Strategies for Managing the Change from ICD-9 to ICD-10 in Developing Countries: The Case of South Africa

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Introduction

Among the several reasons for disease coding, at the minimum, it allows for easy storage and retrieval of information. This facilitates the analysis and interpretation of disease-related data. Disease coding allows for standardisation among users and producers and for international comparability. Disease coding also allows for efficiency in billing (Verma and El-Sayed 2008, Thompson & Greenberg 2009). The de-facto standard for disease coding is the WHO family of disease and health related classification of which the core is the International Classification of Diseases (ICD) system (Last 1995). The two ICD versions currently in use are the ninth version (ICD-9) and the tenth version (ICD-10). However ICD-9 is over 30 years old and is no longer supported or maintained by WHO. For this and other reasons, many countries (users) have either moved or planning to move over from ICD-9 to ICD-10 (Prokhorskas 2002). Some other reasons given for the preference of ICD-10 over ICD-9 include the following: 1) the vastly larger number of codes in ICD-10 compared to ICD-9. For mortality coding alone, while ICD-9 has about 4000 unique codes, ICD-10 has about 8000 unique codes. 2) There is higher specificity in ICD-10 compared to ICD-9. 3) ICD-10 is more in line with advancement in medicine (more current) than ICD-9. 4) ICD-10 codes are more in line with changes in health care delivery system. 5) As ICD-10 is alphanumeric, it has room for more codes than the numeric ICD-9. In other words, ICD-10 is more expandable and hence can easily accommodate newer codes in the future (Chavis 2008, Thompson & Greenberg 2009, American Hospital Association 2008) .

While the subject of changeover from ICD-9 to ICD-10 has been actively discussed in the context of developed countries, the subject is hardly discussed in the context of developing countries. Of the few developing countries that have successfully made the transition from ICD-9 to ICD-10, South Africa is one of them. The experience of South Africa in making the transition could be useful for other developing countries, which are also considering to make the move. The paper starts by making some technical clarifications on disease coding. This is followed by the South African case study. The paper ends by discussing some general principles that can be derived from the case study in the light of other developing countries.

The two sub-systems in disease coding

There are two sub-systems in disease coding, the mortality sub-system and the morbidity (health care) sub-systems. The elements of these sub-systems and the relationship between them is shown in Figure 1. In the mortality sub-system, the main document containing information on causes of death is the death certificate. The certifying physician completes this certificate for deaths taking place in or out of hospitals. Definitely, there is more information available to the certifying physician if he or she was also the attending physician. The death certificate is ultimately sent to the national statistics office or the center responsible for processing statistics on causes of death. It is there that the causes of death (contributing, multiple or underlying causes) are identified and given an appropriate ICD code. These codes are then used for storage, retrieval, for producing national reports and for subsequent analysis. As deaths have legal implications, this sub-system is largely government regulated and

driven. When the ICD coding system changes, for example from ICD-9 to ICD-10, the established practice adopted in this sub-system is to do dual or bridge coding in a sample or totality of records and compute comparability ratios to relate the two systems (Center for Health Statistics 2004).

The second sub-system belongs to the health care system. This sub-system deals with the documentation of the encounter between patients and health service providers. Typically, the patient would present a complaint to a physician. The physician would examine the patient and use subjective and/or objective assessment to arrive at a diagnosis, the primary diagnosis. If there are secondary diagnoses, these are also noted down. Subsequently if the patient is given any treatment or undergoes surgery, the procedure is also noted down. All of these observations are coded and are used to calculate the cost incurred by the patient during the encounter. In effect, there are two sets

of codes, one for diagnoses (diagnosis coding) and the other for procedures or interventions (procedure coding). As can be seen from the above, more details are required in this sub-system than in the mortality sub-system. The ICD-10 as it stands does accommodates both diagnosis and procedure coding but at a basic level. As more details are needed in the clinical setting, the basic ICD codes are modified to increase specificity (clinical modification). This detailed information is important for third party payers, for example insurance companies. As insurance companies are mostly in the private sector, this sub-system is government-regulated but largely privately driven. Again, as in the mortality-subsystem, in the change from ICD-9 to ICD-10, there are established practices to relate the two systems. This involves the directional mapping of similar codes in the two systems and is known is cross-walks or General Equivalence Mapping (GEM) (Butler 2007, Centers for Medicare and Medicaid Services 2009).

