Examining the Cost of Implementing ICD-10

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Executive Summary

Over the next few years doctors, hospitals and other health care providers will change the codes they use to identify different diagnoses. Hospitals will also change the codes they use to describe the services they provide to patients. Diagnoses will be described using the *International Classification of Diseases, Tenth Revision, Clinical Modification* (ICD-10-CM) and inpatient procedures will be described using the *International Classification of Diseases, Tenth Revision, Procedure Classification System* (ICD-10-PCS). This change will affect any organization that uses detailed health information, including public programs such as Medicare and Medicaid, as well as private health insurers and health plans.

Both health care providers and the organizations that pay for care will have to modify their information systems to accommodate the new codes. Anyone working directly with diagnosis and procedure codes will also require training. Because of the number of systems and people involved, the cost of this transition will be substantial.

Several reports have been published estimating the cost of implementing the new codes. Based on a review of this literature:

- A reasonable preliminary estimate of the total cost to the healthcare system would be $3.2 to $8.3 billion;
- The implementation will cost the Medicare program between $200 and $220 million;
- The implementation will cost state Medicaid programs $1 to $3 million each; and
- Requiring health care providers and private payers to speed up implementation has the potential to increase costs and result in a less effective implementation; and
- While difficult to quantify precisely, requiring an accelerated implementation of the ICD-10 code sets as proposed in H.R. 4157 rather than a more orderly, staged roll-out has the potential to increase system implementation costs by $115 to $416 million.

Introduction

Background

The effective use of health information in an increasingly complex and diverse health care system depends on well defined, commonly understood terminology and coding systems. The coding systems used to describe diagnoses and treatments are directly used by virtually every participant in the system other than the patient, and are deeply embedded in the delivery, management and financing of care.

Most diagnosis coding is currently performed using the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM). It is also used for procedure coding in inpatient hospital settings. Most outpatient procedure coding is performed using the Current Procedure Terminology (CPT©).[1] It is anticipated that over the next few years, the ICD-9-CM

[1] The American Medical Association owns the CPT.

will be replaced by the *International Classification of Diseases, Tenth Revision, Clinical Modification* (ICD-10-CM) and, for inpatient procedure coding, the *International Classification of Diseases, Tenth Revision, Procedure Classification System* (ICD-10-PCS). The ICD-10 is intended to be more accurate and flexible than the coding systems it will replace, and better document patient health and treatment. As might be expected, the structure of the ICD-10 is significantly different from that of the ICD-9 and CPT.

Survey of Existing Estimates
Implementing the ICD-10 will require a significant effort on the part of health care providers, health plans, health insurers, and other organizations that pay for health care.

Several organizations have attempted to estimate the cost of this conversion. The three most complete recent estimates are by the RAND Corporation (2004), Robert E. Nolan Company (2003) and PriceWaterhouseCoopers (2003).[2] These estimates vary dramatically. This is due in part to differences in the scope of costs considered; however, there are also very real disagreements over the likely difficulty of the transition.

Purpose of this White Paper
This paper is intended to:

- Identify the primary sources of implementation cost;
- Review the existing cost estimates; and
- Develop a preliminary estimate of the likely cost to the U.S. health system as a whole.

The scope of the discussion will include health care providers, private payers and government payers. The types of cost considered will be systems implementation, training and provider contract renegotiation.

We are not including employers or other health plan sponsors that are not directly involved in the administration of benefits. Nor are we including organizations that are not directly involved in the delivery or financing of care, such as research and academic organizations. Only direct implementation costs are considered – we do not include the cost of work that must be re-done due to increased error rates or other forms of lost productivity.

