance program. We believe that the costs of *not* proceeding—costs measured by potentially avoidable illness and injury as well as spending on care that does not improve patients' health—outweigh the potential for unintended negative consequences.

Pay for performance in Medicare

One of the most important strategies to change the system's incentives is to base a portion of providers' payments on the quality of their care: to pay for performance. To determine whether it is feasible for Medicare to pay for performance we consulted with quality experts, providers, researchers, purchasers, CMS, the NQF, and accreditors. It is their hard work and enormous progress in improving quality measurement that provide the foundation for these recommendations. In June 2003, the Commission established criteria for measures to compare providers to determine whether pay for performance is feasible in every setting where Medicare beneficiaries receive care. The Commission also outlined principles for the design of such a program.

Is it feasible to tie a small portion of hospital, home health agency, or physician payment to quality?

We find that the current measures for hospitals, home health agencies, and physicians meet our criteria for sound measures (discussed in detail later) and that it is feasible to tie a small portion of payment to quality. Sufficient numbers and types of measures and measurement activities now exist for each setting of care, with more on the horizon. In addition to using current measures, MedPAC recommends several ways to improve the information available for quality measurement.

To determine the feasibility of pay for performance, we evaluated four types of measures for hospitals, home health agencies, and physicians—process, outcomes, structural, and patient experience:

- Process measures are used to determine whether care known to be effective is provided.
- Outcomes measures provide information on how the care affects patients, such as whether they experienced complications from their care.
- Structural measures are designed to ensure that the provider is capable of delivering good care.
- Patient experience measures provide information on whether patients' needs are met.

Each type of measure has attributes that affect its validity, how providers use it to improve care, and the difficulty of collecting data. These measures provide information on four of the IOM goals for quality care—clinical effectiveness, safety, patient-centeredness, and timeliness.

Criteria for measures

The Commission's criteria for measures were developed from our original discussions of incentives for quality improvement and the experience of private sector payers and purchasers when they implemented pay-for-performance programs (MedPAC 2003). These criteria are:

- **Evidence-based, accepted measures must be available.** The measures should be accepted by independent quality experts and organizations, private and public sector purchasers, providers, and consumer organizations. The process for developing, testing, and determining which measures to use should also be broad-based. To be credible, process measures should be derived from standards of practice that have been shown to lead to better outcomes for patients in clinical trials or similarly rigorous tests. The measurements should be valid (corresponding to the phenomena they purport to measure) and reliable (different assessors would come to the same conclusion about performance on the measure). Although few individual measures are perfectly valid or reliable, taken together, the available measures should be adequate for differentiating among providers on quality.
- **Collecting and analyzing data should not be unduly burdensome for either the provider or CMS.** To minimize the burden of collection and analysis, CMS should base quality measures on data currently collected, wherever possible. However, when quality information is not routinely collected through existing streams, some increase in provider burden may be needed to develop other measures that give valid comparisons. Providers' use of electronic health records could greatly reduce the burden of reporting and greatly improve the breadth and depth of

available quality information. Adding new information to claims and other administrative data may be burdensome in the short term, but in the longer run this approach will be easier than other methods, such as manually extracting data from medical records. As providers get used to collecting and reporting information to CMS, and CMS establishes a system for receiving and analyzing the data, the data burden should lessen and the reliability of the data should improve. The need for additional information collection should be balanced against the value of the additional information to the provider being measured, patients, and the Medicare program.

- **If risk adjustment is needed, it must be accepted as sufficient to deter providers from avoiding patients who might lower their quality scores.** Risk adjustment is primarily an issue for outcomes measures. No standards currently define "adequate" adjustment, so the question is whether current risk-adjustment methods are sufficient for the purposes for which the measures would be used. However, the more detailed the clinical information collected, the greater the ability to adjust measures to reflect expected outcomes. Addressing this concern is often a matter of balancing the burden of data collection with the accuracy of the risk adjustment. Including measures that do not need risk adjustment, such as process measures, will allow quality measurement to go forward until better data are available to risk-adjust outcomes.

- **Finally, most providers should be able to improve on the available measures.** This criterion has several dimensions.

  First, the measures must apply to a broad range of care and providers. The greater the proportion of providers whose care is measured in the incentive program, the broader the impact will be on beneficiaries. For this reason, some have suggested that in addition to measures that capture the quality of care for specific conditions such as heart care or hip replacements, Medicare should use cross-cutting measures that apply to all patients in a setting. Hospitals, for example, might measure the use of appropriate safe practices, and physicians, the use of information technology to manage patient care. For home health agencies the primary measures—functional improvement and stabilization—already cut across conditions.

  Second, the measures should capture aspects of care that are under the control of the providers being measured. For example, the data collected should enable us to measure whether a physician counsels a patient to stop smoking (counseling is under the physician's control), rather than whether a patient actually stops smoking.

  Third, the areas of care measured should be those needing improvement. It may be appropriate to include measures for which achievement is already high. The program, however, should seek new measures to replace ones on which performance improvement potential is low.

Design principles

The Commission also developed design principles to provide guidance on how the program should be administered and funded. A pay-for-performance program should:

- **Reward providers based on both improving care and exceeding certain benchmarks.** The goal of this initiative is to improve care for as many beneficiaries as possible. Thus, it is important both to reward providers who attain certain thresholds of quality, and to ensure that all are encouraged to improve care and have an opportunity for rewards.

- **Be funded by setting aside, initially, a small proportion of payments.** How to fund the program and how large the incentive are two key variables in its effectiveness. To ensure minimal disruption for beneficiaries and providers, the Commission recommends that, at least initially, the percentage of dollars should be small (perhaps 1 percent to 2 percent of payments). As our ability to measure quality improves, this amount should increase significantly.

  Is this amount enough to encourage providers to improve quality? It is not clear how large the rewards must be to evoke the desired response. Although some in the private sector have said that a greater percentage of payment should be at risk, other factors suggest that this amount will provide an incentive for change.[1] As pay for performance develops, we should increase the amount of the rewards. Medicare, however, is a large purchaser of care, and 1 to 2 percent on such a large share of the payment base is significant. The Medicare Prescription Drug, Improvement, and Modernization

Act of 2003 (MMA) requirement that hospitals report on quality measures or forgo 0.4 percent of their update encouraged almost universal reporting on certain process measures. Therefore, fear of losing revenue may also encourage action. In addition, the redistributive nature of this incentive would result in some providers receiving much more than the amount withheld. Finally, initiatives using nonfinancial incentives have succeeded in encouraging improvements (Chassin 2002, Cutler et al. 2004, AHRQ 2004). Some types of providers may require higher amounts tied to quality than others depending on their Medicare share and the net effect on payments.

- **Distribute all payments that are set aside to providers achieving the quality criteria.** Although savings could accrue from improved quality, the goal of our recommendations is improved quality, not saving dollars. Therefore, the Commission intends for all of the withheld dollars to be distributed.

- **Establish a process for continual evolution of measures.** Quality measurement is a dynamic process. The evolution in measures and the ever-expanding initiatives using these measures must be encouraged and supported. Although CMS would administer the pay-for-performance programs, an open, formal, routine process must be in place to develop, validate, and continue to evolve measures. The process should be managed by a public/private body including representatives of the major stakeholders and armed with the requisite clinical and analytical expertise. Not only would such a process enhance the credibility of the effort, it would vastly improve its efficiency and effectiveness. Duplicative, even contradictory, efforts could be eliminated—and providers would get much clearer and stronger signals. To the extent an organization exists with these characteristics, the process should build on these efforts. (We discuss this in more detail under implementation issues.)

  Building on the deliberations of this body, the Medicare program should be authorized to determine which clinical and other performance areas are important for research and to determine when to add, delete, or revise measures. Congress, in the MMA, did not authorize CMS to do so for purposes of the annual update reporting; consequently, because they were set in law, CMS cannot revise the measures.[2]

Hospitals

Beneficiaries entering a hospital are at one of the most vulnerable points in their lives. Studies have found that many patients are at risk for complications and infections in hospitals (IOM 2000, MedPAC 2004a). In addition, data show that a significant proportion of Medicare beneficiaries in hospitals do not receive care known to be effective for their condition (Jencks et al. 2003).

To consider whether it is feasible to base a portion of hospital payment on quality, the Commission evaluated the available measures and measurement activities for hospitals and found a wide spectrum of useful measures that capture information on the IOM quality goals. The Commission concludes that it is feasible to base a portion of hospital payment on quality. Initially, the hospital pool should be closer to 1 percent than 2 percent.

RECOMMENDATION 4A

The Congress should establish a quality incentive payment policy for hospitals in Medicare.

RATIONALE 4A

Well-accepted measures are available, and CMS is already collecting and publicly reporting data on most hospitals for some of these measures. Measures of mortality can be derived from claims with no burden on the hospital. Cross-cutting measures that apply regardless of the size of the hospital or type of patients also exist and are, or soon will be, reported by a significant number of hospitals. Together, these sources of information provide every hospital with the opportunity for rewards on quality.

IMPLICATIONS 4A

Spending:

- Because this recommendation redistributes resources already in the system, it would not affect federal program spending relative to current law.

Beneficiary and providers:

- This recommendation should improve the quality of care for beneficiaries.

- This recommendation will result in higher or lower payments for individual providers depending on the quality of their care.

Which hospital measures could be used?

We found process, outcomes, structural, and patient experience measures that could be used for hospital measurement. Other measures could be added to the set as the program evolves. Better information on claims could greatly improve the ability to collect valid information on rates of complications.

Process measures

The most promising types of measures for pay for performance for hospitals are measures of processes known to improve the outcomes of care. The quality experts we consulted said that clinicians support process measures because they are based on evidence showing that the process increases the chances of positive patient outcomes and at the same time provide guidance on how to improve. A number of process measures are in active use (Table 4-1, p. 190). One set of 10 measures (referred to as the annual payment update measures) is already being reported to CMS by almost all inpatient acute care hospitals using the prospective payment system (approximately 3,800) and 200 critical access hospitals. CMS posted the scores for individual hospitals on its website in November 2004. Hospitals participating in the Hospital Quality Alliance—a voluntary reporting initiative whose members include hospital organizations, CMS, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), and AARP—are now reporting information on an additional 12 measures, including several focused on preventing surgical infections.

Risk adjustment is not needed for these measures, and the infrastructure to collect them already exists. These data collection efforts should be coordinated among multiple external organizations so that, to the extent possible, hospitals only need to collect information once.[3] Table 4-1 illustrates the considerable overlap in measure sets from different organizations.

Most hospitals provide care for at least one or more of the conditions being measured, and measures that cut across different types of patients—such as surgical infection prevention—are a part of the set. Small hospitals or those that see only certain types of patients, such as rural hospitals, are reporting on many of these measures and, particularly if multiple quarters or years of data are used, could report on even more. For rural hospitals, efforts are under way to develop additional measures, such as timely stabilization and transfer; these measures could be included in the future (Moscovice 2004).

Hospitals report that physician involvement in improving care on these measures is a key driver of success. With more research on how to attribute hospital performance to physicians whose activity at a hospital is sufficient to affect that hospital's performance score, CMS may want to link physician performance to hospital scores on these measures. In a separate report on specialty hospitals, MedPAC recommends that the Congress allow gainsharing, the opportunity for hospitals and physicians to work together on a variety of fronts, including cost-saving strategies.

Outcomes measures

Our experts also noted that hospital mortality and adverse event measures derived from claims are widely used to measure outcomes. However, the adequacy of risk adjustment, the extent to which complications are avoidable, and small sample sizes in some hospitals are issues (Dimick et al. 2004, AHRQ 2004). To some extent using sources of information other than claims can address these issues, but others arise. For example, specialty society databases that require medical record abstraction could be used; however, the cost and the proprietary nature of the measure definitions may be at issue.[4] Improving information available on hospital claims, as we recommend, could also greatly enhance mortality and adverse event measures.

A recent AHRQ report concluded that, with appropriate caution (such as using multiple years of data), outcomes measures could reliably serve as performance indicators for quality-based purchasing (AHRQ 2004). Previous work by CMS, AHRQ, and the NQF varies in its conclusions on which of these types of measures are adequately risk-adjusted for individual hospitals. At a minimum, two mortality measures endorsed by all of these entities—acute myocardial infarction (AMI) and coronary artery bypass graft (CABG) mortality—could be used in an initial set.