Figure 1
The two sub-systems in disease coding

Government regulated and driven

Government regulated but largely private-sector driven
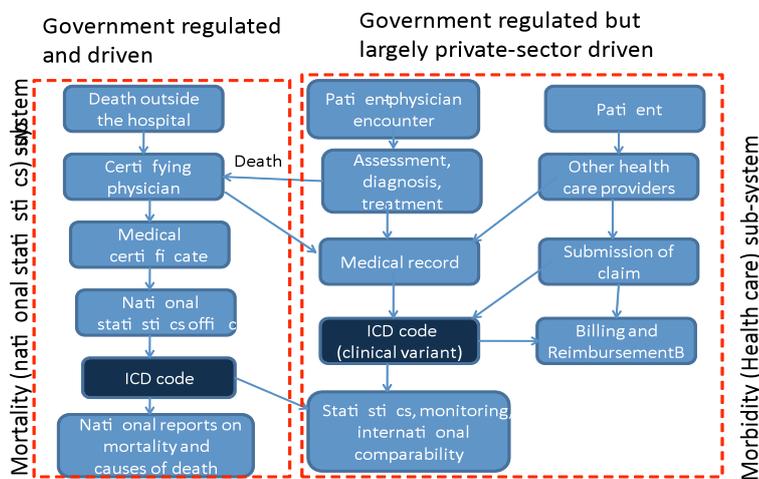
Table 1
Versions of the ICD and some of their clinical modifications

Abbreviation	Description	Year
ICD	International Classification of Diseases. A disease classification system developed and maintained by WHO.	Since 1893
ICD-9 ICD-10	Ninth revision of the ICD Tenth revision of ICD	1977 1993
ICD-10-AM ACHI	Australian clinical modification of ICD-10 Australian classification of Health Interventions (for procedure coding)	1998
ICD-10-CA CCI	Canadian clinical modification of ICD-10 Canadian classification of Health Interventions (for procedure coding)	2001 2001
ICD-9 CM	USA Clinical modification of ICD-9 (for both diagnosis and procedure coding)	1979
ICD-10-CM	USA Clinical modification of ICD-10 (for diagnosis coding)	2013**
ICD-10-PCS	USA Procedures Code System for ICD-10 (for procedure coding)	2013**

** Implementation date in the US

ICDs and their clinical modifications

Although there are several clinical modifications of the ICDs, the main ones considered here are the Canadian, Australian and US ones. For ICD-9 and ICD-10, Table 1 shows the different ICD versions, their descriptions and years of implementation. The structure of the different ICD-10 code sets is shown in Table 2. In general, the more characters there are in a coding system, the greater its specificity.

The system followed in ICD-9-CM was to have two volumes of the report for diagnosis coding (volumes 1 and 2) and one volume for procedure coding. This system was adopted in Australia wherein volumes 1 to 2 are for diagnosis coding and volumes 3 to 5 are for procedure coding. The system was changed in the case of ICD-10-CM and ICD-10-PCS. In this case, diagnosis coding was effectively separated from procedure coding. ICD-10-PCS was developed using ideas from current medical practice, anatomy, principles of surgery and biomedical devises and instruments. As was the case with volume 3 of ICD-9-CM, ICD-10-PCS was designed for coding in-patient hospital procedures rather than coding outpatient transactions (American Hospital Association 2008). The structure of ICD-10-PCS is shown in Table 3. In a sense, ICD-10-PCS is a misnomer as it largely independent of ICD-10 (AHIMA 2003). Also, ICD-10-PCS is not linked to any medical scheme system, as is the case with the Australian Classification of Health Interventions (ACHI), which is linked to the Commonwealth Medicare Benefits Schedule (MBS). Unlike the Canadian Classification of Health Interventions (CCI) which has 17 060 codes, ICD-10-PCS has 197 769 codes, which are highly specific and still has room for expansion (Averill et al. 1998). As the implementation date for ICD-1-0-CM/ICD-10-PCS in the US has not yet reached, procedure coding is currently done using Current Procedural Terminology, 4th Edition (CPT-4) and Health Care Common Procedure Coding System (HCPCS) (American Hospital Association 2008).

