

APPLICATIONS AND TECHNOLOGIES COLLABORATIVE

ICD-10 – A Primer

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This research report is provided in response to requests from members of both the IT Strategy Council (ITSC) and the Applications and Technologies Collaborative (ATC) for additional background information on ICD-10 in a format that can easily be shared with those inside and outside of the IT organization. Additional ICD-10 research will continue to be provided that is specific to the ITSC and ATC services.

2011

March

The Advisory Board Company
2445 M Street NW
Washington, DC 20037

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Overview

The United States currently uses a 30 year old coding system to report patient health conditions. This coding system is woefully inadequate to accommodate changes in health care and the increasing demand for more meaningful information from standard health care transactions. In 1990 the World Health Organization adopted ICD-10 as the international version of diagnostic codes. These codes are used widely internationally as well as for mortality reporting in this country, but have yet to be adopted as the standard for diagnosis related coding in the United States.

Regulatory Requirements

In January of 2009, the final rule¹ was published that required the use of ICD-10 codes on all HIPAA transactions. The regulation requires that claims will not be accepted with ICD-9 codes for outpatient services with dates of service on or after Oct 1, 2013. Similarly inpatient claims are not to be accepted with discharge dates on or after Oct 1, 2013. The new standard for diagnostic coding under this regulation is the U.S. version of ICD-10; ICD-10-CM². The new standard for institutional procedure codes is ICD-10-PCS³.

Magnitude of the Changes

This migration from the current ICD-9 standard to the ICD-10 standard will represent one of the greatest changes in health care information in many years. These codes are used not only for analytic and reporting purposes; they are ingrained in most business processes. They factor into pricing, payment, contracting risk prediction, and a variety of other mission critical business functions. Rules, categorizations, and a variety of edits and algorithms to support many different business functions use these codes either as table look ups or as hard coded logic in existing systems

Cost of Migration

A number of studies have looked at the cost of this transition for payers, providers, and the industry as a whole. While there is considerable variation in cost estimates across these studies, most suggest that the cost will be in the billions and require a significant refocusing of existing resources^{4,5}. Estimates of the system implementation cost for a 400+ bed hospital range between \$500,000 and \$2,000,000 per entity⁶. Estimates of the cost of implementation for clinical practices range from \$83,000 for a small clinical practice to over \$2,700,000 for a large clinical practice⁷. The actual cost of implementation across the industry could be substantially higher since most of these estimates were made before organizations had any significant assessment experience. As organizations have looked deeper into areas of potential

¹ <http://edocket.access.gpo.gov/2009/pdf/E9-743.pdf>

² The U.S. version (ICD-10-CM) is substantially different from the international ICD-10 version. The international version has ~12,500 codes as compared to the U.S. version which ~69,000 codes.

³ ICD-10-PCS is not related to any international standard and was developed by 3M on behalf of CMS for use in this country as a replacement for the ICD-9 volume 3 institutional procedure codes.

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 Thomas Wildsmith, *Examining the cost of implementing ICD-10*, The Hay Group, October 2006

⁷ Stanley Nachimson, *The impact of implementing ICD-10*, Nachimson Advisors, October 2008.

ICD-10-CM

impact, many have been surprised by the magnitude of the resources that will be required to make this transition.

ICD-10 is the standard for diagnosis codes managed as an ‘international’ standard by the World Health Organization. This standard is used (with modifications) by most countries outside of the United States. ICD-10-CM is the U.S. version of this code standard, but differs significantly from the international standard in that it contains over 69,000 codes as compared to the WHO standard which contains ~ 12,500 codes. Australia and Canada also have significant variation from the U.S. Standard with their own modifications of the international ICD-10 standard.

The nature of the difference between ICD-9 (diagnosis codes) and ICD-10-CM (diagnosis codes) can be illustrated in the example in fig. 1 which shows the best potential code in ICD-9 and ICD-10 to represent the same key medical concepts in the same clinical scenario. In this example, the ICD-9 code is unable to fully represent the concepts in [red] as compared to the richer medical concept support in ICD-10.