A further issue in measuring complications is determining the source of the complication. Is it actually the result of the care delivered, or was the patient predisposed to a

TABLE 4-1

Many hospital process measures are endorsed or collected for multiple purposes

Hospital quality measures	APU	HQA	JCAHO	Premier Demonstration	NQF	QIO
Acute myocardial infarction (AMI)						
Aspirin at arrival	✓	✓	✓	✓	✓	✓
Aspirin prescribed at discharge	✓	✓	✓	✓	✓	✓
ACE inhibitor for LVSD	✓	✓	✓	✓	✓	✓
Adult smoking cessation advice/counsel		✓	✓	✓	✓	✓
Beta blocker at arrival	✓	✓	✓	✓	✓	✓
Beta blocker at discharge	✓	✓	✓	✓	✓	✓
Mean time to thrombolysis			✓			✓
PCI received within 120 minutes of arrival		✓	✓			✓
Thrombolytic agent received within 30 minutes of arrival		✓	✓	✓	✓	✓
Inpatient mortality			✓	✓	✓	
CABG mortality				✓	✓	
AMI test measures only						
LDL cholesterol assessment						✓
LDL cholesterol testing within 24 hours after arrival						✓
Lipid-lowering therapy at discharge						✓
Heart failure						
Discharge instructions		✓	✓	✓	✓	✓
Left ventricular function assessment	✓	✓	✓	✓	✓	✓
ACE inhibitor for LVSD	✓	✓	✓	✓	✓	✓
Adult smoking cessation advice/counseling		✓	✓	✓	✓	✓
Pneumonia						
Oxygenation assessment	✓	✓	✓	✓	✓	✓
Pneumococcal vaccination	✓	✓	✓	✓	✓	✓
Blood cultures performed within 24 hours before or after arrival						✓
Blood cultures performed before first antibiotic		✓	✓	✓	✓	✓
Adult smoking cessation advice/counseling		✓	✓	✓	✓	✓
Antibiotic timing (mean)			✓			
Initial antibiotic received within 4 hours of arrival	✓	✓	✓	✓	✓	✓
Initial antibiotic selection for community-acquired pneumonia		✓	✓	✓		✓
Influenza vaccination		✓	✓	✓	✓	✓
Surgical infection prevention						
Prophylactic antibiotic received within 1 hour prior to surgery		✓	✓		✓	✓
Prophylactic antibiotic selection for surgical patients		✓	✓		✓	✓
Prophylactic antibiotics discontinued within 24 hours after surgery end time		✓	✓		✓	✓

Note: APU (annual payment update), HQA (Hospital Quality Alliance), JCAHO (Joint Commission on Accreditation of Healthcare Organizations), NQF (National Quality Forum), QIO (Quality Improvement Organization), LVSD (left ventricular systolic dysfunction), PCI (percutaneous coronary intervention), CABG (coronary artery bypass graft), LDL (low-density lipoprotein), ACE (angiotensin-converting enzyme). QIO measures are from the 7th scope of work.

Source: MedPAC analysis, based on material prepared by the Iowa Foundation for Medical Care.

comorbidity or complication? Several of the complications that can be derived from claims data are considered quality measures because they are often the result of poor-quality care; pressure sores are one example. However, because we do not know the full condition of patients on admission, it is unclear whether pressure sores reported on discharge summaries are the fault of the provider. A minor change to claims could help with attributing the source of complications.

RECOMMENDATION 4B

CMS should require hospitals to identify which secondary diagnoses were present on admission on their claims forms.

RATIONALE 4B

Currently, a diagnosis recorded on the discharge summary that may have been present on admission cannot be distinguished from one that developed during the hospital stay. This additional information would significantly enhance the ability to identify which complications are avoidable. It would improve risk-adjustment of mortality and complications measures. Several quality organizations have supported this concept, and it should not significantly increase hospital burden.

IMPLICATIONS 4B

Spending

- This recommendation would not affect federal program spending relative to current law.

Beneficiary and provider

- This recommendation is expected to improve the quality of care for beneficiaries.
- This recommendation is expected to result in some increase in training for hospital coders.

When hospital coders are using the original history and physical documentation to determine what diagnoses to record on the claim (a task they must do anyway), they also need to flag whether the diagnoses were present at admission. California and New York already require hospitals to report this information, and researchers have found it very helpful for identifying patient characteristics that may affect the likelihood they would die or experience an adverse event.

The quality subcommittee of the National Committee on Vital and Health Statistics, the Agency for Healthcare Research and Quality, and the Consumer/Purchaser Disclosure project have all supported including this type of information in claims to better measure quality. In addition, the National Uniform Billing Committee has included a field for this information in the UB04 hospital billing form.

Some have suggested that in addition to including these types of complications as measures in a pay-for-performance initiative, Medicare could also identify a subset of events that should never happen (for example, wrong site of surgery) and either deny payment or pay less for care associated with the event. One health plan in Minnesota has implemented this policy using data from a state sentinel events reporting system. This recommendation would also help Medicare identify those events. MedPAC will continue to explore the feasibility of identifying "never events" for purposes of revisions to payment policy.

Structural measures

Measures of structures that ensure a provider is capable of delivering high-quality care can apply to all types of hospitals and patients. Assuring safety is one goal of these types of measures. A survey designed to assess hospital progress on implementing 27 of the NQF-endorsed safe practices is used by large purchasers (Leapfrog Group 2004).[5] Proponents of the survey and hospitals themselves say that the survey creates opportunities for hospital leaders and staff to discuss strategies and priorities for decreasing medical errors and poor quality in their hospitals. The Leapfrog Group worked with the Texas Medical Institute of Technology (TMIT) to develop the survey, and in its first year of use, more than a thousand hospitals have assessed their internal systems. Hospitals fill out the survey on a Web-based tool designed to score the hospitals electronically. The TMIT has audited surveys that appear as outliers, in which hospital scores are very high, low, or are out of the normal range. It plans to institute a more formal random audit process in the next round of surveys, later in 2005.

The survey provides information on a variety of aspects of hospitals' operations, including simple ones like hand-washing practices, and more complex ones, such as whether pharmacists are active in setting medication use policies. The scores on the responses about the practices are weighted to signal the relative importance and comprehensive nature of each. For example, out of a possible 1,000 points, ensuring that patient care information and orders flow to all necessary providers is worth 84 points, and hand-washing practices is worth 33 points. Other examples include (with associated points):

- verbal order readback (36)
- pharmacists active in medication use (32)
- pressure ulcer prevention (28)

- documentation of resuscitation or end-of-life directives (12)
- central venous line sepsis prevention (33)

The survey asks hospitals to determine their level of implementation on each individual safe practice by requiring information to be reported on:

- awareness of the need for the safer practice. For example, whether the hospital held educational sessions on appropriate drug labeling to avoid medication errors.
- accountability for the practice. For example, the extent to which pharmacists' involvement in medication decisions are a part of senior executive staff evaluation for compensation purposes.
- ability to implement. For example, whether nurses were trained in techniques to prevent pressure sores.
- actions taken. For example, whether the share of patients for whom resuscitation or end-of-life directives are used is increasing.

The NQF endorsed these safe practices based on the evidence and their face validity, as assessed by safety experts. The survey to capture information on these practices was also developed with input from quality experts and providers. However, while much has been learned through its broad application by the Leapfrog Group—the questions are continually evolving, as is the audit process—the survey has not yet been peer-reviewed or rigorously tested. Therefore, in the initial years CMS should continue to assess the survey's ability to accurately capture differences among hospitals and make needed revisions. The entity administering and scoring the survey needs to give clear guidance on how a hospital should characterize its implementation of the safe practices. In addition, to ensure accuracy of hospital responses, a larger percentage of hospitals may need to be audited in the initial years. Over time, with ongoing feedback and auditing, the questions and scoring should become more precise.

Patient experience

Self-reported patient experience is another important aspect of quality. A standardized survey designed for hospital patients, expected to be released later this year, could be used in the initial set of measures for pay for performance. AHRQ developed and tested a version of its Consumer Assessment of Health Plans Survey (CAHPS) to capture the patient experience in hospitals. AHRQ originally developed this survey to assess health plans, but has also developed and continues to work on patient experience surveys on other providers, including hospitals. A tool for risk-adjusting the responses is also available. Like the safe practices, these measures are also cross-cutting—they apply to all types of patients and hospitals. CMS has asked NQF to endorse the survey and it is expected to do so in 2005. Through the HQA voluntary initiative, CMS intends to collect patient experience information from some hospitals in 2005, with plans for a full rollout in early 2006. The hospital version of CAHPS should also be added to the set of measures used for pay for performance.

Home health agencies

Home health payments do not distinguish between high- and low-quality providers. Including a financial incentive for home health agencies to improve care will reward those agencies that are committed to improvement. Moreover, moving toward paying for outcomes will begin to give Medicare some confidence about what it is purchasing under this benefit. The benefit is less well defined than others in the Medicare program. It is not clear which beneficiaries are eligible for the benefit nor what services they should receive. Linking payment to quality means that Medicare will be buying improvement in patients' ability to walk or to dress themselves, alleviation of the pain of open wounds on their skin, better management of their medication, or avoiding hospitalizations by monitoring their diabetes or making their homes safer.

Agencies miss opportunities each year to make improvements in the lives of home health patients. We compared the scores on assessments conducted by nurses and therapists of home health care patients on their admission with the scores on discharge. We found, for example, that among patients who were admitted with some limitation in their ability to manage their oral medications, and thus had an opportunity to improve their ability, 65 percent were discharged with the same or greater limitation than they had upon admission (Table 4-2).

TABLE 4-2 **Missed opportunities for home health care to improve patients' health**

Activity of daily living	Percent of patients who could improve but did not
Upper body dressing	38%
Ambulation	66
Management of oral medication	65
Patient management of medical equipment in home	75

Source: The effect of the prospective payment system on home health quality of care, report submitted to MedPAC by Outcome Concept Systems, 2003.

After evaluating the available measures for home health by the criteria described above, the Commission concludes that it is feasible to base a portion of home health agency payment on quality. Useful outcomes measures meet our criteria. Additional work is needed to develop other types of measures.

RECOMMENDATION 4C

The Congress should establish a quality incentive payment policy for home health agencies in Medicare.

RATIONALE 4C

We can link payment to outcomes because the current home health system already provides the data to make meaningful comparisons of agencies. Currently available indicators from the Outcome-Based Quality Improvement set are well-accepted, risk-adjusted, and pose no additional data collection burden. Every agency records the outcomes of care for every Medicare patient and provides that information to CMS along with the claims for payment. To ensure that we can make valid comparisons of agencies with very different patient populations, the system includes the most comprehensive data set of important patient characteristics of any service setting in Medicare: doctors' and nurses' prognosis, functional status at the start and completion of care, multiple diagnoses, caregiver status, obesity, smoking, and even behavioral and cognitive status.

IMPLICATIONS 4C

Spending

- Because this recommendation redistributes resources already in the system, it would not affect federal program spending relative to current law.

Beneficiary and provider

- This recommendation is expected to improve the quality of beneficiary care.
- This recommendation will result in higher or lower payments for individual providers depending on the quality of their care.

Which home health care measures could be used?

All Medicare home health patients are assessed by a nurse or a therapist when they begin home health and again when they are discharged. The tool used in this assessment is the Outcome and Assessment Information Set (OASIS), which includes dozens of measurements of patients' health status. CMS compares the OASIS scores at the beginning and end of patient care and creates two sets of measures: the OBQI and the Outcome-Based Quality Monitoring (OBQM). Together, the OBQI and OBQM sets comprise about 50 measures of the outcomes of care and the incidence of adverse events. These measures are reported back to the agencies on a regular basis. CMS also reports 11 of the OBQIs on its public website.

CMS and the home health provider community have invested time and effort to make the OBQI set useful to providers and consumers; providers can use the information internally for quality improvement and consumers can make valid comparisons of agencies. As such, measures from the OBQI set are the most promising for a pay-for-performance system. The OBQMs are also useful for internal quality improvement, but some additional development is needed to use them to make fair comparisons among agencies. Additional measures of the process and structure of care would complement the available measures, but these are not currently available. Also, patient self-reports of their experience of care would add an important dimension to measuring the quality of home health care.

Outcomes measures

Outcomes measures can capture whether providers' processes and structures produce better health and functioning for patients. Available outcomes measures

cover a wide range of the goals of all home health agencies: clinical and functional improvement and stabilization of patients with a full range of diagnoses (Table 4-3).

Linking payment to OBQI measures would pose no additional documentation or data submission burden on providers or CMS. Home health providers have performed patient assessments, transmitted the information, and received scores on patient outcomes as part of participation in the Medicare program since 1999. CMS has developed the infrastructure to receive the data and calculate scores.

Tests of reliability were conducted to confirm that the patient assessments used to create the outcome scores are sufficiently objective—they are based on well-defined standards which would lead different clinicians to come to the same conclusion about patients' health status or level of ability.

Researchers conclude that the OASIS items used to determine OBQI scores reliably measure the clinical and functional condition of patients (Madigan and Fortinski 2004, Shaughnessy et al. 2002). Different nurses' assessments of the same patients' characteristics demonstrate an acceptable degree of reliability. That is, two nurses' independent assessments of the same patient are usually the same or only slightly different.[6]

TABLE 4-3

Currently available home health indicators are reliable, valid, risk-adjusted, and pose no additional data collection burden

Indicators endorsed by AHRQ, NQF (preliminary), and collected by CMS

Improvements in:

1	Ambulation and locomotion	6	Management of oral medications
2	Bathing	7	Toileting
3	Dyspnea	8	Transferring
4	Frequency of confusion	9	Upper body dressing
5	Frequency of pain	10	Urinary incontinence

Note: AHRQ (Agency for Healthcare Research and Quality), NQF (National Quality Forum). Indicators are from the Outcome-Based Quality Indicators set.

Source: NQF working paper on initial measure assessment, AHRQ report of the Technical Advisory Panel, and CMS's Home Health Compare website.

In addition to being reliable, evidence suggests that OBQIs can also be fair. The calculation of the OBQIs adequately accounts for the relative difficulties that agencies face in achieving positive outcomes given their different patient populations. For example, the score for improvement in bathing is a comparison of the percentage of patients who improve with the percentage of patients *expected* to improve given their weight, skin condition, and ability to move themselves. The current risk adjustment for a subset of 10 of the OBQIs have received support from both AHRQ and the NQF.[7] And, on a subset of the OBQI measures, the risk model generates c-statistic scores between .70 and .80 (Hittle et al. 2003); this range of scores is good (Hosmer and Lemeshow 1989).[8] The calculation takes into consideration up to 50 different patient characteristics when determining the expected outcome for a given patient population. Risk adjusters include age, sex, and diagnosis, as well as patient prognosis, functional limitations, presence of a caregiver, and some cognitive and behavioral information.