Systems Implementation

Overview
Changing code sets involves more than just widening a data field, although that certainly is part of the process. Perhaps the simplest change will be modifying the field definition (size and

[2] Martin Libicki & Irene Brahmakulam, *The Costs and Benefits of Moving to the ICD-10 Code Sets*, RAND Corporation, March 2004;
Replacing ICD-9-CM with ICD-10-CM and ICD-10-PCS: Challenges, Estimated Costs and Potential Benefits, Robert E. Nolan Company, October 2003;
Cost-Benefit Analysis Implementing CPT as the Single Procedure Code Set, Implementing ICD-10-PCS as the Single Procedure Code Set, or Implementing ICD-10-PCS in the Inpatient Environment, PriceWaterhouseCoopers, September 2003.

character set) in the various databases where diagnosis and procedure codes are stored. The tables used to store the code definitions themselves must also be restructured, as well as input screens and data edits. In addition to basic data editing, any program logic that depends on diagnosis will also have to be revised.

Updating particular software packages is only on part of the process. Most large organizations have multiple systems and exchange data with multiple other organizations. The interfaces between internal systems and those with business partners must be revised to accommodate a new code set, as must any electronic transactions using diagnostic or procedure codes.

Existing data must be converted, provision made to support both the old and new formats, or parallel systems must be maintained during a transition period. The most efficient approach will vary. Reports, whether on-line or hardcopy, will also need to be reformatted and in some cases restructured. Similarly, paper forms and the attendant work flows will also need to be revised and in some cases restructured.

For any given organization, the extent of the effort will depend on the number of computer systems in place, whether those systems are purchased or developed in-house, the age and flexibility of each system, the number of internal system interfaces and reports, and the number of external data transfers and reports to business partners and other entities.

The ICD-10 implementation presents the greatest challenge to hospitals, because the ICD-10-PCS will only be used for inpatient procedure coding. For outpatient settings, the existing code sets – most commonly the CPT – will continue to be used.

Hospitals

Hospitals typically use a variety of software systems to support clinical management and data reporting, utilization and case management, managed care and quality reporting (e.g., HEDIS and JCAHO), billing, ordering of tests and pharmaceuticals, reporting of mortality and morbidity, financial reporting and submission of claims to various payer organizations.

The number and complexity of the information systems used varies by size and type of hospital. In general, larger hospitals use more information technology than smaller hospitals. Urban hospitals use more information technology than rural hospitals, teaching hospitals use more than non-teaching hospitals, and hospitals that are part of a system use more than do stand-alone hospitals. The level of financial investment also varies significantly. The median annual capital investment in information technology of hospitals that have just begun using advanced information systems is $140,000; the median annual capital investment for hospitals with cutting edge systems is $2 million.[3] Annual operating spending on information systems varies proportionately.

Physician Practices

Medical practices are even more diverse than hospitals, ranging from large multi-specialty organizations with multiple locations to solo practitioners. At the upper end, a large provider organization may have a range of systems similar to that of a large hospital, including financial,

[3] *Forward Momentum: Hospital Use of Information Technology*, American Hospital Association, 2005.

clinical, medical management and billing systems. These organizations may have a mix of purchased systems from multiple vendors and in-house legacy systems, with multiple interfaces between internal systems and with external business partners.

Overall, most group medical practices now have automated billing and scheduling systems. Many are in the process of implementing more sophisticated systems, such as electronic medical record, drug interaction warning and clinical ordering systems. Larger practices tend to be further along in adopting health information technology.

At the other extreme, the information systems of some solo practitioners may be limited to a desktop computer with the minimum amount of purchased software necessary to support billing. In that case the implementation may be limited to the installation and testing of updated software from a single vendor, conversion of existing data or parallel operation of two versions for a period of time, and purchasing revised paper forms.

Payers
Health insurers, Health Maintenance Organizations (HMOs), Pharmacy Benefit Managers (PBMs) and other payer organizations are, by their very nature, financial intermediaries that are intensely data driven. Diagnosis and procedure information is central to their core function of paying for necessary and appropriate medical care. The broad functions that are supported by computer systems include the adjudication of health care claims, medical and case management, provider payment, provider contracting, pricing and underwriting, actuarial reserving and financial reporting, enrollment and customer billing.