The ICD code sets (diagnosis and procedure coding) form some of the inputs into the billing process, which is complex and is linked to the health care delivery system. In the US for example, payment by Medicare and Medicaid is linked to Diagnosis Related Groupings (DRGs). The use of DRGs was part of the Prospective Payment System (PPS) that was introduced in the US in 1983 as a cost containment measure. It puts the onus on the health service provider to be more efficient as the payment is based on the estimated need of the patient rather than the amount of service provided. DRGs are used to arrive at relative weights for reimbursement to hospitals for cost of treating patients covered by Medicare. It is arrived at empirically using database of US hospitals and takes into account the patient's diagnoses and procedures, length of stay, discharge status and selected characteristics of the patients (eg age and sex). While the DRGs are empirical weights, the actual payment is based on formula that can be changed. The formula includes a comparison of a hospitals average DRG as compared to the

Table 2
Structure of ICD-10 code sets for diagnosis coding

	Category	Separator	Disease etiology, severity, anatomic site or variety	Extension
ICD-10 (3 characters)	Xnn			
ICD-10 (4 characters)	Xnn	.	n	
ICD-10-AM	Xnn	.	nn	
ICD-10 CA	Xnn	.	nnn	
ICD-10 CM	Xnn	.	nnn	n

Table 3
Structure of ICD-10-PCS

	Section	Body system	Root operation	Body part	Approach	Device	Qualifier
ICD -10 PCS	X	X	X	X	X	X	X

national (case-mix index), actual DRGs. There are factors relating the different components. These factors can be changed in such a way as to give more weight to actual DRG or to give more weight to hospital-specific factors (Murphy-Muth 1987). Subsequent to the original DRG, various variants have been developed over the years to suit different contexts (Moravi-Bottli 2000).

The South African case study

1. The mortality sub-system

In South Africa, the main driver for the adoption of ICD-10 was the National Health System for South Africa (NHIS/SA) committee. The committee was formed in 1994 by the Department of Health (DoH) and started work in 1995. The committee recommended for the adoption of ICD-10 as the national standard for disease and mortality coding. The recommendation was officially approved (DoH 1997). Subsequently, in January 1996, the national statistics office published an ICD-10 manual for use by the South African medical profession (Central Statistical Service 1996). Hundreds of copies were later distributed free of charge to all registered medical practitioners. While the national statistics office was responsive to the government's needs, there was lack of expertise in organization on ICD-10 coding. The disease coders in the Vital Statistics section were professional coders who

had been trained in the ICD-9 system. The coders were initially exposed to self-learning using the free ICD-10 teaching software, TENDON but this did not produce the desired effect. The lead coders were then sent on ICD-10 coding course which they passed successfully. The course was offered by an overseas consulting company which had sent some of its staff members over to South Africa to run the course. In spite of this, the larger vision of the Vital Statistics section was to move to multiple-cause coding using ICD-10 and to adopt automatic methods for the selection of underlying cause of death. For these reasons, the Vital Statistics section invested further on the lead coder, the programmer and two statisticians. With the assistance of donor support, these staff members were sent for training courses and workshops in the United States in 2001 and 2002. The total cost of the training was in the range of US $10 000. The investment was successful and the results are shown in Table 4.

2. The morbidity sub-system

Unlike the mortality sub-system, it took much longer for the transition to ICD-10 to take place in the morbidity sub-system. As mentioned earlier, even though this sector is government-regulated, it is largely private sector driven. More caution is needed here as the financial implication of the transition from ICD-9 to ICD-10 is much larger in this sector as compared to the mortality sector. The first step taken was to separate diagnosis coding from procedure coding and start off with

Table 4
Results of this combined approach

Dimension	Results
Lead coder	Passed ICD-10 training course, gained confidence, developed training manuals and coding guides and was responsible for training new recruits
Programmer	Developed applications in visual basic with ICD-10 look-up tables and coding rules and multiple cause tabulations
Statistician	Prepared a report based on deaths coded in ICD-10 and completed linking ICD-9 to ICD-10 using 1996 data (bridge- coding)
Overall (South Africa)	First African country to publish mortality data using ICD-10 First African country to publish data on multiple causes of death using ICD-10 First African country to automatic coding of causes of death

diagnosis coding. In the transition from ICD-9 to ICD-10 in the diagnosis coding sector, the approach used was to follow a phased process involving the government and several stakeholders in the health industry. In 2001, The Dept of Health and the Council of Medical Schemes set up a Committee on Standardisation of Data and Billing Practices. The committee recommended the need to develop appropriate coding standards for South Africa. Based on this recommendation, the Dept of Health and the Council of Medical Schemes set up a national task team on ICD-10 implementation in 2004. The task team had the following sub-committees: Operational, Technical (with over 60 members from insurance companies, associations and government bodies), Training and finally Confidentiality. The National Task Team made some decisions on the stantardisation of ICD-10. One decision was that while the full five digits of the ICD-10 should be used, the optional fifth digitshould be made mandatory for some conditions. Another decision made was that some South African specific codes should be added to the ICD-10 (after consultation with WHO). Finally, a decision was made to have one master table to have all updates (BHF/DXC ICD-10) (National Task Team on ICD-10 Implementation 2006).