Agencies can act upon the reports of their patients' outcomes, improve their care processes, and make improvements that lead to better health and function for their patients. Shaughnessy and colleagues (2002) found that agencies that collected and analyzed the OBQI indicators for two years and used them to target quality improvement efforts experienced a much greater decrease in the rate of hospitalization than a control group of agencies. The OBQI group also improved on targeted measures by an average of 5 to 7 percent per year, while outcomes they did not target only improved an average of 1 percent. Since 2002, the QIOs have helped most of the home health agencies to use OBQIs to improve quality. The draft 8th statement of work will require them to expand these efforts by working with agencies to achieve better levels of performance on the measures included in "Home Care Compare," with a focus on reducing re-hospitalization (CMS 2004b).

The best accepted OBQIs are those that focus on improving patients' health and functioning. However, stabilization, rather than improvement, is the goal of care for many patients. An initial set of measures should therefore include some measures of stabilization to more fully capture the range of goals of home health patients. CMS currently includes "stabilization in bathing" in its publicly reported set of quality measures.[9] Other measures of stabilization that are available and endorsed by the NQF include "stabilization in management of oral medications" and "stabilization in cognitive function."

In contrast to the positive outcomes measured by OBQIs, the OBQMs provide measures of negative outcomes (or "adverse events")—such as falls that lead to emergency room use—that occur during patients' care. OBQMs are used by agencies and surveyors to identify potential patient safety issues. However, they do not differentiate between hospitalizations that were consistent with good care and those that were due to a deficiency in the quality of the agency's care; home health patients often have good reasons to seek acute hospital care. Also, because these events are far more rare than the positive events in the OBQI set, the risk adjustment is not as well developed. Adequate risk adjustment for OBQMs may be available in the future; but at present, they may not be adequately risk adjusted for a pay-for-performance system.

RECOMMENDATION 4D

The Secretary should develop a valid set of measures of home health adverse events, including adequate risk adjustment.

RATIONALE 4D

Patient safety is an important aspect of quality in home health agencies. One of the primary goals of home health care is to ensure that the patient is able to stay at home safely. CMS should improve the current measures so that they can be applied in a pay-for-performance program.

IMPLICATIONS 4D

Spending

- This recommendation should not affect federal program spending relative to current law.

Beneficiary and provider

- This recommendation should improve the quality of beneficiary care.
- This recommendation is not expected to affect providers. In the long run, home health agencies will be able to obtain better information on the prevalence of adverse events in their patient population.

Other measures

In addition to outcomes measures, it is important to develop and enhance other types of measures, including, as was discussed earlier with hospitals, process, structure, and self-reported measures of patient experience.

Process measures for home health care were developed by RAND in its Assessing Care of Vulnerable Elders (ACOVE) measure set. The ACOVE measures were used in an important study of care for the elderly in two large managed-care organizations (Wenger et al. 2001). However, home health providers are not familiar with the ACOVE measures and do not have a standardized tool to collect the information for these measures.

Continuing to develop process measures is important. As noted in the discussions of hospital and physician measures, process measures help clinicians identify the steps they need to take to improve care. Tied with outcomes measures, home health agencies can begin to identify the processes that are most likely to lead to good outcomes.

Developing structural measures, such as use of information technology, medication management, patient tracking, and the level of education and training of staff are also important. Because of the need to manage care across locations, the use of information technology to track patient symptoms, functional status, and medication usage could hasten the delivery and use of important data on patients and help agencies develop and alter care plans more quickly and thoroughly. Having a standardized tool such as OASIS greatly enhances the ability to collect and use this type of information electronically. Although no measures of IT functions or outcomes have been developed for home health, to the extent that IT use helps agencies to improve scores on the OBQIs, they will benefit under our proposed performance initiative.

Measuring self-reports of patient experience for home health agencies is important because communicating with and educating patients and their families is a central goal of home health care. Although many home health agencies use surveys to assess patient *satisfaction,* few of these surveys address these specific goals of care. Currently, no single standardized survey of patient experience exists. Therefore, a standardized survey should be developed for patient experience and included in a pay-for-performance set of measures. CMS is considering adding home health to the family of CAHPS surveys currently used or under development for Medicare Advantage plans, hospitals, and clinician offices.

Where is quality measurement for home health heading?

The Robert Wood Johnson Foundation and AHRQ are both funding work to guide efforts to enhance quality measurement and improvement in home health (Rosati 2004). The potential to move forward on quality measurement depends upon the development of clinically tested, evidence-based best practices. MedPAC has recommended such research in previous reports and reiterates its importance elsewhere in this report. Work has begun on gathering protocols and exploring their applications in home health (Peterson 2004). One potentially useful step would be to adopt a common vocabulary to describe the processes of home health care. Combined with the already widespread use of a common patient assessment tool (OASIS), a common vocabulary could help to focus providers' efforts to improve and stimulate the necessary research.

Home health provides an opportunity that policymakers may wish to consider to take a step toward bridging the setting-by-setting orientation of the current quality measures. Policymakers could consider creating an incentive for the physicians who are responsible for reviewing, approving, and amending the plan of care for home health care patients. This incentive would be similar to the incentives for physicians who are responsible for dialysis patients that MedPAC recommended in its proposal to pay for performance in the end-stage renal disease benefit (MedPAC 2004a). Physicians only use three codes to bill Medicare (two for certification and recertification of the plan of care and one for care oversight); from these, a small pool could be formed and redistributed to physicians whose patients achieve better outcomes.

Home health as a setting is perhaps uniquely positioned to take a larger step toward the quality of transitions or "hand-offs" as patients move through the medical system. Home health agencies are the front line for patients who are making the difficult transition from the highly structured environment of inpatient settings, such as a hospital or rehabilitation facility, to their own home or perhaps an assisted living facility. The quality of the transition can improve a patient's ability to recover from an acute illness or injury or to prevent another exacerbation of the condition (Forster et al. 2003). Measures that transcend single settings would encourage better management of patients as they move among different sites of care.

Physicians

Physicians are central to the delivery of health care. They evaluate and manage patients in their offices; decide when hospitalization is necessary; perform surgery in hospitals and ambulatory settings; prescribe drugs; and direct nurses and others in nursing homes, home health agencies, and dialysis facilities. The quality of the care they provide has a tremendous effect on Medicare beneficiaries. Improving Medicare quality will require their active participation.

Physicians are highly trained and knowledgeable professionals who are expected to apply their training, experience, and the most current research to decisions regarding uniquely different individuals with serious health problems. Without electronic means to store, retrieve, and assist the physician in managing the information regarding patients, this task is very difficult (Crane and Raymond 2003, Bates and Gawande 2003). MedPAC has stated that information technology is one of the key organizational changes necessary to improve quality (MedPAC 2003). However, the Medicare program includes no incentive for physicians to adopt clinical IT.

To consider whether it is feasible to base a portion of physician payment on quality, the Commission evaluated the available measures and measurement activities for physicians by our criteria and found useful structural, process, and patient experience indicators. Outcomes measures could be used with additional data and research. The Commission concludes that it is feasible to base a portion of physician payment on quality.

RECOMMENDATION 4E

The Congress should establish a quality incentive payment policy for physicians in Medicare.

RATIONALE 4E

Physician participation is essential to improving quality. Well-accepted measures of quality do exist, and the data for many can be collected with minimal additional burden. By focusing on measures of quality-enhancing functions and outcomes associated with IT use, the quality incentives in a pay-for-performance program could spur physicians to adopt information technology that improves care and helps build the infrastructure for further assessment efforts. Condition-specific process measures

are also available, and those based on physician claims would add no burden to physicians and apply to many different conditions of importance to Medicare beneficiaries.

IMPLICATIONS 4E

Spending

- Because this recommendation redistributes resources already in the system, it would not affect federal program spending relative to current law.

Beneficiary and provider

- This recommendation should improve the quality of care for beneficiaries.
- This recommendation will result in higher or lower payments for individual providers depending on the quality of their care.

Which physician measures could be used?

The experts whom we consulted said that a wide variety of measures exist for many types of physician specialties. However, they also said that measuring physician quality is more complex than measuring quality in other settings because of the lack of sufficient data infrastructure, the wide variety of often specialized services, and the sheer number of physicians. Further, although Medicare requires other providers to submit information on how they ensure or improve quality, the primary data Medicare receives from physicians are claims.

This lack of an infrastructure for measuring the quality of physicians does not argue against a pay-for-performance program. However, this program may require a transition strategy because of these challenges.

Although some have argued that pay for performance should be applied to only those types of physicians for whom many measures are available, exempting some physicians from the program would undermine the ability to improve care for as many beneficiaries as possible. Including all physicians will build the incentive for different physician specialties to develop and improve measures.

The Commission finds that two types of measures are ready to be collected. The starter set of measures for physicians reflects the need to balance two priorities: building capacity and minimizing burden. First, we recommend measuring quality-enhancing functions and outcomes associated with information technology use, such as whether a physician office tracks whether its patients receive appropriate follow-up visits. These types of measures apply to all types of physicians and address important components of physician care—appropriate monitoring, follow-up, and coordination of patient care. Further, as physicians adopt IT in response, the capacity to move toward more sophisticated and complete measure sets will grow.

We also find that claims-based process measures provide important information and are the least burdensome approach to collecting condition-specific information. Current research is finding that these measures are available for a broad set of conditions of importance to Medicare beneficiaries and some of them correlate well with measures drawn from medical records. However, the depth of information they provide on each individual clinician is still the subject of research, as is the ability to expand the set to measure an even greater number of physicians. These measures will be greatly enhanced by information on prescriptions and laboratory values, which can be added over the next few years. Finally, we note that patient experience measures will be available soon for physicians and should be considered for this program.

Because these claims-based process measures do not currently apply to every physician and we wish to ensure that all physicians who see Medicare patients have the incentive to improve, a transition strategy is necessary. From the beginning of the program, CMS should collect information on both structural measures—functions and outcomes associated with IT use—and the claims-based, condition-specific measures that are available, but it should only base rewards on the IT structural measures. The information on each physician's performance on the condition-specific measures could be given to the physician for quality improvement purposes. To encourage specialty societies to work with others to continue to develop measures, CMS or the Congress should establish a date certain, perhaps two to three years, when the claims-based process measures would be included in the pay-for-performance program.

Structural measures

To provide optimal care, physician offices need systems to track numerous patient interactions over multiple settings of care, pharmaceutical use, test results, and continually evolving clinical guidelines. While tracking patients could be achieved without information technology, it would be far easier with IT. The ultimate goal is use of electronic health records to improve quality. The Commission, however, has concluded that it is important to reward physician offices that have put systematic processes in place to improve care management even with more limited IT functions. This strategy would base payment on the physician's ability to produce information clearly related to quality, rather than on the physician's purchase of an IT system. (We discuss the relationship in more detail in the section of this chapter on IT.)

Measures of quality-enhancing activities associated with IT use assess central functions of patient care: appropriate monitoring, follow-up, and coordination. This is important both for primary care physicians, who must manage patients with chronic conditions, and for surgeons and other specialists, who must follow patients after acute events and coordinate care across settings. In addition to the potential for improving care, encouraging physician adoption of IT increases physicians' ability to report on quality and allows the pay-for-performance program to apply to nearly all types of physicians.

This strategy will not require physicians to purchase fully operational electronic health records. Various forms of information technology enable these types of functions to be performed much more easily (Table 4-4). For example, NCQA finds that in its Physician Practice Connections recognition program, some physician offices use their patient management systems to satisfy the function of a patient registry, while others receive credit through use of an electronic health record. This flexibility makes it more likely that all types of physician practices, large groups and small offices, will participate in the program.

Data collection to report achievement on these types of measures would add some burden to physician offices. However, some physicians are already participating in a recognition program that uses similar ones and CMS is also planning to use them to measure physician quality.

The National Committee for Quality Assurance (NCQA) has a recognition program that uses these types of measures to encourage the adoption of IT and improve patient care and has recognized 450 physicians in 38 practices. The Integrated Healthcare Association, a California-based group of health plans, health systems, and physician groups, and several other large purchasers use these measures in its pay-for-performance programs.

Currently, physician offices applying for recognition report data on their practices, including printouts of the results on a Web-based data collection tool. For example, if an office reports that it has a patient registry, it must identify patients with different chronic conditions (the function) and report whether the office sent reminders prompting office visits or other necessary follow-up (the outcome of the use of the registry). NCQA allows physician offices to receive credit without actually using IT, but reports that physician offices that use information technology to perform the functions have a far easier time complying.

TABLE 4-4 **Examples of information technology functions and outcomes**

Functions of IT	Outcomes of IT use
Registry for patients with chronic conditions	Patients with chronic conditions tracked and sent reminders prompting office visits or other necessary follow-up.
Registry for all patients	Patients in practice screened for risk factors.
System for tracking patients after an acute event to determine follow-up	Patients who are identified as at-risk are contacted.
System for tracking test results and prompt follow-up of abnormal results	Patients with potential drug-to-drug interactions are contacted.
Medication safety checks (allergies, dose, age, drug-to-drug interactions)	Patients are contacted to communicate lab results.
System for decision support within the patient encounter	Quality measured internally and care management improved.
System for tracking lab results, including status of patient notification	
System for aggregating, measuring, and monitoring patients by category, such as disease, medications, or age.	

Note: IT (information technology).

Source: MedPAC analysis, using some examples from the National Committee for Quality Assurance Physician Practice Connections recognition program.