The number and type of systems will vary by organization. Larger organizations that support multiple product lines and accept insurance risk will require systems to support all of these functions. In some cases, due to consolidation in the industry, there will be a complex mix of legacy systems. Smaller, local organizations will generally have less complex infrastructures. Some, such as PBMs and Third-Party Administrators (TPAs) will not perform all of these functions. Small TPAs, in particular, may rely on a relatively small number of purchased systems. Large PBMs, however, will have a variety of systems for managing pharmacy utilization and costs.

Training

Implementation of a new code set requires that both the individuals assigning codes, and those using the codes, become familiar with the new system. The amount of training needed will vary, as will the mix between formal and informal training. Regardless of the training methods used, however, some training time will be required by many individuals working for both providers and payers.

Hospitals
Most hospitals are likely to have full-time staff dedicated to the assignment of codes. Familiarity with current code sets will be central to the jobs of others involved in medical records and

billing. Finance and information technology staff would also need to become familiar with the new code sets.

For all of the benefits of a new code set to be realized, clinical staff must also become familiar with the new terminology and codes, even though most will not do their own coding. This will include physicians, nurses, and any other clinical staff who currently use diagnostic or procedure codes.

Physician Practices
Large multi-specialty practices are also likely to have one or more individuals for whom coding is a primary job function. Smaller practices, and especially solo-practitioners, will typically depend on part-time coders. Regardless of the size of a practice, the same core functions will be performed: code assignment, maintenance of medical records, billing, financial reporting, and ordering of tests and medications. The depth of knowledge needed will vary based on the size and complexity of each practice, but every practice will require some degree of familiarity for both administrative and clinical staff. Because the ICD-10-PCS is only used in inpatient settings, the transition will generally be easier for medical practices than for inpatient facilities.

Payers
Because the core function of a health plan is paying for health care, understanding what care was provided and why it was needed is central its operations. Thus, it is unsurprising that a large number of payer personnel require at least a basic understanding of current procedure and diagnostic terminology and codes.

The areas most directly affected are claim adjudication, medical management, provider contracting and auditing – these staff must be thoroughly familiar with current code sets. Others working with utilization and claim data, such as actuaries, underwriters and finance staff, must also have a basic familiarity with the codes.

Contract Re-negotiation

The payment rates negotiated between health plans and providers are defined using standard diagnostic and procedural codes. Provider contacts that are currently based on ICD-9 codes will have to be revised. Because the ICD-10 is designed to more accurately describe the services that are provided, a one-to-one mapping is not appropriate – and both providers and payers will want a clear understanding of the payments that will made for services billed under the new code set. Each negotiated fee schedule will need to be updated and perhaps actively re-negotiated.

Review of Existing Cost Estimates

Three primary estimates have recently been published of the cost of implementing the ICD-10 code set. The first was performed by the RAND Corporation for the National Committee on

Vital and Health Statistics (RAND report).[4] The second was performed by the Robert E. Nolan Company for the Blue Cross and Blue Shield Association (Nolan report).[5] The third was prepared by PriceWaterhouseCoopers for the American Medical Association (PWC report).[6] The Congressional Budget Office has also published a cost estimate of the impact of H.R. 4157, which would mandate the implementation of the ICD-10 code sets as of October 1, 2010.[7]

While all three considered providers and payers, the scope of these estimates was significantly different. The most significant difference between the PWC report and the other estimates is that the PWC estimates only examine procedure coding. All three reports considered the cost of system changes and staff training. The RAND report includes the cost of lost productivity. The Nolan and PWC reports do not include productivity losses, but do include the cost of renegotiating provider contracts. The PWC report also includes the cost of "[t]hird party users of health claims data and modifications and reconciliation of data." The RAND report includes an estimate for the cost to the Centers for Medicare and Medicaid Services (CMS) for systems implementation for the Medicare program, but does not separately identify the implementation cost for Medicaid or other state programs.