A provider sees a patient in a [subsequent encounter] for a [non-union] of an [open] [fracture] of the [right] [distal] [radius] with [intra-articular extension] and a [minimal opening] with [minimal tissue damage]

ICD9 Code	Description
81352	Other Open Fracture of Distal End of Radius (Alone)

ICD10 Code	Description
S52571M	Other intra-articular fracture of lower end of right radius, subsequent encounter for open fracture type I or II with nonunion

[Note] For all codes related to fractures of the radius:

- ICD-9 codes = 32
- ICD-10 codes = 1731

Fig.1

Table 1 demonstrates some of the key differences between ICD-9 and ICD-10 code standards.

ICD-9 CM Diagnosis Codes (Vol. 1 & 2)	ICD-10-CM Diagnosis Codes
~14,000 Codes	~ 69,000 Codes
Up to 5 characters all numeric (except for the 1 st character for “E” and “V” codes)	Up to 7 characters all of which could be alpha or numeric characters
Limited inclusion of co-morbidities, complications, severity, manifestation, risk, sequelae, and other disease related parameters.	Includes many of these parameters within codes.
Does not distinguish laterality (left vs right vs bilateral)	Usually includes laterality where appropriate
Does not define initial and subsequent encounters	Includes these concepts

ICD-9 CM Diagnosis Codes (Vol. 1 & 2)	ICD-10-CM Diagnosis Codes
Expansion ability is limited	Alphanumeric support and place holders characters provide significant ability to expand the codes sets without a significant structural change
Consistency of terms and definition has been a challenge	Consistency for terms and concepts has been improved.
Combination codes are limited.	Combination codes are frequent, with multiple distinct medical concepts per code.

Table 1

ICD-10-PCS

The ICD-10-PCS codes are a set of codes that represent procedures that are performed and reported on institutional (hospital-based) claims and other related transactions. Despite the name, ICD-10-PCS codes are neither international nor associated with any specific diagnosis codes. These codes are specific to the US and are not part of any international standards. They were developed under a contract between CMS and 3M. Their first draft was completed in 1993 with an initial release in 1998 for review. There have been updates annually; however the codes are not being used today. Regulatory requirements state that this ICD-10-PCS will be the standard code for the definition of institutional procedures¹ for all HIPAA transactions with dates of discharge on or after Oct 1, 2013. There are dramatic changes in the structure, terminology, coding rules, and number of codes as illustrated in table 2.

ICD-9 –CM Procedure Codes (Vol. 3)	ICD-10-PCS Codes
~4,000 Codes	~ 72,000 Codes
3 to 4 characters all numeric	7 characters all of which could be alpha or numeric characters. All 7 characters are required
Not structured	Highly structured
Diagnosis occasionally included	Diagnosis not included
NEC and NOS (unspecified and elsewhere specified) are common	NEC and NOS are uncommon
Eponyms used frequently	Eponyms rarely used
General body locations	Detailed body locations
Combination codes used frequently	Combination codes are rare
Common medical terminology	Completely new medical terminology model

Table 2

The nature of the difference between ICD-9 (procedure codes) and ICD-10-PCS (procedure codes) can be illustrated in the example in fig. 2 which shows the best potential code in ICD-9 and ICD-10-PCS to represent the same key medical concepts related to a procedure. In this example, the ICD-9 code is unable to fully represent the concepts in [red] as compared to the richer medical concept support in ICD-10.

¹ Professional services and some institutional outpatient services will still be defined based on existing HCPC and CPT codes.



While hospitalized, a patient has a procedure done through an [endoscope] inserted [through the skin] to [bypass] the blood flow from the [abdominal aorta] to the [right] [renal artery] using a [synthetic material]

ICD9 Code	Description
3924	Aorta-renal Bypass

ICD10 Code	Description
04104J3	Bypass Abdominal Aorta to Right Renal Artery with Synthetic Substitute, Percutaneous Endoscopic Approach

[Note] For all codes related to Aorta-renal Bypass:

- ICD-9 codes = 2
- ICD-10 codes = 30

Fig. 2

The nature of these codes will require a major translation process to assure that codes in different ICD standards can be normalized to support existing processes and analysis. This translation will take two forms; “Crosswalks” and “Equivalent Aggregations” (or Grouping) of codes. During the time surrounding the migration from ICD-9 to ICD-10, there will be significant impacts to the quality and reliability of information due to the many-to-many relationship of these codes and the fact there are considerable differences in supported granularity. **Over 95% of the best possible matches between ICD-9 and ICD-10 codes will be inexact.** This means that that some information may be lost in translation, or some information may be assumed when there is no evidence to support the new detail. Clearly understanding the process and limitations of mapping will be critical to understanding the nature of health care data during this migration.