CMS is working with NCQA to revise this set to use in the QIO 8th scope of work.[10] The draft 8th scope of work requires every QIO to work with physicians to adopt and use electronic health records, electronic prescribing, and reminders to better manage patient care on these and other functions (CMS 2004a). In addition, CMS is planning to use these types of measures in the Medicare Care Management Performance Demonstration mandated by the MMA to test pay-for-performance strategies for physicians.

Two other structural measures—certification and education—could eventually be part of a measure set, but the link with improved care would need to be clear. Certification measures could include whether a physician was board certified in his or her specialty or other types of certification or education that help keep physicians' clinical knowledge current. Continuing education measures could include physician participation in courses on strategies for improving quality or enhancing physician clinical knowledge.

Most hospitals, health plans, the JCAHO, and the NCQA use board certification as one measure of physician quality. However, the linkage with quality is unclear. A recent systematic review found that more than half the studies of this relationship showed an association between board certification status and positive clinical outcomes (Sharp et al. 2002). However, few published studies used methods appropriate for the research question.

As of 2002, 85 percent of licensed physicians were board certified (Brennan et al. 2004). Because so many physicians are board certified, the American Board of Medical Specialties (ABMS) has begun to revise its process to better measure physician quality. Physicians now must recertify periodically. In addition, several member boards have begun to incorporate data about current physicians' performance into the recertification process. The ABMS recently announced that all 24 specialty boards had agreed to develop a "maintenance of certification" requirement, including measures of patient care, practice-based learning, and interpersonal skills (Romano 2004). Board certification could be part of a pay-for-performance program, but the specific requirements need to be clearly linked with quality.

Condition-specific process measures

Process measures are the most widely used and accepted for physician quality and apply broadly to different types of conditions and physicians. Clinicians use these measures to assess their performance and at the same time, identify necessary improvements. For example, the percentage of diabetic patients who have had their hemoglobin A1c tests at appropriate intervals is a measure of quality, but it also tells the physician what steps are needed for improvement. While a wide variety of physician measures are available from medical records, flow sheets, or electronic health records, some are also available through claims. Claims-based measures put little new burden on physicians, and efforts are under way to develop a broader set.

MedPAC is sensitive to the potential burden of data collection. Therefore, while acknowledging the quality of information collected from other sources, we conclude that, at least initially, the program should use currently collected data, such as claims and other administrative data to derive condition-specific process measures. We also recommend improving the information stream CMS could use to link with claims data. (This is discussed in more detail below.)

Although measures derived from physician claims are not an extra burden for physicians, they do not provide as detailed information as other data collection sources. For example, a physician claim tells us whether a certain test was performed, but information on the outcome of that test resides in medical records.

Some researchers have tested whether the detailed information derived from medical records provides a more accurate picture of physician quality by observing the correlation between rankings based on claims-based scores and those based on medical record abstraction. Recent unpublished research shows a strong correlation between the relative rankings of physicians based on information from claims and those based on information from medical records for a set of conditions (Greenfield and Kaplan 2004). While this research focused on measures for a few conditions, including diabetes and heart care, those conditions affect many Medicare beneficiaries and, therefore, the care of many types of physicians. RAND is currently testing the ability to use claims-based process measures on physicians in many different conditions of importance to Medicare beneficiaries, including:

- asthma
- atrial fibrillation
- breast cancer

- cataracts
- cerebrovascular disease
- chronic obstructive pulmonary disease
- colon cancer
- congestive heart failure
- coronary artery disease
- depression
- diabetes
- hip fracture
- hyperlipidemia
- hypertension
- orthopedic conditions
- pneumonia
- preventive care

RAND's research shows that claims-based measures are available for a wide spectrum of conditions (around 25) and physicians, but not for every individual physician or specialty (McGlynn 2005). However, they suggest that the more difficult question (on which they have additional research under way) is whether the number and type of claims-based process measures (absent any other type of measures) for any individual physician are sufficient to reach conclusions regarding the quality of the physician's care.

Several programs have used other tools for data collection, such as medical record abstraction, flow sheets, or electronic health records.[11] Such tools would support many more measures of physician quality. One example of a program that measures physician quality by requiring them to collect their own data is the recognition program developed jointly by the American Diabetes Association and NCQA. It requires physicians to report detailed clinical information on at least 35 diabetic patients. Physicians must use one of the tools noted above to obtain the information.

Flow sheets are designed to be filled out each time a physician sees a patient. Flow sheets create a history of patient care and make it simple for the physician to check whether the patient is up-to-date on recommended treatments. The Physician Performance Improvement Consortium of the American Medical Association (the AMA Consortium) has developed measures on 10 conditions and a flow sheet to be filled out on every condition at the time the physician sees the patient. In addition to recommending use of a flow sheet, the Consortium has also worked with CMS to develop specifications for all of its measures so they can be integrated into electronic health records.

Working with NCQA and the AMA Consortium, CMS has developed a list of physician quality measures and categorized them by source of information—administrative data, medical record abstraction, flow sheet, or electronic health record. CMS has asked NQF to endorse the set. This process may identify additional measures that could be used in this program and the number and types of measures that could be applied using different data collection instruments.

We note the need to measure the quality of physicians' care in settings other than their offices. The pay-for-performance program should also explore linking physician performance measurement to the quality scores of the hospital or other setting where physicians practice. For example, if a hospital had high scores on care for a particular condition, physicians who contributed to those high scores would also receive credit.

Outcomes measures

We asked physician quality experts about three types of outcomes measures, but found that without further data and research, none could be used at this time. We considered intermediate outcomes, potentially avoidable admissions, and outcomes of physician care in settings other than physician offices, such as hospitals, home health agencies, or skilled nursing facilities:

- Intermediate outcomes are the short-term results of care, such as recommended cholesterol levels for patients with coronary artery disease. The long-term outcome is preventing an acute episode. Physician claims, the only currently collected information on patients in ambulatory settings, do not provide information on intermediate outcomes. However, two improvements in administrative data would help. If laboratory values and prescription data were linked with physician claims, quality experts say that the set of physician process and outcomes measures would be much more useful. (This point is discussed below.)

- Potentially avoidable admissions are hospitalizations due to conditions that if appropriately managed outside the hospital would have been avoidable. These claims-based measures are generally used to assess the quality of care for populations. Without further research, these would not be appropriate to assess the quality of individual physicians.
- Outcomes of care in settings of care outside the physician's office would provide additional information and incentives for improving physician care and coordination of care across settings. Because of the need to align incentives across settings and the need for a broader array of physician measures, further analysis should explore how such linkages could be made.

Patient experience

Patient self-reports of their experience of care are an important aspect of physician quality. When a standardized survey is ready, these self-reports could be included in a set of pay-for-performance measures. Surveys of patients reveal how involved patients are in their care and whether they understand their role in improving their health. Several large health plans and purchasers have been encouraging use of patient surveys on their experience of ambulatory care, and many pay-for-performance initiatives have included the concept in their measure sets. Much research has focused on this area in the last few years, and AHRQ is developing a standardized survey. AHRQ expects to release this standardized tool into the public domain within a year and it could become a part of the pay-for-performance measure set.

Improving the administrative data available on the quality of physician care

Further development of physician measures based on administrative data is essential. Measures based on physician claims data will impose the least burden on physicians and CMS, at least until clinical IT is in wider use. Two types of information would greatly enhance measures derived from administrative sources—laboratory values and prescription data. The laboratory values and prescription data could be linked to physician claims using beneficiary and provider identifiers to provide a more complete picture of patient care.

RECOMMENDATION 4F

CMS should require those who perform laboratory tests to submit laboratory values, using common vocabulary standards.

RATIONALE 4F

This change would give Medicare a greater ability to assess the quality of physician care.

IMPLICATIONS 4F

Spending

- This recommendation should not affect federal program spending relative to current law.

Beneficiary and provider

- This recommendation is expected to improve beneficiary quality of care.
- This recommendation will result in some increased burden for those who conduct laboratory tests.

Reporting laboratory values is not without precedent. Claims submitted by dialysis facilities must include laboratory values based on two types of tests. Our recommendation, however, would require those who perform the laboratory tests, including some physicians and hospitals, to submit the value to CMS.

To avoid creating a new data stream for laboratories and CMS, this information should be included on the claims form. The new information could be included in new or existing fields on the claims form or else reported as an attachment to the claims form. Including it as an attachment might make it easier to capture the more in-depth information and text necessary to describe some test results. Laboratories with electronic clinical information systems may find this easier than small laboratories or physician offices without electronic systems.

To ensure that the information reported is comparable, laboratories would need to use a standard format and vocabulary. The Logical Observations: Identifiers, Names, Codes (LOINC) standards are available and have been adopted by the federal government and supported by large laboratories and associations. Use of common vocabulary and messaging standards would also make it much easier for physicians and others to receive and use information from laboratories electronically. (We discuss this point in greater detail in the IT section of this chapter.)

Reporting laboratory information as a part of claims is not without burden. Industry representatives, both laboratories and physician groups, say that clinical and payment systems are currently separated and that it would take work to link them. They suggest it could be difficult to design fields in the claims form that would capture the variety of results reported, such as panels and text results. Further, while many in the industry use LOINC standards for some of their results and support their use more broadly, they say it will take time to develop strategies for applying the standards and for all laboratories, including those in physician offices, to redesign their systems.

Some have also expressed concern that because some types of test results come back after claims are submitted, this requirement could delay payment. However, clinical laboratory representatives told us they typically wait until test results are reported before submitting claims, so it does not appear this is a widespread problem.

To allow providers and CMS time to adopt standards and an infrastructure to collect this information, a two- or three-year transition before using it for pay for performance might be prudent. But adoption and implementation of standards must begin now.

Prescription data on beneficiaries and physicians who prescribe the pharmaceuticals would also greatly enhance physician quality measure sets based on claims. For example, prescription data could be used to identify patients with diabetes. Then the claims for those patients could provide information on whether they were receiving appropriate tests and examinations. Linked further with laboratory results, these data could then help determine whether patients' diabetes was under control. Some prescription information can also help identify whether medication errors are occurring in hospitals.

RECOMMENDATION 4G

CMS should ensure that the prescription claims data from the Part D program are available for assessing the quality of pharmaceutical and physician care.

RATIONALE 4G

CMS will have a much more complete picture of patient and physician care if it knows which pharmaceuticals have been prescribed and whether beneficiaries have filled their prescriptions. The data will help CMS determine who has certain conditions and whether, given their condition, they are receiving clinically appropriate care.

IMPLICATIONS 4G

Spending

- This recommendation should not affect federal program spending relative to current law.

Beneficiary and provider

- This recommendation is expected to improve the quality of beneficiary care.
- This recommendation is not expected to affect providers.

In the proposed regulation describing how the Part D prescription program will work, CMS asked for guidance on the manner and format of such information. CMS already needs Part D data to develop its risk-adjustment methodology and to track beneficiary and program spending. The data elements required for quality measurement need not be complex: The name and dosage of the drug, the prescriber identification in a form to be linked with the national provider identifier, and the beneficiary's unique identifier are all that is necessary. These data could also be used to assess the quality of pharmaceutical care provided through the Part D drug benefit.

Implementation issues

Differentiating payment to providers on the basis of quality is a significant step for Medicare. Having analyzed the measures and measurement activities, we find it is feasible to do so, but also recognize the many challenges ahead. Implementing this program will require Medicare to measure the care delivered by a broad spectrum of providers, collect and analyze significant amounts of new data, and continue research and assessment of measures. Some of these functions could be performed by CMS or under contract with CMS. Others could be separate from CMS but coordinated with this program.

Addressing the scope of patient care

Providers see a wide variety of patients. Condition-specific measures are not yet available on every type of patient. However, measures of quality that cut across different types of patients are available. The measures we suggest be used in a pay-for-performance program, taken together, can be applied to every type of hospital,

physician, or home health agency. The recommendations for additional data collection and research will greatly enhance the depth and breadth of measures for each individual provider, but even without such information all providers could be eligible for rewards. Several strategies help ensure that the measures are as useful as possible.

First, the cross-cutting measures could be weighted more heavily than condition-specific measures in the beginning of the program. For hospitals, a fairly broad array of process measures that are condition-specific are already in use, but smaller hospitals may not have enough patients with a certain condition, so safe practices and patient experience may receive higher weight initially. For home health agencies, most of the current functional improvement measures are broadly applicable, so they may not need cross-cutting measures. However, for those patients whose goal is stabilization, measures that assess their care are also important. For physicians, in the short run, claims-based analysis (without lab values or prescription data) may limit the number of condition-specific measures. Therefore, as noted previously, broad measures of functions and outcomes of IT use could be weighted more heavily until lab values and prescription data are linked with physician claims or until current research on use of claims-based measures is further along. When more physicians use electronic health records, a wider array of condition-specific measures will be available.

Second, data for longer time periods could be used. The AHRQ report on the use of outcomes indicators for hospitals notes that collecting multiple years of data may provide enough data to address the small sample sizes in some rural or smaller hospitals. CMS has also noted that the number of hospitals able to collect minimum sample sizes varies depending on how many quarters of data are used. The issue of small sample size for physicians could also be lessened with longer measurement periods.

Data collection and analysis

CMS already collects information on many of these measures for hospitals, home health agenices, and physicians. The OASIS data for home health agencies, many hospital process and claims-based outcomes, and physician process measures based on claims are already collected. Although the claims-based information on hospitals and physicians is collected, it has not been used for this purpose. CMS would need to establish a process to assign scores to individual hospitals and physicians. However, except for home health, new data streams would also be necessary.