The general approach taken by RAND was to develop a point estimate for each component of cost, and then assign a confident interval around it to produce a likely range of costs. The confidence intervals appear to be based on the judgment of the researchers. Nolan assigned ranges to specific key assumptions. In most, but not all cases, we have been able to use those ranges to reproduce the range of costs reported in the Nolan report.[8] The PWC estimate was based on a prior report by Coopers & Lybrand of the cost of system changes, which was trended forward and adjusted to reflect training, contract renegotiation and other implementation costs.[9]

Table 1 restates these three estimates to put them on a more directly comparable basis. The RAND report estimates system implementation costs separately for providers, software vendors, payers, and CMS. Table 1 allocates RAND's estimated cost for software vendors between providers and vendors. RAND analyzes training costs by full-time coders, part-time coders, physicians, and code users. Based on the descriptions in the RAND report, Table 1 allocates the cost for coders and physicians to providers; the cost for code users to payers.

The Nolan report included an estimate for the system implementation costs for "ancillary providers" – providers other than hospitals or physician practices – but excluded them from the

[4] Martin Libicki & Irene Brahmakulam, *The Costs and Benefits of Moving to the ICD-10 Code Sets*, RAND Corporation, March 2004.
[5] *Replacing ICD-9-CM with ICD-10-CM and ICD-10-PCS: Challenges, Estimated Costs and Potential Benefits*, Robert E. Nolan Company, October 2003.
[6] C*ost-Benefit Analysis Implementing CPT as the Single Procedure Code Set, Implementing ICD-10-PCS as the Single Procedure Code Set, or Implementing ICD-10-PCS in the Inpatient Environment*, PriceWaterhouseCoopers, September 2003.
[7] U.S. Congressional Budget Office, *Cost Estimate of H.R. 4157: Health Information Technology Promotion Act of 2006*, July 25, 2006.
[8] In estimating training costs, Nolan discusses an assumed number of individuals receiving training and a range for the number of hours each spends in training. We have been unable to reproduce the range of estimated costs using a single assumed cost per hour of training.
[9] *Cost-Benefit Analysis of a Uniform Procedural Coding System for Physician Services*, Coopers & Lybrand (PWC), September 1989.

totals. Table 1 adds them back in. These include a wide variety of providers, such as physical therapists, nursing homes, home health care companies and substance abuse treatment facilities.

The PWC report developed a "cost impact," which is described as representing the one time implementation cost of converting information systems to use the ICD-10 code sets, and a "full cost" includes the expenses associated with training, education, provider contract renegotiation, and certain costs associated with "third party users of health claims data." Table 1 shows the "cost impact" as the systems implementation cost, allocates 10 percent of the difference between the full cost and the cost impact to contract renegotiation, and allocates the rest of the difference to training. It appears that some of the costs reflected in the difference between PWC's cost impact and full cost represent integration activities (other than code training) that the other estimates include under system implementation. Table 1 does not attempt to reallocate that portion of the cost. Thus, for PWC the system implementation cost is likely somewhat understated, and the training cost somewhat overstated.

Table 1
Summary of ICD-10 Implementation Estimates*
(All $'s in $1,000's)

	RAND		Nolan		PWC**
	Low	**High**	**Low**	**High**	
System Implementation					
Health Care Providers	$75,000	$262,500	$2,845,000	$8,600,000	
Payers	$125,000	$312,500	$378,000	$833,000	
Government Programs	$25,000	$125,000	$700,000	$1,550,000	
Total	**$225,000**	**$700,000**	**$3,900,000**	**$11,000,000**	**$178,000**
Training					
Health Care Providers	$200,000	$450,000	$900,000	$1,400,000	
Payers	$25,000	$50,000	$54,000	$80,000	
Total	**$225,000**	**$500,000**	**$950,000**	**$1,500,000**	**$831,600**
Contract Re-Negotiation			**$82,000**	**$416,000**	**$92,400**
Total Implementation Cost	***$425,000***	***$1,150,000***	***$5,700,000***	***$13,900,000***	***$1,102,000***

* The estimates have been restated to put them into a more directly comparable format.
** PWC provides cost estimates for three different procedure coding scenarios – the number shown are based on the PWC estimates for the implementation of the ICD-10-PCS for the inpatient hospital setting only.