Crosswalks

Crosswalks are specifications that state what code in ICD-9 or in ICD-10 should be migrated to a corresponding code or codes in its corresponding standard. Crosswalks are intended to support automated translation rather than manual coding where other clinical information is used to code the clinical scenario to the appropriate code.

A “Crosswalk” is the deliverable that answers the question:

“If I need to replace an ICD-9 code with one or more ICD-10 code(s), which ICD-10 code(s) would best represent the concepts that the original ICD-9 code intended to represent?”

As noted above, codes that have been cross-walked will be inexact 95% of the time and result in **lost or assumed information** in the translation process.

Equivalent Aggregation (Grouping)

Equivalent Aggregation is the process for defining the codes in the ICD-10 standard that represent the original intent of policies, rules reporting categories, algorithms, and other processes where a set of codes has been defined to represent some medical concept like 'Acute Myocardial Infarction'. Because of the change in the code structures and the fact that current concepts may not be represented or are represented differently, a simple crosswalk from a current group of codes to a new group of codes in ICD-10 may not capture the intent of the rule, policy, or categorization.

An "Equivalent Aggregation" is the deliverable that answers the question:

"If I need to replace the original intent of a grouping of ICD-9 codes with an equivalent grouping of ICD-10 codes, which ICD-10 codes would best represent the original intent of the group of ICD-9 codes?"

Example: A medical policy may define the appropriate use of "Chelation Therapy" as treatment directed at conditions involving "heavy metal toxicity". This treatment for all other conditions is considered inappropriate and would not be paid. The following represents an analysis of the codes related to this policy:

- 24 ICD-9 codes related to "heavy metal toxicity" were part of the "inclusion" list for appropriate diagnosis associated with this treatment under the original policy.
- 42 ICD-10 codes would be mapped to the above note ICD-9 codes based on the GEM ICD-9 to ICD-10 mapping file.
- 100 ICD-10 codes related to "heavy metal toxicity" (as determine through direct research of ICD-10 codes) would be used in a new policy based on the 'medical intent' of the original policy.

In this case, new ICD-10-CM codes representing types of heavy metal toxicity like "lead induced gout" were never included in ICD-9. Additionally a standard crosswalk from ICD-9 to ICD-10 might only include a fraction of the appropriate codes. To properly redefine the policy to be consistent with its "medical intent" the ICD-10 codes need to be researched independent of how codes were selected in ICD-9.

Mapping

Mapping is the process of arriving at the deliverables noted above.

- Creating the "crosswalk" requires the identification of the code or combination of codes that best translates a code from ICD-9 to ICD-10 or from ICD-10 to ICD-9. Crosswalks are generally bi-directional and may be different for each direction because of the mixed granularity of the codes.
- Creating "Equivalent Aggregation" requires that the medical intent of the policy is represented in ICD-10 codes. This should not be mapped by using a code based crosswalk, but rather **the new group of codes should be defined based on a clear understanding of the medical intent and then reflecting that intent in the new code set.**

GEM

General Equivalency Mapping (GEM) files have been created by 3M at the request of CMS to provide some assistance in the mapping process. These files are bi-



directional from ICD-9 to ICD-10 and from ICD-10 to ICD-9. There are bi-directional maps for both the ICD-10-CM (diagnosis) codes as well as the ICD-10-PCS (institutional procedure) codes. They provide some assistance in identifying codes that might be equivalent for a variety of mapping purposes, but they are not crosswalks and are not intended to be used as crosswalks. While the GEM files are an important tool in the mapping process, they do not provide a complete solution. Though most of the maps appear to be accurate, there are a number of examples where the maps are clinically inaccurate, incomplete, and applied inconsistently for similar codes. **Clinical judgment must be part of the process of decision making when using GEM or other tools in crosswalking efforts.**

Business Impacts

Those who have been recently exposed to ICD-10 codes often ask; “Why is this big deal. Isn’t it just an update to a code set?”