ICD-10 implementation was carried out in phases and was only applicable for those health care providers who dealt with some form of medical diagnosis. The first phase lasted from 1 July 05 to 30 Sept 05 during which time the first group of health care providers were required to adopt ICD-10. The second phase lasted from 10 Oct 05 to 31 Dec 05 during which time the second group of health care providers were required to adopt ICD-10. The third group of health care providers was required to adopt ICD-10 in the third phase, which started on 1 Jan 2006. The implementation of the policy 'no ICD-10 code(s)-no pay' was put into effect in March 2007 (National Task Team on ICD-10 Implementation 2006).

On procedure coding there has been no final decision towards adopting a national standard as was done for diagnosis coding. This is understandable as there are several systems used in South Africa for procedure coding and billing. In the private sector, doctors and hospitals use the Complete CPT for South Africa (CCSA) (Bourne, Hanmer & Heavens 1998). In the public sector, there is the proposed South African National Health Reference Price List (NHPRL) and its related Uniform Patient Fee Schedule (UPFS) system that are used for billing. There is also medicine classification coding system, the National Pharmaceutical Product Interface (NAPPI) used for giving unique codes to medicines and devices as they come into use. Work on DRGs has started in South Africa for some time (Bourne, Hanmer & Heavens 1998). Recently, there has been discussion about the introduction of DRGs as one of the tools for billing. Since 2005, the Private Health Information Standards Committee (PHISC) has tabled a proposal to the government, through the National Health Information System for South Africa (NHIS/SA) committee for the identification and implementation of a standard coding system for South African hospitals using the same Task Team model as was used for diagnosis coding

(PHISC 2005). Subsequently, BHF commissioned a study to investigate adopting a procedural coding system for South Africa. The findings of the report were published in 2007 (Actuarial Solutions at Deloitte and Ferreira 2007). The report argues against the use of NHPRL on the basis that it is not specific, not hierarchical and does not come with the DRG grouper. On the other hand, while CPT was hierarchical and considered to be sufficiently detailed, the report noted that its shortcoming was that it did not come with a DRG grouper. Earlier, PHISC had also judged CPT as being unsuitable for hospital billing. Further, the report argued against South Africa going the route of developing its own coding system and grouper. One of the alternatives for procedural coding is the Canadian procedural system, CCI. The report argued that CCI is not licensed outside Canada. After discussing different procedural/billing systems, the report recommended the use of Australian ACHI for procedural coding in South Africa (Actuarial Solutions at Deloitte and Ferreira 2007).

Discussion

When ICD-10 was adopted in the mortality sub-system, for practical reasons, the coding was limited to three characters. With the adoption of ICD-10 in the morbidity subsystem, the full range of ICD-10 is now used in South Africa. The use of ICD-10 for diagnosis coding instead of adopting one on the existing clinical modifications (for example ICD-10 CM, ICD-10 CA or ICD-10 AM) has both advantages and disadvantages. One advantage of this approach is that it could save on costs. Since South Africa already had ICD-10 license for use in the public sector, it has been suggested that the government could just negotiate with WHO to extend the license to the private sector. The disadvantage of this approach however is that some amount of specificity is lost as the clinical modifications are clearly more detailed than the standard ICD-10.

In the absence of an international standard for procedure coding, different countries use coding systems or combinations of them. Of the different procedural coding systems available, arguably, the ICD-10-PCS is the most detailed, the most 'structurally independent' and most flexible. It can easily accommodate new procedures and devises that would be introduced at some future date. Somehow, this was missed in the South African report, in the section reviewing different procedural coding systems. Partly for this reason, the Australian ACHI was recommended for South Africa to consider when deciding on adopting a procedural coding system.