The most significant area of disagreement appears to be how much system implementation is likely to cost provider organizations. In comparing these estimates, it is important to remember that the PWC numbers are limited to the implementation of the ICD-10-PCS, and do not include

the cost of transitioning to the ICD-10-CM for diagnostic coding. It is important to note that these estimates are now two to three years old – current costs would be higher due to inflation.

Preliminary Cost Estimates

Basic approach
These preliminary cost estimates are based in large part on a review of the methods and assumptions used by the three published estimates discussed above. The basic approach taken is to parallel those methods and assumptions where practical, in order to improve the comparability of the results. A key goal is to provide sufficient detail to allow the reader to reproduce the calculations.

The scope includes the cost of implementing the ICD-10-PCS for procedure coding in inpatient settings, and ICD-10-CM for diagnostic coding in both inpatient and outpatient settings. The types of expense included are systems implementation, training, and provider contract renegotiation for health care providers, private payers, and government payers. No attempt is made to quantify productivity losses. The estimates exclude organizations that are not directly involved in the delivery or financing of care, such as research and academic organizations. Also excluded are employers or other health plan sponsors that are not directly involved in the administration of benefits.

The general structure of the Nolan estimates is followed, because it provides a simple and easy to understand format for discussing the key assumptions driving costs. Analyzing system implementation costs by size of provider and payer organization is especially useful.

Systems Implementation
System implementation costs are estimated separately for health care providers, private payers and federal and state health benefit programs. Training staff in operating new versions of software systems is included, but not the cost of educating staff about the new code sets. System vendors are not considered separately. Ultimately, vendors will pass their costs on to their clients – whether in the current contract period, or through higher license and maintenance fees in the next contract period.

Three types of health care providers are considered: hospitals, physician practices, and ancillary providers. Hospitals and physician practices are grouped by size; larger organizations are assumed to have more complex information system infrastructures and higher average implementation costs. Hospitals are generally assumed to face the highest costs, because both their diagnostic coding and their procedural coding will be changing; medical practices and most ancillary providers will only have to adopt a new diagnostic code set. At a minimum, small practices will have to install and test a new version of their software.

Ancillary providers are a very diverse group – no attempt has been made to analyze them by size or type. The average implementation cost for ancillary providers has been assumed to be equivalent to that for a small medical practice (3 to 5 physicians). This is likely conservative, but provides a sense of the potential magnitude of the aggregate cost for this group.

Table 2
Preliminary Estimate of System Implementation Costs – Health Care Providers
(All $'s in $1,000's)

Hospitals	Per Entity			Total Cost	
	Low	High	Entities	Low	High
400+ Beds	$500	$2,000	428	$214,000	$856,000
200 - 400 Beds	$250	$1,000	973	$243,250	$973,000
100 - 200 Beds	$150	$500	1,168	$175,200	$584,000
< 100 Beds	$35	$150	2,326	$81,410	$348,900
			4,895	$713,860	$2,761,900
Physician Practices					
Very Large (21+)	$50	$100	2,586	$129,300	$258,600
Large (11-20)	$20	$40	3,324	$66,480	$132,960
Mid-Sized (6-10)	$10	$20	8,644	$86,440	$172,880
Small (3-5)	$5	$10	22,387	$111,935	$223,870
Independent (1-2)	$2	$8	145,000	$290,000	$1,160,000
			181,941	$684,155	$1,948,310
Ancillary Providers	$5	$10	100,000	$500,000	$1,000,000
Total for Health Care Providers				$1,898,015	$5,710,210

Two types of private payers are considered: risk bearing entities, and non-risk bearing Third Party Administrators (TPAs). Risk bearing entities include licensed health insurance companies and Health Maintenance Organizations (HMOs). System costs for risk bearing organizations are assumed to vary by size. Larger organizations are assumed to have more complex systems, more internal system interfaces, and more interfaces with external business partners. Health plans are heavily dependent on historical data for pricing, reserving and financial reporting. In addition, a small subset of medical claims may require an extended period of time to be fully resolved. As a result, historical data must be converted to the new standards, or two standards supported, for several years.