CMS also already has hospital data on the "10" process measures (those linked to the update by the MMA), which are derived from information in medical records, and is beginning to collect information on 12 more from hospitals that report through the HQA initiative. Because of this initiative, CMS, JCAHO, and the hospitals involved in the HQA have largely built the infrastructure for collecting this information and assigning hospital scores. Although the efforts to develop this infrastructure were considerable, it can accommodate new measures.

Medicare would need to establish new processes for collecting information on hospital safe practices. More than 1,000 hospitals (around one fourth), have already filled out the Web-based data collection tool for the safe practices. The Leapfrog Group contracts with Medstat for data collection and scoring for this survey. The TMIT, which developed the survey, is responsible for auditing and ongoing evaluation and evolution of the survey. CMS could contract with these groups, issue a request for proposal for these services, or potentially contract with the QIOs to administer the survey and audit hospital responses.

Medicare would also need to establish new processes for collecting information on physician functions and outcomes associated with IT use. As mentioned earlier, NCQA has developed a tool to evaluate physicians on such measures as whether the physician's practice uses systems to track patients and ensure they receive appropriate follow-up. Having worked with NCQA to revise the tool for its own purposes, CMS is familiar with it.

The number of physicians is very large. Therefore, this strategy should be developed carefully. CMS could evaluate surveys centrally, contract with the QIOs (in particular those currently using the tool), contract with NCQA to expand its recognition program or other organizations that might wish to develop this capacity. Another model would be for NCQA to certify organizations to perform the data analysis and auditing function. CMS currently works with NCQA in this way to audit Medicare Advantage (MA) quality reports. One way to limit these numbers would be to measure groups of physicians and assign scores to all the physicians in the group, or at least give physicians the option of being measured as a group.

The patient experience surveys will require a new data collection and analysis infrastructure. CMS already collects this type of information on a CAHPS survey from a large sample of beneficiaries who evaluate their experience in the fee-for-service program and in MA plans, as well as from beneficiaries who disenroll from MA plans. Thus, CMS is familiar with the questions and analysis. However, CMS's experience is limited to attributing scores to the approximately 300 MA plans. Developing a strategy for scoring patient reports on individual physicians and hospitals would require significant expansion in the current CAHPS analysis. However, CMS is building the capacity for collecting information from patients on a hospital CAHPS survey into their HQA initiative.

CMS could also work with others knowledgeable about CAHPS. NCQA works with the health plan ambulatory CAHPS, from which many of the clinician-specific CAHPS measures are expected to be drawn, and many vendors and consultants have been assisting hospitals in their related surveys. CMS would not have to develop the expertise and data infrastructure alone.

Process for updating measures

After Medicare chooses an initial measure set to start the pay-for-performance program, it would need to improve and adapt measure sets over time. Improving measure sets involves considering criteria for new measures, dropping measures, and ensuring that research is under way to create or validate others. Medicare would also need to evaluate the adequacy of risk adjustment in new and existing measures.

CMS or another entity could coordinate the process of improving and adapting measure sets. AHRQ, specialty societies, and health services researchers could inform the discussion. Groups such as the HQA, the AMA Consortium, and the Leapfrog Group could help bring the various interested parties together to establish priorities and coordinate efforts. Because the NQF plays such an important role in facilitating discussion among these key stakeholders, it may be a starting place to begin to build the process.

Although CMS has made and continues to make significant progress in its ability to measure and collect information on MA plans, dialysis care, home health agencies, hospitals, and physicians, the increased activity required by this new program may require some additional funding. CMS could also reallocate some of its funding to administer these programs or rely on its new contractor flexibility to work with private sector organizations to perform some of the necessary functions.

Accelerate adoption of health information technology

Many observers believe that use of IT will improve the quality of health care and our ability to measure it, and increase efficiency for both individual providers and the health system. However, use of IT is low due to barriers such as the lack of return on investment, cost, and the difficulty of successful implementation. Therefore, many argue that additional government action is needed to accelerate its adoption.

The potential for IT to improve quality and our ability to measure it motivate its inclusion in our previous discussion of pay for performance in Medicare, particularly in the area of physician services. In this section, we have a fuller discussion of the role of IT in pay for performance under Medicare. We also consider additional actions to further its use, both within and outside the Medicare program. These actions are organized around three strategies: offering financial incentives, helping providers navigate the IT market and implement systems, and promoting the sharing of information among providers.

Providing financial incentives—through pay-for-performance initiatives, direct grants and loans, or requirements—could promote adoption of IT. We recommend that functions of IT systems that are linked to quality improvements be included as measures in pay-for-performance initiatives in all sectors, beginning with physician offices.

Helping providers navigate the IT market and implement systems could address some of the barriers to IT adoption. Public and private sector efforts to certify software products and provide technical assistance should help providers assess products, understand their needs, and manage implementation and ongoing maintenance.

Promoting the sharing of information among providers could improve coordination of care and efficiency. Data exchange could also increase the value of IT investments to individual providers because they could access needed clinical information, such as patient histories and lab

results. One building block necessary for information exchange is common technical standards; another is ensuring that they are used. Our recommendation in the previous section that laboratory values be submitted to CMS using common vocabulary standards addresses this second step. This section also discusses the role of community networks in exchanging health information and the legal barriers to hospitals and physicians sharing health information.

The federal government, other purchasers, and some private sector foundations have already taken many steps to accelerate adoption, and additional actions should complement, not duplicate, those efforts. The appointment of a national coordinator for health information technology indicates the level of interest in IT at the federal level. The Framework for Strategic Action released in July 2004 provides guidance on possible directions (see text box below).

Government actions to promote IT must take into account the fiscal realities presented in Chapter 1 and the potential for unintended consequences. Policymakers must also appreciate the complexity of health care processes, which amplify the difficulty of adopting health IT. Pushing adoption before providers can manage system change may be unwise.

Federal push for health information technology

In April 2004, President Bush issued an executive order calling for widespread adoption of interoperable electronic health records (EHRs) within 10 years and appointed a national coordinator for health information technology. In July 2004, the Coordinator and the Secretary released the *Framework for Strategic Action*, a plan to guide the nationwide implementation of information technology (IT) in both the public and private sectors, with an initial focus on the physician office (ONCHIT 2004b). The framework outlines the administration's four goals:

- *Inform clinical practice by encouraging clinicians to adopt EHRs.* The framework outlines a number of strategies to encourage EHR adoption and reduce the risk for providers who invest in IT systems. Potential strategies include providing regional grants and contracts, improving the availability of low-rate loans, updating physician self-referral and anti-kickback protections, paying for use of EHRs, starting pay-for-performance programs, and providing ongoing technical and product selection assistance.

- *Interconnect clinicians by creating an interoperable information infrastructure*. Health information must be portable and accessible as consumers move from one point of care to another. Strategies to further interoperability include fostering regional collaborations through the formation and operation of regional health information organizations and through the development of a national health information network. In the framework, the Department of Health and Human Services (HHS) also emphasizes the need to provide interoperability and exchange of data through federal health information systems.

- *Personalize care by taking steps to help individuals manage their own wellness*. Such steps include encouraging the use of personal health records, enhancing informed consumer choice, and promoting the use of telehealth systems.

- *Improve population health through the collection of timely, accurate, and detailed clinical information.* Strategies to accomplish this goal include unifying public health surveillance architecture, streamlining quality and health status monitoring, and accelerating research and dissemination of evidence.

To further these goals, HHS anticipates collaboration between the public and private sectors. A number of federal initiatives are under way, including the development of standards and grant-based demonstration projects. Multiple agencies within the department are involved. ■

Benefits and diffusion of health information technology

IT supports the delivery of health care. When treating a patient, doctors, nurses, and other health professionals must gather, sort, and evaluate information from multiple sources, including patients, their families, laboratories, primary physicians, consulting physicians, hospitals, and other institutional providers. In addition, the evidence base for medical decision making is large and changes frequently as researchers and manufacturers introduce new research results, techniques, drugs, and medical devices. Currently, most actors in the health care system collect and transmit information on paper, over the phone, and via fax machines. More advanced information technology offers a tool to streamline and support the process of collecting and analyzing the data needed to provide the best and most efficient care possible.

This discussion focuses on clinical IT used in managing patient care, rather than administrative systems used for billing and other administrative functions. Clinical IT comprises multiple applications that support different functions in health care, such as:

- tracking patients' care over time (the electronic health record);
- allowing physicians to order medications, lab work, and other tests electronically, and then access test results (computerized provider order entry);
- providing alerts and reminders for physicians (clinical decision support systems); and
- producing and transmitting prescriptions electronically (e-prescribing).

Of course, these functions can overlap, as with provider order entry and e-prescribing systems that include decision support. Many IT vendors now offer products that integrate numerous functions.

In the following two sections, we summarize the evidence linking IT use to improved quality, describe the level of diffusion, and consider the barriers to further adoption. More detailed discussion of these topics can be found in our June 2004 *Report to the Congress*.

Benefits of health information technology

Limited but suggestive evidence shows that some kinds of information technology improve the quality and safety of care. For example, use of computerized provider order entry (CPOE) of medications with clinical decision support has been shown to reduce medication errors and adverse drug events in hospitals (Bates et al. 1998; Oren et al. 2003). Use of barcoding of medications also reduces errors (Bates and Gawande 2003). In an ambulatory setting, use of electronic reminders and alerts has been shown to improve some processes and outcomes of care (Hunt et al. 1998). A recent study of quality of care in the Department of Veterans Affairs (VA) Health System, which uses a systemwide electronic health record (EHR), showed that VA patients were more likely to receive recommended care (Asch et al. 2004). Other studies note that IT may also introduce new errors, such as accidentally entering drug orders for the wrong patient (USP 2004, McDonald et al. 2004).

In addition, information technology could be a key tool for quality performance measurement and reporting. Quality measurement is an important building block for improving quality. It gives providers information on their own performance to identify areas for quality improvement efforts, evaluate the results of those efforts, and compare their performance to others. It also allows payers and consumers to make judgments about the quality of care they pay for and receive. However, collecting and reporting quality information can pose a burden on providers, particularly when it involves abstracting information from medical records or other special data collection efforts. Information technology, if sufficiently advanced, could automate and streamline this process. Paying for quality is one way to build the business case for IT adoption.

Some studies and anecdotal evidence also suggest that certain kinds of technology may improve providers' efficiency, although rigorous analyses of return on investment at the level of an individual provider are rare.

- Digital imaging software can decrease the costs of inputs like film and staff time to archive and retrieve X-rays and other images.
- E-prescribing saved one regional health system, Geisinger, nearly $1,000 per physician annually due to greater use of formulary drugs. Use of an EHR and other IT systems led to fewer lab and radiology reports printed and filed, while documentation and billing were more accurate and complete. Geisinger also lowered transcription costs (20 percent reduction systemwide) and paper chart pulls (reduced from 1 million to 400,000 annually). Physician productivity

generally did not drop significantly when various IT systems were implemented. Indeed, in many cases, it improved after installation (Walker 2004).

- An EHR implemented by one small physician practice in Colorado led to a 6 percent decrease in overhead expenses for record keeping and chart pulls in the first year. The practice estimated a two-year payback period on their $125,000 investment. Other anecdotal reports cite efficiency improvements, but they are not universal (Omura 2004, Miller and Sim 2004, Richmond 2004).
- Interoperability in IT, or electronic communication among organizations, may save resources on a system level through fewer repeated tests and improved efficiency (CITL 2004, Walker et al. 2005).

Information technology can also be used to improve population health by enabling rapid collection of epidemiological information, reporting cases of specific diseases, and identifying individuals who might be at risk from a specific exposure. Large databases of patient care and outcome information (with patient identifiers removed) could also improve clinical research. While we recognize the importance of IT for population health, our discussion is focused on the use of IT for personal health services that are covered by the Medicare program, rather than broader public health applications. In addition, while we recognize the potential for personal health records maintained by consumers, they are beyond the scope of this work.

Diffusion of health information technology and barriers to adoption

Despite the promise of clinical information technology, diffusion among providers is low but growing. Estimates of physician use of EHRs vary, with many falling in the range of 10 percent to 25 percent. Use of IT is higher in staff model HMOs, large group practices, and medical schools. Surveys also indicate that many physicians intend to invest. In hospitals, diffusion of IT varies with the type of technology, but is also expected to increase. Studies report that 5 percent to 6 percent of hospitals currently use a CPOE system; a similar percentage use EHRs. More hospitals use digital imaging and departmental IT systems (MedPAC 2004b). In a recent Banc of America survey of 121 nonprofit hospitals and hospital systems, 66 percent of respondents reported that clinical IT is one of their top three capital spending priorities (BoA 2004). Among the major post-acute care providers for Medicare, the use of point-of-care technology varies greatly, from 30 percent to 40 percent of home health agencies to less than 5 percent of skilled nursing facilities. The text box on p. 208–209 describes diffusion of the IT applications used in home health and skilled nursing facilities.

Many factors contribute to the low rate of diffusion. Providers, particularly physicians, cite the cost of IT systems and the lack of a clear return on investment as barriers. However, other barriers include the difficulties of successful implementation. Few providers, and especially those in smaller settings, know enough to navigate a large and complex market of IT products, implement their choice, and maintain a system over time. In addition, implementing health IT requires changes in work processes and culture that can be difficult to engineer and may be resisted by clinicians and office staff. These difficulties have led to implementation failures. Some providers have been concerned that productivity will decline when new systems are implemented, leading to decreased revenues. However, the experience of Geisinger and others suggests that any productivity declines are temporary.