On the question of reimbursement and billing, there is no definite answer. Several options are being debated. On the whole, the direction that South Africa seems to be moving towards is adapting DRGs to suit the local context. But this is just one step in the full billing process.

From the South African case study discussed here, the following general principles can be drawn: First, the change from ICD-9 to ICD-10 is inevitable if the

health industry in a developing country wants to keep abreast with best practice. Second, changing over from ICD-9 to ICD-10 needs national drivers to move the process. More often, the drivers in the mortality sub-system are different from those in the morbidity sub-system. Third, for most countries, the change over from ICD-9 to ICD-10 started first in the mortality sub-system before being implemented in the morbidity sub-system. In the United States for example, ICD-10 was adopted for mortality statistics since 1999 but up to ten years later, its clinical modification had still not yet been put into use (AHIM 2003) . Fourth, high costs are involved in changing over from one system to another, especially so in the morbidity sub-system. Fifth, there is need for a tool to map one coding system to another; bridge-coding in the mortality sub-system and GEM or crosswalk in the morbidity sub-system (existing ones can be used). Sixth, there is need for legislation (with clearly stated dates) to drive the change from ICD-9 to ICD-10. Seventh, the change-over from ICD-9 to ICD 10 is best implemented in phases. Different sectors of the health industry would come on-board in different phases. For some reluctant role players, if the 'carrot' of 'encouragement and motivation' does not work, then the 'stick' of 'no ICD-10 code, no-pay' will inevitably do the trick. Eight, there are multiple approaches for training coding staff on ICD-10 coding: self-learning packages, on-line courses, sending them for training or bringing the trainers to them. Ninth, for a hospital that has a pool of coders and wants to change from ICD-9 to ICD-10, one approach to consider is to 'train the trainers'. To invest heavily on the most experienced coders and have them train the others. Tenth, it is easier to get consensus in changing the coding system for diagnostic coding than for procedural coding. As such, it is easier to start with the former and use the lessons learnt to work on the latter.

In spite of the success in the South African approach, there are a few problems that can be avoided by other developing countries. At the start of the process, there was no national health standards body to drive the process. In place of it, a task group was formed that drove the process. In several developed countries there is one or more governmental body responsible for overseeing the development and maintenance of coding standards. In the United States, there was a separation between the diagnosis coding and procedure coding. However, the drivers of both sets of codes rested with the government. For diagnosis coding, it was the NCHS, the same group responsible for the transition to ICD-10 in mortality statistics. For procedure coding, it was the Centers for Medicare and Medicaid (CMS). Both groups commissioned out studies to answer research questions but did that within the open process format with technical advisory groups and room for comments. There was collaboration between the two groups as each has a representative in the advisory group of the other. This was not the case in South Africa. It was the BHF that commissioned research on both diagnosis coding and on procedure coding. The final industry tables resides with BHF which is outside the government though cooperates with it.

Conclusion

In a country in which most of the hospitals are owned and run by government and in which hospitals are given lump sums to cover wages and treatment costs, the reimbursement system is different. From the financing point of view, for such systems, there is not much need for DRGs and the payment system associated with them. However, the general trend in health care provisioning in many developing countries is one that is moving away from government financing and provisioning towards one in which the private sector is playing a greater role in provision of health care. The financing is moving towards an insurance-based system. In this approach, the employee takes an insurance policy that is partly or fully covered by the employer, which could be government and private. The more health care financing tends towards an insurance-based system, the more important billing and clinical coding becomes. Hence, developing countries going down the route of privatization of health care will sooner or later be confronted by the need for precise ICD-10 clinical modification and procedural codes. Therefore the sooner they start discussing the transition to ICD-10 the better. The South African case study has shown that, with motivation and commitment, it is possible for developing countries to make the transition to ICD-10 using legislation with some 'teeth' and effective collaboration and partnership with the private sector.

For developing countries wishing to make the transition, the tools and resources are now available and hence the process could be shortened considerably. For a middle-income developing country with a fairly developed health information system and is a looking for a ready-made package, one set of possibilities that could be considered is the following: ICD-10 for mortality coding, ICD-10-CM for diagnosis coding and ICD-10-PCS for procedure coding. No suitable ready-made package is available for reimbursement and billing. Considerable adaptations would be needed to adapt existing ones to suit local needs.