The primary function of TPAs is claim adjudication. They are typically much smaller than a health insurer or HMO, and do not provide all of the same services. The assumed average cost per TPA presupposes that most TPAs will require the installation and testing of a single vendor supplied system, with limited customization of reports and interfaces with external business partners.

Table 3
Preliminary Estimate of System Implementation Costs – Private Payers
(All $'s in $1,000's)

	Per Entity			Total Cost	
Health Plans & Health Insurers	Low	High	Entities	Low	High
National	$10,000	$25,000	6	$60,000	$150,000
Multi-Regional	$5,000	$10,000	6	$30,000	$60,000
Large	$3,000	$6,000	45	$135,000	$270,000
Mid-Sized	$500	$1,500	75	$37,500	$112,500
Small	$150	$500	160	$24,000	$80,000
			292	$286,500	$672,500
Third-Party Administrators	$25	$50	1,500	$37,500	$75,000
Total for Private Payers				$324,000	$747,500

Both the Medicare and Medicaid programs face many of the same implementation challenges as do private payers. The cost to implement, operate and maintain the claim-processing and other systems for Medicare is borne by the Centers for Medicare and Medicaid Services (CMS), and is subject to appropriation. The assumed cost to CMS is intended to be consistent with the CBO cost estimate for H.R. 4157.

Implementing the ICD-10 code sets will require state each Medicare program to upgrade its Medicaid Management Information System (MMIS). Conservatively, the system implementation cost for a state Medicaid program would be equivalent to that for a mid-sized to large health insurer. States operate a variety of other programs that provide health care, pay for health care, or collect and analyze diagnostic and procedure data. These estimates assume that state spending to implement the ICD-10 code sets for these other programs will be roughly equivalent the system implementation costs for Medicaid.

Table 4
Preliminary Estimate of System Implementation Costs – Government Programs
(All $'s in $1,000's)

	Per Entity			Total Cost	
	Low	High	Entities	Low	High
Medicaid	$1,000	$3,000	50	$50,000	$150,000
Other State Programs	$1,000	$3,000	50	$50,000	$150,000
Medicare	$200,000	$220,000	1	$200,000	$220,000
Total for Government Programs				$300,000	$520,000

Training

Training costs are estimated based on the number of individuals receiving training, an assumed number of hours spent in training, and an assumed personnel cost per hour. The assumed cost

per hour is intended to reflect both direct pay and other personnel costs, such as benefits and payroll taxes. Both formal training (e.g., classroom seminars) and informal training (e.g., time spent on-the-job becoming familiar with the new code definitions) are included. These estimates only include staff time spent in training – the cost of developing or purchasing training materials is excluded, as is the cost of providing trainers.

Following the RAND report, a distinction is made between full-time coders and part-time coders; those coders working for hospitals are assumed to be full-time coders, while those in outpatient settings are assumed to be part-time coders. Full-time coders are assumed to require the most extensive training – most likely including several days of formal training.

Physicians and other clinical staff are assumed to spend the equivalent of a half day familiarizing themselves with the new codes over the transition period – much if not all of it on an informal basis. Some other hospital staff (non-coding, non-clinical) will also require familiarity with the diagnostic and procedural code sets – primarily billing and financial reporting personnel. On the low end, they are assumed to require at a minimum a few hours of informal training. At the high end, they are assumed to require a day or two of formal training.

Payer staff who work directly with codes on a routine basis are assumed to require less training than a full-time coder, but more than casual familiarity. The range of hours assumes the equivalent of one to two days of training.