Beyond cost and implementation barriers, payment incentives may be skewed so that the purchaser of technology may not reap all of the financial rewards of the investment. To the extent that use of EHRs results in fewer tests, for example, payers benefit because costs are lower, but the physicians who invest in them do not share in those savings and may have lower revenues (Walker et al. 2005, CITL 2004). Building the business case may thus require changes in financial incentives to value quality care and good coordination rather than additional services.

Another type of barrier is that many of the information technologies currently in use lack standard ways of transmitting information or describing content, limiting the ability to share and use information across systems (interoperability). Therefore, an institution may find that information contained in its clinical information system cannot be easily linked to information in its billing systems. Information from an outside source, such as a laboratory, may not be usable in an institution's system because a different syntax is used. Since patient care is delivered across a number of settings, providers may hesitate to invest in systems that cannot be linked to others. Sharing information across providers, however, promises great benefits, including greater availability of information

Information technology in post-acute care

The diffusion of clinical information technology (IT) varies in post-acute care (PAC) settings such as home health agencies and skilled nursing facilities (SNFs), with greater diffusion in home health than SNFs. Many of the same potential benefits and barriers exist for IT implementation in PAC settings as in hospitals and physician offices.

Health information technology has the potential to improve post-acute care in a number of ways. A survey by Meredith et al. (2001) showed that one-third of home health care patients age 65 and older had evidence of a potential medication problem or were taking medication considered inappropriate for the elderly. In addition, patients in PAC settings often have multiple comorbidities. IT could help manage these complex patients, including tracking medication use. Continuity of care might be improved through use of interoperable technology that transmits patient data from previous providers. IT could enhance the collection of government-mandated patient assessments such as the Outcome and Assessment Information Set (OASIS) and the Minimum Data Set (MDS); both require detailed and lengthy data collection and electronic transmission. Finally, data gathered through IT can be used internally for quality and performance management.

Home health

A number of different technologies are currently used in home health. Some, including PDAs, tablet PCs, and laptops, capture and store data at the point of care. Others transmit data from a patient's home. Finally, telephony and scanning are used on a smaller scale.

Point-of-care devices can store and transmit referral information, demographics, payer information, medication databases, and clinical progress notes. Experts speculate that 30 percent to 40 percent of home health clinicians use some form of point-of-care data capture system. The diffusion of point-of-care technology in home health is concentrated among large agencies. Costs and the difficulty of measuring the rate of return seem to be significant barriers to further diffusion.

The payment system is a major driver of point-of-care technologies in home health. Home health agencies are eligible to receive an early partial payment if they collect and submit OASIS data within seven days of a patient's admission. Because data must be submitted electronically, point-of-care technologies reduce transcription time and enable agencies to meet the deadline for early payment.

Telehealth is also used in home health care. An expert estimates that telehealth is used by 5 percent to 10 percent of home health agencies, mostly for chronic care and diabetes patients. In general, telehealth involves the use of a device that transmits information from a patient's home to a central location staffed by a clinician. Telehealth technologies range from sophisticated video-based monitors that transmit data such as heart rate, weight, blood pressure, oxygen saturation, blood glucose levels, and answers to disease-related questions to blood-pressure cuffs that transmit readings. Because some telehealth devices may substitute for visits by nurses or therapists, they can provide cost savings to agencies. However, cost savings only occur if the referring physician recognizes telehealth visits as a substitute for a home visit.

Telehealth may also improve patient care quality. One study of patients with congestive heart failure, coronary heart disease, diabetes, or chronic obstructive pulmonary disease showed that home monitoring is associated with lower rates of hospitalization and emergent care visits (Rosenblum et al. 2004). A second study showed that a remote video system in home health care settings can be well received by patients and can have the potential for cost savings (Johnston and Deuser 2000).

Two technologies used much less frequently are telephony and scanning technology. Telephony software allows nurse aides to avoid some manual entry of data through the use of the telephone. Telephony is generally used for simple functions such as recording the time and duration of visit. With scanning technology, clinicians fax or deliver paperwork to a central location where high-speed scanners capture the data. The machines can read the information and output the data in electronic form.

Information technology in post-acute care (continued)

The Visiting Nurse Service of New York (VNSNY) uses many kinds of IT. The point-of-care tablet PC system used at the VNSNY allows home health nurses to view all OASIS data and the last clinical progress notes while they are in the field. During the care session, nurses can check for drug-to-drug interactions and duplicate therapy. The tablet system can prompt them on structured interventions. After the session is over, the nurse can then submit all the information to a central office over the patient's phone line, saving travel time. For this agency, the system improved timeliness in obtaining medical orders and billing. The VNSNY also uses a telehealth system that allows for speech therapists to administer therapy via video-conferencing. The agency reported an increase in productivity through the use of telehealth, but the return on investment has been hard to quantify.

Skilled nursing facilities

Experts estimate that the diffusion of clinical information technology in SNFs is low. Although all SNFs use IT to submit MDS electronically, the number using point-of-care technology to capture and store data is thought to be less than 5 percent. The number, however, is growing. SNFs may use IT for admissions, care planning, notes, and ordering medications and consultations.

One study showed that the benefits of using clinical IT in SNFs vary by facility. In some nursing homes where orders were entered electronically, the staff reported a reduction in ordering time and error rates (Kramer et al. 2004). Although receiving previous hospital information was considered critical, many clinicians still conducted an independent assessment on admission. ■

for clinical decision making, fewer repeat tests, and better coordination of care across sites of service. From a practical perspective, increasing adoption by providers and building the capacity to share information across settings will need to happen simultaneously.

Given what we know about clinical IT, its benefits, and the barriers to diffusion, what should be done to accelerate adoption and information exchange? In addressing this question, we considered many options, taking into account what is already being done in the public and private sectors. We organized our analysis around three strategies: offering financial incentives, helping providers navigate the IT market, and promoting sharing of information among providers. We relied on recent literature and consulted widely with experts in the field, including hospitals, physicians, home health agencies, and health systems that have implemented IT; communities involved in information exchange projects; speciality societies active in helping their members adopt IT; staff at agencies within the Department of Health and Human Services (HHS); as well as QIOs, IT professional societies, and clinical laboratories. We also assembled an expert panel of those who have successfully adopted IT in a small physician office, a regional health system, and a community network.

Provide financial incentives

Cost is often cited as a major barrier to adoption of IT, suggesting that financial incentives may be needed to improve the business case for investment. The federal government is a major purchaser of health care. It can provide financial incentives for information technology, both within payment systems such as Medicare and through other federal programs. This section recommends including IT in pay-for-performance initiatives in Medicare and discusses the pros and cons of two other actions: providing grants and loans and requiring use of IT. Some have argued that Medicare and other payers should pay providers for the use of IT, but in its deliberations, the Commission concluded that Medicare should focus its incentives on the results of IT use—performance—rather than the use of the tool itself.

The type and size of appropriate financial incentives are not obvious. How strong an incentive is required? Should incentives be direct (linked specifically to IT) or will more indirect incentives (quality measures linked to IT use) work? One group has suggested that the full costs of implementing EHRs must be covered to encourage adoption by physicians in small and medium group practices, with a rough cost estimate of between $22 billion and $43 billion over three years (Connecting for Health 2004).[12] However, it is not clear that this level of federal incentive is possible or prudent. To ensure effective investment, providers must bear at least some of the risk. In addition, successful implementation of health IT requires leadership and commitment to changing work processes. Offering a large or full subsidy could encourage adoption by providers lacking the necessary underlying commitment. With high failure rates, this kind of approach could put public funds at risk.

Information technology and pay for performance

MedPAC has embraced pay-for-performance initiatives to improve the quality of care provided to beneficiaries (see preceding section for full discussion). Pay for performance could motivate use of information technology in three ways:

- Providers will need to collect and report information on the performance measures; information systems may make this easier.
- Use of information technology itself could be directly measured; IT measures would be one domain of a measure set that also included other quality measures.
- Additional quality payments could help build the business case for making an IT investment and sustaining its use in the face of competing priorities.

Some private sector plans and purchasers have incorporated use of IT into their pay-for-performance initiatives. Physician use of IT is included as a quality measure in recognition programs and sometimes as a basis for financially rewarding physicians by a number of groups, including the Integrated Healthcare Association—a California-based group of health plans, health systems, and physician groups—and the Bridges to Excellence program sponsored by General Electric and other large employers.[13] Some hospitals report on their use of CPOE to the Leapfrog Group, which publically reports this information. Some payers have financially rewarded providers on that basis. A recent review of pay-for-performance programs indicated that about half included IT measures in 2004, a significant increase over 2003 (Baker and Carter 2004).

Medicare could also include information technology measures in its pay-for-performance initiatives—that is, it could include measures of IT adoption. However, this approach has limitations. The first involves ensuring that clear and enforceable definitions of what constitutes a given IT application are available. For example, does a spreadsheet containing patient-specific information that is maintained by a physician office constitute an EHR? Certification of IT products (discussed below, p. 212) may help in defining them, as measures could be tied to use of certified products. However, having the product does not immediately translate into use or guarantee the desired outcome of improved quality.

Alternatively, Medicare could include measures that describe evidence-based quality- or safety-enhancing functions performed with the help of IT. This approach focuses the incentive on quality-improving activities, rather than on the tool used. It also allows providers to achieve performance in the early stages without necessarily investing in IT, although it would be easier if they did so. This could be especially important for physicians in small practices, where adoption of IT has been slower. By focusing on quality-enhancing functions, these measures could also give guidance on the kinds of systematic work process changes that are required for successful IT implementation.

In the physician office, quality-enhancing activities might include tracking patients with diabetes and sending them reminders about preventive services, or providing educational support for patients with chronic illnesses. For hospitals, an example of a quality-enhancing activity would be ensuring that physicians check for drug-to-drug interactions and drug allergies when they place pharmacy orders. This clinical decision support function is the link between CPOE and safety improvements. In the home health setting, a measure could be identifying patients on medications that require the management of side effects and documenting steps taken to help them. In all of these settings, other mechanisms could be used to perform the function, but appropriate IT would facilitate the process. Focusing on the function, not the technology, targets the quality-enhancing outcome, but also recognizes that adoption of IT is an evolutionary process.

As more providers adopt IT, measures of functions that can only be performed with IT could be added. Beyond use of IT in a provider's own setting, future measures could also address the transfer of information across settings. For example, does a primary care provider put lab results and reports from specialists into the EHR? Does a specialist send reports in compatible formats? Does a hospital send relevant electronic data on patients transferred to post-acute care settings?

Because physicians play a central role in directing patient care, physician adoption and use of IT should be a part of physician pay-for-performance initiatives from the beginning of such a program. Physician use of EHRs promises to lead to better care management, reduced errors, and improved efficiency. Finally, physician adoption of IT can facilitate reporting of meaningful quality indicators that may not be available through claims analysis. In other settings, measures of quality-enhancing functions supported by IT use may need further development.

RECOMMENDATION 4H

The Congress should direct CMS to include measures of functions supported by the use of information technology in Medicare initiatives to financially reward providers on the basis of quality.

RATIONALE 4H

Adoption of clinical IT by providers has the potential to improve the quality, safety, and efficiency of health care. Because the benefits of IT result from its use for specific quality-enhancing functions, Medicare should incorporate measures of quality-enhancing functions supported by the use of information technology in any initiative to financially reward providers on the basis of quality, beginning with physicians. Providers will want to adopt IT because it will make quality measurement and reporting easier. Furthermore, the prospect of additional payments under pay for performance will enhance the business case for IT adoption.

IMPLICATIONS 4H

Spending

- This recommendation would not affect federal program spending relative to current law.

Beneficiary and provider

- This recommendation is expected to improve beneficiary quality of care.
- Providers could receive higher or lower payments depending on their quality performance.

As discussed in the section on pay for performance, CMS must establish a process to develop measures and ensure coordination between Medicare and other payers, including for IT measures. Purchasers should also coordinate with IT vendors to ensure that their systems can generate the needed measures.

Grants and loans to providers

Some have advocated large-scale grant and loan programs to providers to jump-start adoption of information technology. The Commission considered the pros and cons of this approach, as well as the extent of existing programs, and concluded that the risks outweigh the benefits. We return to the idea of loan funds in the context of community data exchange projects below.

Establishing large-scale federal grants and loans could make sense if capital costs were the only barrier to adoption. Grant and loan funds could potentially leverage investment from capital markets. Efforts to improve the stability of the market through certification and technical assistance (discussed below, p. 212) could improve the odds of success.

However, factors beyond cost also limit adoption, and could limit the effectiveness of large-scale grants and loans. If there were a clear return on investment from clinical IT, adoption would occur as it has for administrative IT. In addition, commitment to change and willingness to revise work processes have been important cornerstones of successful IT implementation. It would be difficult to ensure that recipients have these attributes. If they did not, large federal investments in grants and loans would be an inefficient use of funds. Moreover, federal funds would need to be targeted at providers that clearly cannot afford health IT on their own; otherwise, public loan and grant funds risk displacing private capital. Some evidence shows that physicians can recoup their investments in IT systems through efficiency gains and enhanced revenues derived from, among other things, better documentation of care (Miller and Sim 2004, Omura 2004, CITL 2003, Richmond 2004). Finally, loan and grant funds incur high administrative costs.