References

Actuarial Solutions at Deloitte and Ferreira 2007, *Investigation into a Procedural Coding System for South Africa.* Board of Healthcare Funders viewed 15 July 2009 <http://www.bhfglobal.com>

AHIMA 2003, Support of Prompt Adoption of ICD-10-CM and ICD-10-PCS Medical Code Set Standards in the United States. AHIMA viewed 20 July 2009 <http://library.ahima.org/>

American Hospital Association 2008, 'Adoption of ICD-10 CM and ICD-10-OCS.' *Regulatory Advisory,* September 2008, viewed 6 June 2009, < http://www.ahacentraloffice.com>

Averill, R, Mullin, R, Steinbeck, B, Goldfield, N, Grant, T. & Butler, R. 1998, *Development of the ICD-10 Procedure Coding System (ICD-10-PCS).* 3M HIS Research Report 1-09, viewed 9 June 2009 <http://www.cms.hhs.gov>

Bourne, DE, Hanmer, LA, and Heavens, KJ, 1998. 'Towards developing a national health information standards framework for South Africa' *International Journal of Medical Informatics* 48 (1998) 29-31.

Butler, R 2007, 'The ICD-10 General Equivalence Mappings: Bridging the Translation Gap from ICD-9' *Journal of AHIMA* 78, no.9 (October 2007): 84-86. Viewed 20 July 2009, < http://library.ahima.org>

Central Statistical Service 1996. ICD-10 *Manual: International Statistical Classification of Diseases and Related Health Problems (Based o The International Statistical Classification of Diseases and Related Health Problems, ICD-tenth revision. Geneva: World Health Organisation, 1992).* No. 09-90-04 (1996), Central Statistical Service, Pretoria

Center for Health Statistics 2004, Guide to Presenting and Using ICD-10 Mortality Data. Center for Health Statistics, viewed 20 July 2009. < http://www.doh.wa.gov>

Chavis, S 2008, Crossing over to ICD-10. *For the Record.* Vol 20, No. 24 viewed 25 May 2009, < http://www.fortherecordmag.com/archives/ftr_111408p20.shtml>

Deloitte Center for Health Solutions 2008, ICD-10: *Turning Regulatory Compliance into Strategic Advantage* Deloitte viewed 20 July 2009, < http://www.deloitte.com>

Department of Health 1997, White Paper for the Transformation of the Health System in South Africa viewed 6 June 2009 < http://www.doh.gov.za/nhis/index.html>

Last, J. (ed.) 1995. *A Dictionary of Epidemiology.* Oxford University Press, New York.

Moravi-Bottoli, S 2000, Diagnosis Related Groups (DRGs): An Estimate of Annual DRG Maintenance in the US. Kommission zur Vergabe von Stipendien zum Zweck einer, viewed 20 July 2009, <http:// http://www.oeph.at>

Moskal, L 2004, 'The Implementation of ICD-10-CA and CCI in Canada'. *IFHRO Congress and AHIMA Convention Proceedings,* October 2004, viewed on 20 July 2009, < http://library.ahima.org>

Murphy-Muth, S 1987, *Medical Records: Management in a Changing Environment.* Aspen Publishers, Rockville

National Task Team on ICD-10 Implementation 2006, *ICD-10 Implementation Review: Januay 2004- October 2006.* Council for Medical Schemes and the Department of Health, viewed 25 May 2009, < http://www.dhsolutions.co.za>

PHISC 2004. Minutes of the PHISC Meeting held on Thursday, 22 July 2004. PHISC viewed on 25 May 2009, < http://www.dhsolutions.co.za/phisc/meetings>

PHISC 2005. Submssion to NHISSA Committee Meeting 16-18 March 2005. PHISC viewed on 25 May 2009, < http://www.dhsolutions.co.za/phisc/meetings>

Prokhorskas, R 2002, *Global Summary of the ICD-10 Implementation Status in 2002.* Meeting of Heads of WHO Collaborating Centres for the Classification of Diseases, Brisbane, 14-19th October 2002, viewed 6 June 2009, < http://www.cdc.gov/nchs/data/icd9/Brisbanetitles.pdf>

Thompson. P & Greenberg, C 2009 *Why Payers Must Embrace ICD-10 and How They Should Prepare for it.* EDS Viewpoint Paper. EDS viewed 25 May 2009 < http://www.eds.com/>

Verma, D & El-Sayed, A 2008. *Principles and Practice of ICD-10 Coding.* Rochak Publishing, Allahabad.