Table 5
Preliminary Estimate of Training Costs

	Range of Hours			Cost per	Total Cost (in $1,000's)	
Health Care Providers	Low	High	Personnel	Hour	Low	High
Coders & Medical Records (Full Time)	24	40	50,000	$50.00	$60,000	$100,000
Coders & Medical Records (Part Time)	8	12	200,000	$50.00	$80,000	$120,000
Physicians	4	6	691,873	$100.00	$276,749	$415,124
Other Clinical Staff	4	6	691,873	$70.00	$193,724	$290,587
Other Hospital Staff	4	16	44,207	$50.00	$8,841	$35,366
Total for Health Care Providers			1,677,953		$619,315	$961,076
Payers	8	16	150,000	$50.00	$60,000	$120,000
Total Training Costs					$679,315	$1,081,076

Contract Renegotiation

Reimbursement contracts between health care providers and private payers must describe the services that may be purchased and the price for each. Most often, standard code sets are used for this purpose. If a new code set is to be used for billing purposes, then the contracts must be changed as well. In many cases, this will require active renegotiation.

Moving to the ICD-10-PCM for procedure coding will affect most if not all hospital contracts. The change in diagnosis coding may affect some contracts with other types of providers – that cost is excluded from the preliminary estimate below.

The cost of this may be estimated in a manner similar to that for training costs. An assumed number of contracts per hospital multiplied by an assumed number of hours per contract, and an assumed personnel cost per hour. Because of the financial significance of these hospital contracts, the assumed cost per hour presupposes at least some involvement by senior management.

Table 6
Preliminary Estimate of Contract Renegotiation Costs

	Number of Hospitals	Contracts per Hospital		Hours		Cost per Hour	Total Cost (in $1,000's)	
		Low	High	Low	High		Low	High
Hospital Contracts	4,895	10	20	10	20	$70	$34,265	$137,060

Summary
Table 7 below summarizes the results of these preliminary estimates. The overall cost to implement the ICD-10 code sets is estimated to be $3.2 to $8.2 billion. Much of this is attributable to system implementation. Because of the large number of health care providers, even a relatively small cost per provider results in a large aggregate cost to the system as a whole.

Table 7
Summary of Preliminary ICD-10 Implementation Estimates
(All $'s in $1,000's)

	Low	High
System Implementation		
Health Care Providers	$1,898,015	$5,710,210
Payers	$324,000	$747,500
Government Programs	$300,000	$520,000
Total	**$2,522,015**	**$6,977,710**
Training		
Health Care Providers	$619,315	$961,076
Payers	$60,000	$120,000
Total	**$679,315**	**$1,081,076**
Contract Re-Negotiation	**$34,265**	**$137,060**
Total Implementation Cost	***$3,235,595***	***$8,195,846***

Proposed Acceleration of the Implementation

Background
One significant precondition to the successful implementation of the ICD-10 code sets is the implementation of the next generation of the HIPAA codes for electronic healthcare transactions (X12 5010 and the NCPDP telecommunications standard). At the same time, health care providers, payers and transaction clearinghouses will are faced with the need to implement a number of other HIPAA changes, including the new provider identifier (May of 2007), the new health plan identifier (still under development), the claims attachment standards and the anticipated HIPAA 835 ERA Enhancements.

Both the hospital and medical practice communities are beginning to implement much more sophisticated health information systems. Completing this transition will require a very significant commitment of both funds and information technology staff time over the next three to five years.

Discussion
Accelerating the implementation of the ICD-10 code sets will also accelerate spending on implementation, moving certain costs forward. But it is not simply a matter of "pay now or pay later" – there are other considerations.

The time available for implementation will directly affect the "build versus buy" decisions made by providers and payers. The longer the lead time, the more likely it is that vendors will be able to provide packaged solutions. Timing is critical. The key question for vendors is not whether they can implement the new codes before a regulatory deadline, but whether they can provide a credible solution to providers and payers at the point at which those organizations must make a strategic decision about how to come into compliance with the new standards. If vendors are not able to respond in a timely fashion, providers and private payers will be more likely to rely on internally developed solutions and work-arounds. (Of course, payers with multiple and highly customized systems may find packaged vendor solutions of limited benefit in any event.)

The supply of programmers, system analysts and consultants who are experienced with health information systems is limited. Accelerated implementation of a major systems revision will of necessity crowd out health information systems initiatives, and potentially increase the cost of labor and software. Dedicating staff and financial resources to this effort has an opportunity cost, as those resources cannot be used for other business improvement and product development efforts that could reduce expenses or improve revenues.