On a more limited scale, however, grants and loans can provide seed money for IT efforts that provide demonstration value. As discussed in our June 2004

Report to the Congress, numerous grants are already in place in the public and private sectors. The federal government has recently increased its funding. In October 2004, AHRQ announced $139 million in grants over 5 years to local providers and communities seeking to develop and use health IT, to 5 states for promotion of statewide and regional networks, and to a National Health Information Resource Center that will provide technical assistance and provide a forum for exchange of best practices. About half of the grants were awarded for technology implementation, and the rest awarded for either planning or research purposes.

A recent IOM report outlined the unique challenges facing rural providers and the potential for certain systems like telehealth to improve rural health care (IOM 2004). Partly in recognition of these issues, a large number of the AHRQ grants had some rural focus and about half were awarded for either planning or implementing initiatives that involve sharing of information across provider settings or among hospitals.

Requirements

MedPAC also considered requiring use of IT. We concluded that this approach is too burdensome to adopt at this time, but could be appropriate in the future. The program could require use of IT by hospitals and other institutional providers by changing the conditions of participation that must be met to receive Medicare payments. For example, CMS could require that hospitals adopt CPOE systems to participate in Medicare.

Conditions of participation do not apply to physicians. Therefore, a different vehicle, requiring a change in law, would be needed to require use of ambulatory EHRs or other IT systems by physicians or other noninstitutional providers.

Requirements have the advantage of specifying the kinds of IT that would be most beneficial for improving quality and quality measurement. Since Medicare is a large payer, requirements would also lead to rapid adoption of IT. To be effective, they would need to be accompanied by actions to help providers implement systems successfully (discussed in next section). They would also need to be announced well in advance of implementation, so that providers have time to comply.

Providers may view IT requirements as overly burdensome, given the costs of IT systems and the barriers to successful implementation. This is a reasonable position in the current environment, where use is low and investment is risky. However, the pace of adoption is picking up and both the public and private sectors have been engaged in activities to assist providers in implementation. As the market evolves and IT use grows, requirements should become more feasible.

Help providers navigate the IT market and implement systems

Health care providers have limited capacity to evaluate the numerous vendors and products available and to manage full-scale implementation, which includes significant work process changes. The government and private sector could take actions to increase market stability, lower the risk of failure, and assist in implementation. Important and needed efforts are already under way to help providers make sense of their options by certifying software products and providing technical assistance in the acquisition and deployment of IT.

Certification

Certification would provide objective analysis of the functions and capabilities of health IT applications and tell providers which products meet specified criteria. It is likely to help providers, and particularly those practicing in smaller settings, choose systems by providing objective guidance on their capabilities. Establishing criteria also provides vendors with guidance on the basic features they should build into their products, including compliance with standards to support interoperability.

From Medicare's perspective, having a certification process could help define what is meant by information technology and electronic health records, which may become important in the context of pay for performance. Knowing that certified EHRs can perform the functions that have been linked to improving quality gives some assurance that public investments in IT adoption could have the desired result.

The private sector, in consultation with HHS, has appointed a Certification Commission for Healthcare Information Technology (CCHIT). It was formed by three organizations representing the health care industry and health information management professionals, and includes two representatives from HHS (one from CMS).[14]

CCHIT will establish criteria for certification and mechanisms for testing products, beginning with ambulatory EHRs for physician offices. CCHIT will build on existing EHR standards, including the draft standard for a functional model of an EHR set out by Health Level 7 (HL7), a standards development organization certified by the American National Standards Institute.

The model outlines functions to be included in an EHR, organized into direct care, supportive care, and information infrastructure. Functions under direct care include, for example, maintaining a patient record and managing a problem list for each patient. Supportive care functions include creation and transfer of disease-specific patient registries, capturing and reporting information on outcomes measures, and generating reports. Information infrastructure functions include following appropriate security measures and using accepted standards for data content and messaging (Table 4-5 provides a fuller, but not complete, enumeration of functions in the HL7 EHR System Functional Model).

Technical assistance

Certification should facilitate choice among applications, but many providers could also use help in understanding their IT needs, managing the changes in work process that ideally accompany adoption of IT, and developing an ongoing capacity for maintenance and growth.

TABLE 4-5 **Illustrative functions of an electronic health record**

Function	Description
Direct care	
Identify and maintain a patient record	Store and link key identifying information to the patient record. Identify a patient's record using a lookup function.
Manage problem list	Create patient-specific problem list to document medical history. Record all pertinent dates to track changes. The entire problem history is viewable.
Manage medication list	Manage exhaustive medication list over time. Store all pertinent dates. The entire medication history is viewable.
Manage allergy and adverse reaction list	Identify, code, and manage allergens over time. Include drug reactions and intolerances to dietary or environmental triggers. The entire allergy history is viewable.
Support	
Support registries	Export health information to disease-specific and immunization registries. Add new registries as needed.
Measure and analyze outcomes	Capture information to be used in outcomes analysis for populations, providers, facilities, and communities.
Generate reports	Create standard and ad hoc reports for clinical, administrative, and financial decision making, and for patient use.
Verify eligibility and determine coverage	Interact with other systems, applications, and modules to verify eligibility for health insurance and special programs, including verifying benefits and coverage.
Information infrastructure	
Authenticate users	Authenticate electronic health record users before allowing access to system.
Ensure data retention, availability, and destruction	Retain, ensure availability, and destroy health record information according to organizational standards.
Support data interchange	Adhere to standards for connectivity, information structures, and semantics to support seamless operations between complementary systems.
Manage health record information	Manage information across electronic health record applications by ensuring that clinical information entered by providers is a valid, accurate, and complete representation of clinical notes.

Source: Based on the HL7 Electronic Health Record System Functional Model Draft Standard for Trial Use, from Health Level Seven (2004).

Within the marketplace, vendors and consultants can provide technical assistance. However, vendors may not be an unbiased source of information. Specialty societies provide another alternative—some have begun to help their members with technical assistance. For example, the American Academy of Family Physicians (AAFP) has negotiated vendor discounts on hardware and software for its members, is conducting a small-scale pilot project on EHR adoption, and provides information resources through its Center for Health Information Technology. AAFP has also explored open-source medical software, which enables anyone to use or adapt the code and distribute it to others.[15]

Similarly, the American College of Physicians (ACP) is offering its members information and support for EHR implementation through its Practice Management Center and provides clinical decision support information through its Physicians' Information and Education Resource. Both the AAFP and the ACP are part of CMS's Doctors' Office Quality Information Technology (DOQ–IT) program, described below. In addition, the AMA and 13 medical specialty societies have joined the Physicians Electronic Health Record Coalition to help their members assess their needs, select products, and use EHRs.

Within the Medicare program, the QIOs may play this role as well, either directly or through subcontracts with other organizations. The DOQ–IT project sponsored by CMS is promoting the adoption of EHRs in small- and medium-sized physician offices. The four QIOs involved in the project assist physicians in evaluating alternatives, implementing systems, and using the EHR to improve quality. The physician support model developed under DOQ–IT will likely be the base for the Medicare Care Management Performance demonstration project mandated in the MMA. This project will incorporate use of IT and quality measurement in a pay-for-performance program, using measures developed in conjunction with NCQA.

The draft 8th scope of work requires all QIOs to provide technical assistance for information technology as a task, expanding on DOQ–IT. The QIOs will encourage physicians to adopt IT and also help them assess their system needs and implement work process changes. QIO performance will be measured, in part, through physician adoption and effective use of IT.[16]

Promote sharing of information across providers and patients

Most patients find that the various actors involved in their care are not well coordinated, and information generated in one setting is not transferred to another setting efficiently, if at all (Coleman and Berenson 2004). One of the promises of health IT is to allow real-time, reliable transfer of information across providers and patients. For example, the results of tests performed in ambulatory settings would be available to doctors in the hospital. Changes in medications made during hospital stays could be available to primary care physicians after discharge. Data exchange could improve the information available for clinical decision making and reduce repeat tests and expenses for administrative tasks, perhaps leading to significant savings across the health care system (CITL 2004, Walker et al. 2005).

Achieving interoperability (creating electronic data sharing capabilities across providers) has been a goal of HHS for many years. Continuing work toward that end includes encouraging standards development, providing incentives for participants to use the standards, stimulating community efforts at information exchange, and addressing legal barriers. All of these efforts must also ensure the security and privacy of shared health information. Exchange of patients' health information for purposes of treatment, payment, and health care operations is allowed under the Health Insurance Portability and Accountability Act of 1996 (HIPAA). However, protocols for defining access rights, authenticating users, and securing data must be developed.

Develop standards

The technical questions of how health IT systems can communicate involve what a system does (function), the types of information it contains (content), the language used to convey information (vocabulary), and how one system can transmit information to another (messaging). Standards are needed in each of these areas (Table 4-6 provides examples). The complexity of information used in health care and the numerous settings of care pose additional technical challenges. For example, a vocabulary used to provide lab test results (e.g., LOINC) is distinct from that used for billing (e.g., International Classification of Diseases, Ninth Revision [ICD–9]), which is distinct from one used for general clinical information (e.g., Systematized Nomenclature of Medicine [SNOMED]).

TABLE 4-6

Standards apply to multiple dimensions of health information technology

Dimension	Sample standards with illustrative elements and descriptions
Function: What can the system do?	**Electronic health record functional model** • Maintain patient record • Maintain problem list • Maintain medication list • Create patient registries • Capture and report outcome measures • Generate reports • Follow appropriate security measures • Use accepted standards for terminology and messaging
Content: What specific pieces of information will be included?	**Continuity of care record** (under development) • Patient identifying information • Advance directives • Condition, diagnosis, or problem • Adverse reactions and allergies • Medications • Recent test results • Care documentation (dates and purposes of visits, names of practitioners seen) • Care plan • Practitioners
Vocabulary: What language will be used to convey content?	**Logical Observations: Identifiers, Names, Codes (LOINC)** • Coding system for laboratory results **Systematized Nomenclature of Medicine (SNOMED)** • Coding system for clinical terminology **ICD–9–CM** • Coding system for diagnoses
Messaging: How will the content from one system be transferred to another?	**Digital Imaging and Communications in Medicine (DICOM)** • Protocols for transmitting digital images from one system to another **HL7** • Protocols for electronic data exchange in health care environments **National Council for Prescription Drug Programs (NCPDP) SCRIPT** • Protocols for transmitting prescription information from prescribers to dispensers **RxHub Formulary and Benefit Information File Transfer Protocol** (currently proprietary) • Protocols to communicate formulary and benefit coverage information from payers and pharmaceutical benefit managers to prescribers **X12N** • Standard for electronic data interchange used in administrative and financial health care transactions • Compliant with HIPAA transactions standards

Note: ICD–9–CM (International Classification of Disease, Ninth Revision, Clinical Modification), HL7 (Health Level Seven), HIPAA (Health Insurance Portability and Accountability Act of 1996).

Source: National Health Information Infrastructure 2004, Tessier 2004, National Committee on Vital and Health Statistics 2004, Health Level Seven 2004.

Each of these vocabularies has multiple components and definitions. SNOMED, for example, contains almost 1.5 million semantic relationships grouped into more than 360,000 concepts.

MedPAC's June 2004 *Report to the Congress* summarized many of the efforts already under way in the private sector to develop standards that will allow for interoperable systems. A recent addition is the EHR System Functional Model Draft Standard for Trial Use that was released by HL7 in the summer of 2004. It provides a comprehensive list of the potential functions of an EHR that users may want and vendors may build into their systems.

Examples of additional standards that are under development include e-prescribing and the continuity-of-care record. The MMA requires the National Committee on Vital and Health Statistics (NCVHS) to develop a set of standards for ambulatory e-prescribing that will be operational by the start of the prescription drug benefit in 2006. Some examples of the functions that an e-prescribing system could perform are:

- linking to benefit and formulary information,
- providing reference information on drugs and dosing,
- incorporating patient-specific information on allergies and current medications,
- writing prescriptions,
- connecting with the pharmacy to transmit the prescription electronically, and
- providing information back to the prescriber on whether a prescription was filled and if generic substitutions occurred.

Few, if any, e-prescribing systems currently in place are capable of all of these functions. NCVHS will be working on the relevant content, vocabulary, and messaging standards needed for e-prescribing systems to perform these functions, building on those already in use (NCVHS 2004). CMS issued a proposed rule containing initial foundation standards in early 2005 (CMS 2005).

The continuity-of-care record (CCR) would provide core patient information. It is meant to be a limited record that includes only essential information needed to ensure continuity of care when patients transition from one provider to another; as such, it may not be as useful for specialty care. Examples of the kinds of information in the CCR include:

- diagnoses,
- allergies,
- recent care provided,
- recommendations for future care (care plan),
- the reason for referral or transfer, and
- demographic and insurance information.

Providers can access the CCR to obtain recent health information and update it with new information. A standard specification is being developed jointly by standards setting organizations, representatives of providers, IT professionals, and patient advocates.[17] It is built on a paper-based Patient Care Referral Form developed by the Massachusetts Department of Public Health and used widely in Massachusetts (Tessier 2004, Massachusetts Medical Society 2003).

Despite the considerable efforts under way for developing standards, the ability of existing IT systems to exchange information across settings and providers is limited. Continued technical development is needed. The technical approaches include further development of standards, as well as cross-walks and other work-arounds that will allow sharing of data across systems that do not share a common structure. The administration acknowledged the limited development of our national health information network in a recent request for information to stakeholders for comments on how "interoperability and health information exchange could be deployed and operated on a sustainable basis" (ONCHIT 2004a).