The migration of ICD-9 to codes to ICD-10 codes is perhaps one of the largest changes in health care information in recent memory. Y2K and even HIPAA “Administrative Simplification” did not represent near as large an impact as the migration of ICD-9 to ICD-10. There are three key reasons that this migration is such a “big deal”.

- ICD codes are a cornerstone of health information:
 - ICD-9 or 10 diagnosis codes define the health state of the patient
 - ICD-9 or 10 procedure codes define the institutional procedures that patients may receive to maintain or improve their health state
- The transition from ICD-9 to ICD-10 represents a major change in the coding system:
 - 14,300 ICD-9 codes to 69,000 ICD-10 codes
 - 3,800 ICD-9 procedure codes to 72,000 ICD-10 procedure codes
 - Major changes in structure of the codes
 - Major changes in coding rules
 - Major changes in terminology
- ICD codes are used pervasively through most health care systems
 - Many business functions are impacted
 - These codes are ingrained in financial rules directly or indirectly
 - Many IT systems are impacted
 - Paper and electronic documents are impacted

Some of the key business areas where these codes play a significant role include:

- Clinical documentation improvement
- Coding and coder productivity and accuracy
- Case mix definition
- DRG assignment

- Audits
- Claim denials or adjustments
- Potential preventable readmission and present on admission conditions
- Medical policies and clinical guidelines
- Quality and efficiency assessment
- Fraud, waste, and abuse analysis
- Comparative effectiveness research
- Outcomes measures
- Population health analysis
- Clinical History
- Regulatory Reporting
- Managing care in an Accountable Care environment.

Since there is no experience with how these codes will be used and which of the codes will be used for which conditions and procedures, it will be difficult to predict how services and conditions will be reported and paid. Understanding the nature of these codes and evaluating the potential impacts will be critical to the viability of health care organizations.

Reporting & Analytics

Reporting and analysis in health care often relies on the ability to appropriately categorize and group diagnostic and institutional procedure codes. These categorizations will be quite different under ICD-10 because of extensive changes in definitions, details, and structure of the codes.

Example: Consider the following scenario based on an analysis of fractures of the distal radius:

- Under ICD-9, the following codes might be considered in the analysis:
 - 5 codes for fracture distal or lower end of the radius
 - 2 codes for Colles' fracture
 - 2 codes for fracture of the lower end of the forearm
 - 6 codes for unspecified part of the radius
 - 4 codes include the concept of "open fracture"
- Under ICD-10, the following codes might be considered in the analysis:
 - 318 codes for fracture distal or lower end of the radius
 - 120 Open fractures of the distal or lower part of the radius
 - 60 Gustilo class I or II
 - 60 Gustilo class IIIa, IIIb, or IIIc
 - 48 Codes for Colles' fracture
 - 48 Codes for Barton's fracture

- 48 Codes for Smith's fracture
- 48 Codes for Radial Styloid fracture
- 48 Codes for Galeazzi's fracture
- 84 fractures of the forearm (does not specify "upper/proximal" or "lower/distal")

An analysis that is attempting to define concepts consistently under ICD-10 as compared to similar analysis under ICD-9 **will require significant research to identify how to redefine categories of codes based on the new codes and structure within the ICD-10 model.** There is not "auto-magic" solution to redefining groups or categories of codes in ICD-10. In this example, if you don't know that Barton, Smith, Colles, Radial Styloid, and Galeazzi are all types of fractures of the distal (lower end) of the radius bone in the forearm, you would not know to group these fractures in that general classification.