More generally, the less time available to implement the new standards, the more likely organizations will be to focus on minimum regulatory compliance, which would seriously limit the benefits obtained by the new codes sets.

Equally important as the amount of lead time available is the orderliness of the transition. As noted above, implementation of new code sets is simplified if new electronic transaction standards have already been fully implemented and post implementation problems resolved. That, in and of itself, is a significant effort and will require time. Both the transaction and the

code set changes will affect all segments of the health care system – and will require coordinated implementation between payers and providers. Provision should be made for sufficient testing between payers and providers before the new codes are used to transmit claim information.

A somewhat aggressive schedule for implementing these changes might be:

2010 Payers and claim clearinghouses required to accept 5010 transactions
2011 Providers required to transmit using 5010 transactions
2012 Payers and claim clearinghouses required to accept ICD-10 code sets
2013 Providers required to transmit using ICD-10 code sets

Such a staggered implementation timeline would allow payers to make their system changes, and then work with their contracted providers over the course of the next year to begin receiving the new data. This would include both cooperatively testing the data interfaces and negotiating any necessary contract changes.

Simultaneous implementation new code sets, by both payers and providers, would add significant additional overhead and confusion to the process – particularly if insufficient time has been allowed between the implementation of new transactions standards and the code implementation. The testing and debugging process would be particularly affected. If both payers and providers were required to go "live" with new systems at the same time, the opportunity for providers to test against stable, fully implemented payer systems would be limited. It would also prevent payers from spreading the effort of implementing new data interfaces with providers over a reasonable period of time after implementing their internal system changes. Pre-implementation testing would become less effective, and the amount of post-implementation debugging would be significantly increased. It is important to recognize that this would affect organizations of all sizes, and those that use vendor software as well as in-house systems. For instance, a solo physician will use purchased software. Nonetheless, if data transmissions to clearinghouses or payers fail due to inadequate testing, business will be disrupted as office staff attempt to make the software work, the vendor is contacted, and a corrected version is installed. Care should be taken to avoid requiring payers or providers to maintain dual systems and business processes any longer than necessary, because this would create unnecessary additional costs.

Potential Increase in Implementation Costs

Legislation being considered by Congress would require implementation of the ICD-10 standard by payers and providers by 2010, almost concurrently with implementation of the new HIPAA standards for transactions (the 5010 and updated NCPDP telecommunications standard). If adopted, this would result less time available for implementation. It would also require near simultaneous adoption of both new transactions standards and new coding standards, and effectively require payers and providers to go "live" with new systems at the same time.

Simply reducing the time available for implementation has potential costs. Increased reliance on in-house solutions due to a lack of vendor solutions and increased demand for experienced health information system personnel will likely result in systems that meet the minimum regulatory requirements, but do not achieve the goals intended for the new standards. In the meantime,

other needed health information initiatives will be deferred, and labor costs may rise due to increased demand. We have not attempted to estimate the impact of these effects.

While still difficult to quantify, the potential effect of requiring near-simultaneous implementation of multiple standard changes by both payers and providers is easier to estimate. The table below illustrates a typical breakdown of system implementation costs for a payer.

Components of System Implementation Cost

	Low	High
Planning and Administration	10%	15%
Development and Deployment	55%	65%
Testing and Debugging	25%	35%

While other aspects of the software development process would be affected, simultaneous implementation of multiple standards by both payers and providers would pose a particular problem for testing and debugging. Assuming testing and debugging costs were increased by 25 to 50 percent, the overall cost of system implementation would be increased by 6 to 18 percent. For private payers, this would represent an increase in system implementation costs of $20 to $131 million.

Simultaneous implementation is a particular concern for payers and clearinghouses because of their greater reliance on custom software systems and the number interfaces they have with providers and business partners. However, as discussed above, even the smallest providers would be affected by a failed implementation. If provider costs were to increase by only 5 percent, this would result in an additional $95 to $286 million to the overall cost of the conversion. Using these assumptions, overall private sector system implementation costs would increase by $115 to $416 million.