Addressing these needs will be a priority within HHS as it seeks to define and plan for a national health information network that provides a common framework for standards implementation, security protocols, and other requirements for allowing health information exchange. The commitment to moving forward is strong on the part of the federal government, foundations, and the private sector. The current model of private sector development with government collaboration is stimulating discussions necessary to move forward. Continued federal involvement will come from the Office of the National Coordinator on Health Information Technology, NCVHS, the Consolidated Health Informatics initiative, and other agencies. In addition, the MMA charged a new Commission on Systemic Interoperability with studying

the best strategy, including a timeline and priorities for adoption and implementation to create a nationwide system of interoperable IT.

Ensure standards are used

Development of a national health information network, as envisioned by HHS, will eventually provide broad guidance on how to achieve interoperability for all health information, one piece of which is ensuring standards are used. In the interim, other incremental actions may be needed to ensure that participants in the market use current standards.

Although many standards have been developed, most are not widely used, partly because adopting new standards requires reworking existing systems and developing detailed specifications to operationalize them. For example, moving from billing based on ICD–9 to a new vocabulary such as SNOMED would require providers and insurers to learn and retool their systems to use new codes to describe the work that is done and paid for.

However, when standards are not used, it is difficult for one provider to incorporate important clinical information from another provider into its own electronic records or a data repository. To do so can require abstraction and manual data entry, which is expensive and can introduce errors.

Making it feasible for physicians to obtain data from other sources—such as laboratories, radiologists, and pharmacies—can improve care and heighten physician demand for IT. Having current and historical information on lab results can help with patient management. Access to prescription data would give physicians information they do not currently have—namely, whether prescriptions were filled or refilled. Many of the quality measures for physician services require lab and pharmacy data, which today generally requires record abstraction to obtain. In addition, successful implementers of IT systems have noted that physicians greatly appreciate electronic access to this high-value information and making it available has generated greater willingness to undertake IT projects.

To encourage standardization, the federal government is adopting certain standards for use across all federal agencies. The Federal Health Architecture (FHA) brings together government agencies to promote common technical approaches and business processes and share infrastructures. Under the FHA, the Consolidated Health Informatics (CHI) initiative has focused on identifying specific health standards.[18] By choosing standards for the federal government to follow, CHI provides direction while allowing private organizations to develop individual standards. To date, the CHI has adopted 19 standards.[19]

The government can also promote use of standards by requiring them for submitting data to the government, as was done in the HIPAA transactions standards for claims submission and will be done for e-prescribing under Medicare Part D. In our discussion of physician pay for performance (p. 196), we recommend that CMS require those who perform lab tests to submit lab values on claims, using common vocabulary standards.[20]

Many clinical labs currently share information with providers electronically, but generally not in a standard way. Accepted vocabulary standards for coding lab data (e.g., LOINC) and sending it (e.g., HL7) exist and have been adopted by the federal government. They are not required, however, and many labs still use their own, internally generated coding sets. In addition, they often send results as Web documents or in other formats that prevent incorporation of results into existing systems.

Lab results generally contain the same structured set of information, such as:

- the name of the test, including detailed specifications;
- the result of the test (or value);
- the units of measure for the test;
- the methodology used; and
- the normal range the lab uses to interpret results.

Standards would provide a common way of presenting this information. While the specific standards for submitting lab data to CMS would be derived through the regulatory process, the LOINC standard has been endorsed by the American Clinical Laboratory Association and the College of American Pathologists and is already used as an alternate code set by a number of the larger clinical labs. The costs of transforming lab data into a common format include mapping laboratory-specific local codes to the standard codes and ensuring that laboratory information systems can accommodate and transmit that information. Although large reference labs conduct many of the lab tests, smaller labs, and particularly labs in hospitals and some physician offices, also do testing. A phased approach could allow additional time for smaller labs to comply.

By requiring labs to submit data according to standards, we will enhance the interoperability of a set of clinically important data. Making these data more available, in turn, could also stimulate physicians to adopt EHRs and facilitate reporting of quality measures derived from lab values.

Use of standards for other sources of clinical information, such as pharmacy and radiology, should also be addressed over time. We earlier recommended submission of Part D pharmacy data to CMS to facilitate quality measurement (p. 202). In addition, the MMA requires use of e-prescribing standards under Medicare Part D.[21]

One initiative in California, Setting Standards, has brought together health plans, providers, and laboratories to develop and agree to use a set of standards for exchanging pharmacy and lab data. The project has been motivated by a desire to increase access to reliable clinical information to improve disease management, as well as to provide physicians with the data needed to submit quality measurements under the Integrated Healthcare Association's pay-for-performance initiative (CHCF 2004).

Stimulate community efforts to exchange health information

Given the local nature of health care and the extent to which local providers share information, stimulating community efforts at information exchange has the potential to improve coordination of care and to encourage adoption of IT. But creating a connected health care system presents a bit of a conundrum. Is the best approach to encourage use of IT by individual providers and then connect them? Or is it better to create information highways that can then be used by individual providers? In the end, both approaches are probably needed.

The previous sections discuss ways to encourage use by individual providers. Here we discuss information exchange that would carry the benefits of ensuring relevant clinical data is available when needed. In the *Framework for Strategic Action*, HHS put forward a strategy of fostering regional collaboration. Local networks of providers and health plans could work together to develop and implement health information exchange. If they use common approaches, the regional networks could form an important building block for the national health information network.

Limited examples of such cooperation exist. Several communities, such as Indianapolis, Santa Barbara County, and New York's Hudson Valley, have developed data repositories or other means of sharing data, but they are limited. These efforts have received considerable grant support. The Santa Barbara effort received $10 million from the California Health Care Foundation, which also funded feasibility studies (Brailer et al. 2003). The efforts in Indianapolis have also been supported by foundations and recently received an AHRQ grant.

Additional communities are beginning to develop similar capacities. Some of these efforts are being supported through the AHRQ grants. AHRQ has sponsored five states, providing them $5 million each over five years to develop statewide networks. The states will follow different models but share goals of making data, including lab and pharmacy data, available to numerous parties through a broad partnership that includes purchasers, providers, and public health programs (including Medicaid). Other local efforts have been supported through the eHealth Initiative and the Health Resources and Services Administration through the Connecting Communities for Better Health project.

MedPAC has considered the development of a federal loan fund to support these entities. If a loan fund were established, it should be time-limited, to signal that federal support is only for building capacity. The program would also need to establish criteria to evaluate the readiness of a community network, such as commitment (including financial resources) by a range of providers and payers and a clear outline of how the project could sustain itself after loan funds were spent. The funds would support exchange of data among participants—which could include hospitals, physicians, labs, pharmacies, other providers, and payers—through use of a data repository or other technologies. To be funded, communities would need to specify the participants in the data exchange network and the kinds of data that would be shared, a plan to achieve interoperability while protecting the privacy and security of data, and a contract specifying how the organizations would work together. Special consideration might be given to rural or other communities that can demonstrate exceptional needs.

Although we see the potential of a loan fund for supporting development of community efforts and discuss what a loan fund might look like, MedPAC does not

endorse the concept at this time. The benefits of a loan fund need to be weighed against the administrative costs of starting a new program. There are other barriers to community networks beyond funding: Funding these efforts in the absence of addressing these other barriers may not be an effective use of federal funds. Additionally, a loan program requires that the receiving entity have a revenue stream that would allow it to pay back the loan; that business model is not yet developed.

Address legal barriers

Legal issues and uncertainties over legal restrictions may hamper efforts to create local health information exchange networks (GAO 2004) and should be reexamined. In local markets, hospitals often have greater financial resources than physicians and might want to encourage adoption of IT by allowing physicians to use their systems. However, a hospital that supports a local information exchange that offers hardware, software, or other items of value to physicians who admit patients to the hospital must be wary of both the Ethics in Patient Referrals Act (Stark law) and the anti-kickback statute. The Stark law prohibits physicians from referring Medicare and Medicaid patients for certain health services to any entity with which they have a financial relationship.[22] The anti-kickback statute does not allow a physician to receive any kind of remuneration in exchange for a referral.

The interim final rule on the Stark law, Phase II, provided a narrow exception for community-wide health information exchange. Hospitals or other entities can provide items or services of information technology to physicians to access and share electronic health records, drug information, and general health information. However, the regulations require that:

- the items and services provided be used primarily for accessing the network,
- provision of the items and services not take into account the volume or value of referrals from the physician,
- the network be available to all providers and residents of the community, and
- the arrangement not otherwise violate the anti-kickback statute (CMS 2004b).

It seems unlikely that a hospital would be willing to engage in an information exchange project that meets all of these criteria, particularly the requirement that a network be available to all providers and residents of the community.

Of course, the legal limitations need to be considered in the context of the purpose of these laws. The Stark and anti-kickback provisions are intended to prevent fraud and abuse. Physicians should make referrals based on the quality of a facility, not financial arrangements. Hospitals should not use financial incentives, including the provision of IT equipment and services, to induce referrals. In the extreme, hospitals and physicians could create closed referral networks that restrain competition.

Nevertheless, it is appropriate to strike a balance between encouraging health information exchange and protecting consumers. The Secretary should direct the Office of the Inspector General and the Department of Justice to reconsider the limited exception and provide guidance on situations that do and do not comply with the laws. Without that kind of change, the existing regulations could stifle important advances in information exchange and adoption of IT.

Other legal avenues for hospitals to support physician use of IT are limited. Physicians can have financial relationships with the entities to which they refer patients if they are charged fair market value for the services they receive. In this scenario, the hospital would need to determine the fair market value of IT resources provided to physicians and could only work with those willing to pay. Other Stark exceptions allow hospitals or other entities to provide nonmonetary compensation to referring physicians of up to $300 per year and limited incidental benefits (but not cash) to their medical staffs.

The MMA instructed HHS to craft exceptions from the Stark law and safe harbors to the anti-kickback law for provision of IT used to receive and transmit electronic prescription information. The information can flow from hospitals to medical staff; from group practices to members of the practice; and from prescription drug plans or MA plans to pharmacists, pharmacies, and those who write prescriptions. The drafting of specifications for e-prescribing may present the Secretary with an opportunity to clarify how the Stark and anti-kickback laws apply to other uses of IT. ■

Endnotes

1 A recent survey of pay-for-performance programs in the private sector found that the size of the rewards ranges from 5 to 20 percent for physicians and 1 to 4 percent for hospitals (MedVantage 2004).

2 CMS is planning to revise the set and add new measures to it for purposes of the QIO program and the HQA voluntary reporting initiative, but is not allowed to update the measures for the set linked to provision of a full update.

3 While the process being measured is the same, sometimes the data definition and method of collection may be different. Therefore, it is critical that CMS, JCAHO, the NQF, and others that measure hospital quality work together to ensure that hospitals only have to collect the information once.

4 The NQF recently endorsed a set of quality measures for cardiac surgery. The set is based on measures in a database developed and maintained by the Society of Thoracic Surgeons (STS). If Medicare wished to include privately held databases and measures, these databases could provide additional information on quality, including linking the surgeon and hospital performance. The STS reports that over 80 percent of thoracic surgeons and 70 percent of hospitals with thoracic surgery report to the database (Conn 2004).

5 The National Quality Forum actually endorsed 30 safe practices. Because the Leapfrog Group has another process for requesting hospital information on three of the measures—evidence-based hospital referral, implementation of a computerized provider order-entry system, and intensive care unit physician staffing—these practices were not included in the safe practices survey.

6 Of the total 38 health status items, 2 items had interrater reliability coefficients of 0.54, 11 had coefficients between 0.60 and 0.70, and 25 had coefficients above 0.70. On this scale, the highest coefficient would be 1.0, or perfect correspondence.

7 The NQF has conduced only a preliminary review of these measures.

8 The "c-statistic" is the proportion of yes/no pairs the model would correctly predict out of all possible yes/no pairs. Higher scores indicate a better predictive model.

9 CMS recently announced that this measure, along with three others, would be replaced by four different measures of improvement.

10 The scope of work defines the activities to be performed by the QIOs during their next contract cycle.

11 The UK has a physician pay-for-performance program that relies on physician use of electronic health records to obtain information on quality (Roland 2004).

12 In developing this estimate, the Connecting for Health Working Group assumed that the capital costs (amortized over three years) and ongoing expenses of an EHR are between $12,000 and $24,000 per year.

13 Bridges to Excellence uses the recognition program run by NCQA.

14 The founding organizations are the National Alliance for Health Information Technology, the American Health Information Management Association, and the Healthcare Information and Management Systems Society (HIMSS).

15 Linux, though not medical software, is an example of open-source software.

16 In preparation for the IT tasks in the 8th scope of work, all QIOs have been working with a few physician practices in each state.

17 Sponsoring organizations include ASTM International, Massachusetts Medical Society, HIMSS, AAFP, American Academy of Pediatrics, AMA, Patient Safety Institute, American Health Care Association, and the National Association for the Support of Long Term Care.

18 Agencies involved in the CHI include the Department of Defense, Department of Veterans Affairs, the Centers for Medicare & Medicaid Services, the Centers for Disease Control and Prevention, and the National Institutes of Health.

19 A private sector initiative, Integrating the Health Enterprise, is developing the detailed specifications needed to implement standards and integrate systems.

20 Our recommendation does not address messaging standards, because claims are already transmitted using standards.

21 The law requires that NCVHS develop standards for e-prescribing. Once standards are developed, all prescriptions under Part D that are transmitted electronically must conform to them.

22 The designated health services include clinical laboratory, physical therapy, occupational therapy, radiology, radiation therapy, various medical equipment and supplies, home health, outpatient prescription drugs, and inpatient and outpatient hospital services.

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