Technical Requirements

Technical requirements are often underestimated. There are those less informed who believe that if they have a field of the appropriate length to handle the new codes, that they are ready for compliance. The reality is that most of the major changes associated with this transition are business changes that will require significant system changes to support the new business requirements. Many of those requirements (e.g. to support Meaningful Use or Accountable Care) are yet to be defined and will represent a significant part of the planning process. The following represents a limited list of some of the technical changes that may be needed to support these new business requirements.

Database Changes

- Data element support for 7 characters
- Support of alpha numeric data types
- Code type (ICD-10 vs ICD-9) definition.
- Support of both codes types per record
- Expansion of number of codes supported consistent with version 5010 institutional and professional electronic data interchange transactions
- Link between an ICD-9 code and the corresponding ICD-10 code in translated data
- Metadata around translation to assure translation accountability and user accessible audit trail
- Addition of ICD-10 codes with attributes to include:
 - Valid begin and end date (from a processing perspective)
 - Valid begin and end date (from a reporting perspective)
 - Create and delete dates
 - Long and short descriptions
 - Unique system ID for code records
- Aggregation models to define and support various categorization schemes with metadata attributes about the nature of the aggregation scheme records.

- Support for retrieval of the initial unaltered submitted code after translation processes are applied for any external reporting or transaction requirements

Data Definition and Validation

- Update to data dictionaries
- Update to validation processes to include validation to ICD-9 or ICD-10 based on the date of service or date of discharge
- Update to all inbound and outbound transaction processes to support ICD-10
- Update to any file format specifications related to ICD codes

Interfaces

Update all fields to support ICD-10 to include:

- Captions
- Data type support
- Field length
- Data sources

Rules

- Re-point all rules that used tabled codes to the appropriate reference tables based on dates of service and dates of discharge
- Re-code rules that are hard-coded to reflect the intent of the rule in ICD-10.

Testing

Test plans, test cases and test data to support business scenario based testing:

- Rules
- Reporting categorization models
- Validation
- Interfaces
- Translation
- Audit trails

These systems changes are only examples of the types of changes that may be needed. Until there is a deep assessment of business requirements, system engineers will not know what tasks are on their plate. Early definition of these business requirements will be critical if needed system changes and testing are to be accomplished prior to the implementation date.

The cost of implementation as noted previously is anticipated to be substantial for any organization. Beyond compliance, the hope is that there will be significant business benefits to make the required investment worth it. These business benefits will not happen automatically and will require strategic and tactical planning to leverage the opportunities that ICD-10 brings.

Leveraging the Advantages – Better Information

ACRONYM KEY

DRG

Diagnosis Related Group

GEM

General Equivalency
Mapping

HIPAA

The Health Insurance
Portability and
Accountability Act of 1996

ICD-9

International Classification
of Diseases (9th Edition)

ICD-10

International Classification
of Diseases (10th Edition)

ICD-10-CM

International Classification
of Diseases (10th Edition)
Clinical Modification

ICD-10-PCS

International Classification
of Diseases (10th Edition)
Procedural Coding System

ICD-10 brings significant opportunities to provide better information about the conditions for which patients receive care as well as better information about the types of procedures that are performed in hospital based institutions.

Greater Detail

As demonstrated earlier in this paper, ICD-10 codes provide much greater detail into the nature of the reported condition.

Enhanced Categorization Models

The greater granularity of the codes allows for categorization of conditions and institutional procedures that identify significant differences to assure that comparisons are as normalized as possible.

Example: Growth plate fractures categorized as Salter-Harris type I fractures are significantly different than Salter-Harris type IV fractures. Today however, ICD-9 codes cannot distinguish these two classes of growth plate fractures where as these types are different codes under ICD-10.

Greater Severity and Risk Definition

The detail within these codes allows for the differentiation of conditions that vary significantly in risk and severity. Some of the additional attributes of conditions that are included in many ICD-10 codes include:

- Co-morbidities
- Manifestations
- Etiology/causation
- Complications
- Detailed anatomical location
- Sequelae
- Degree of functional impairment
- Biologic and chemical agents
- Phase/stage
- Lymph node involvement
- Lateralization and localization
- Procedure or implant related

Greater Precision of Definition

Most of the ICD-10 codes also provide detail such as localization anatomically at a much greater detail to provide far greater precision of definition.

Greater Forward Flexibility

The design of these codes allow for much greater flexibility for modification in the future with minimal impact on the underlying structure. Supporting this flexibility includes:

- Increased code length

Leveraging the Advantages – Better Business

- Use of alpha or numeric values for all characters
- Place holders ('x' in CM and 'z' in PCS) for the addition of future values
- A better consistency in terms that allows for re-usability and application of terms in varying conditions.

Greater Ability to Integrate Clinical Information

ICD-10 codes provide a definition of health conditions that is more consistent with SNOMED and other clinical definitions of medical concepts. In addition, the expandability of ICD-10 allows for the expansion of codes to keep pace with changes in medical knowledge and medical concept definitions.

Consistent with the improvement in health care information standards for the definition of the patients health condition and procedures performed in hospital settings, there are significant opportunities to improve the business of health care.

More Appropriate Contracting

The definition of populations and the scope of conditions and procedures associated with those populations allow for contracting that is best suited to address the burden of illness while assuring appropriate care in a fiscally constrained environment.

More Precise Payment

The improved precision offered by ICD-10 allows for refinement of existing payment methodologies to arrive at more appropriate payment for specific conditions and procedures.

Better Definition of Severity, Risk, and Case Mix

ICD-10 codes offer much greater detail in the definition of conditions and procedures that incorporates attributes related to severity, risks, co-morbidities, classifications, and a variety of other parameters that help distinguish major differences in conditions and procedures that would appear to be the same based on ICD-9 coding today.

Improved Measurement of Quality, Efficiency, and Outcome Measures

ICD-10 offers substantial improvements in the levels to which measures of quality, efficiency, and outcomes accomplish the goal of providing a view of the value of health care.

Enhanced Network Management

Better defined data related to conditions and services will enhance the ability to look at network structure including network adequacy for regional patterns of diseases as well as tiering of networks based on more precise metrics.

Better Fraud and Abuse Detection

The specificity and clarity defined within the ICD-10 codes provides an opportunity to refine rules for the identification of fraud and abuse with greater sensitivity and specificity.

Better Risk Prediction

As data and experience grows with the use of ICD-10, predictive models can be greatly enhanced to more accurately predict risk within populations by a number of refined parameters. Better risk prediction means more accurate pricing and the ability to focus efforts to areas of greatest need.

A Competitive Advantage

Many organizations will struggle with the implementation of ICD-10. Lack of preparedness will certainly impact ongoing operations, but will also limit the ability to leverage any of the opportunities that ICD-10 brings. An organization that has prepared not only for ongoing operations but also has looked at how best to leverage these new codes, will be able to offer more predictable and better priced services with less risk than competitors.

Compliance

It's the law. All covered entities will be required to use ICD-10 codes for any HIPAA transactions as of Oct 1, 2013. Regulatory reporting and other requirements for interoperability defined under health care reform legislation will require the appropriate use of these new codes. Accreditation organizations will be incorporating these codes in their reporting and accreditation algorithms.

Summary

The mandated migration from ICD-9 to ICD-10 as of Oct 1, 2013 will be a watershed moment for health care information and health care business. Because of the critical nature and pervasive use of these codes for most business and analytic activities the magnitude of the change to the industry will be dramatic and out shadow the impact of HIPAA and Y2K combined.

Organizations that are well prepared to implement and leverage the advantages of these new codes will be positioned to succeed in the new health care market. Those less well prepared to deal with these changes will putting themselves at substantial risk.

Additional sites that are helpful in understanding and preparing for this transition include:

- CMS ICD-10 website - <http://www.cms.gov/ICD-10/>
- WEDI ICD-10Workgroup - <http://www.wedi.org/snip>
- AHIMA ICD-10 - <http://www.ahima.org/ICD-10/default.aspx>
- ICD-10 watch - <http://ICD-10watch.com/>
- AAPC ICD-10 - <http://www.aapc.com/ICD-10/>
- HIMSS ICD-10/5010 - http://www.himss.org/ASP/topics_FocusDynamic.asp?faid=220