ICD-10-CM/PCS: Transferring Knowledge from ICD-9-CM

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by Jaime N. Sand, MA, RHIT, CCS, and Patt Elison-Bowers, PhD

Abstract

The transition to ICD-10-CM/PCS has expanded educational opportunities for educators and trainers who are taking on the responsibility of training coders on the new system. Coding education currently faces multiple challenges in the areas of how to train the new workforce, what might be the most efficient method of providing that training, how much retraining of the current workforce with ICD-9-CM training will be required, and how to meet the national implementation deadline of 2014 in the most efficacious manner. This research sought to identify if there was a difference between a group of participants with no knowledge of ICD-9-CM and those with some knowledge of ICD-9-CM in scores on an ICD-10-CM/PCS quiz. Results indicate a difference, supporting the idea of knowledge transfer between the systems and providing additional insight into coding education.

Keywords: coding instruction, training, ICD-10-CM/PCS, ICD-9-CM, learning theory

Introduction

With the transition to the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) and the International Classification of Diseases, Tenth Revision, Procedure Coding System (ICD-10-PCS) soon to be initiated, many educators are working to create adequate training programs to reeducate the current coding workforce and to train those new to the profession. The goal of any ICD-10-CM/PCS training program is to produce individuals who are able to demonstrate competency to join the workforce. One challenge in these efforts is in understanding the differences in educating new students as compared to retraining coders who have been working for years in the profession. ICD-10-CM/PCS is different from ICD-9-CM, but are there basic knowledge themes and skills that could be emphasized and transferred to the new format? Knowledge of the existing system and transfer of that knowledge to the new system may be the key in retraining the existing workforce.

Background

ICD-10-CM codes look different than ICD-9-CM codes in that they range from three to seven alphanumeric characters, but the system uses the same hierarchical structure. In addition, ICD-10-CM features laterality, new combination codes, a trimester designation for obstetric codes, a placeholder, a new type of "excludes" note, additional clinical concepts, and code expansion (among other changes). Many of the guidelines are similar, although ICD-10-CM does introduce new guidelines to address changes in the code structures and the expansion of individual chapters.[1] ICD-10-PCS integrates a few common concepts from Volume 3 of ICD-9-CM, such as the use of an index, but the vocabulary, code structure, use of code tables, and guidelines are significantly different.

Pratt and associates describe five perspectives on teaching, including transmission, apprenticeship, developmental, nurturing, and social reform models.[2] These perspectives and the learning theory on which they are based may assist in the creation of an ICD-10-CM/PCS training program. The transmission perspective focuses on delivering content, including the traditional method of lecture, while an apprenticeship method focuses on applied experience in real-life settings. The developmental perspective emphasizes problem solving and critical thinking skills, and the nurturing perspective focuses more on the learner, enhancing self-concept and self-efficacy. Finally, the social reform perspective views education as a way to better society by driving necessary cultural changes.

Each perspective is based on a learning theory that addresses how we, as humans, obtain and retain knowledge. Three main learning theories include behavioral, which is based on a stimulus-response relationship; cognitive, which addresses the brain as a structure that stores, retrieves, transforms, and uses information; and social-cultural, which assumes that knowledge comes from social interaction through active participation with experts in the field. Ausubel's meaningful learning theory relates the learning process to cognitive information processing, where new information is related to the learner's previous knowledge.[3-4]

Current coding education uses a variety of methods from each of the learning theories. These may include memorization via repetition for the clinical foundation and many of the coding guidelines, breaking down the process of coding into steps and applying basic skills such as those used to look up words in a dictionary, the use of vocabulary and visuals, and hands-on coding both in the classroom and at clinical facilities. While all of these learning theories are popular, there is currently no standardized policy for ICD-10-CM/PCS training. To make further recommendations for training programs, this research seeks to explore the following: Is there a difference between a group of participants with no knowledge of ICD-9-CM and those with some knowledge of ICD-9-CM in scores on an ICD-10-CM/PCS quiz?

Methodology

Research was conducted using a convenience sample of respondents, including local health information management (HIM) professionals, HIM graduates, and non-HIM professionals with a variety of levels of ICD-9-CM knowledge, ranging from those who had never heard of it to those who use it regularly in a professional setting. These participants were randomly selected from a HIM state association roster and self-selected from a networking site. Individuals who had attended formal ICD-10-CM/PCS training were excluded. Potential participants were asked to complete an anonymous survey/quiz using an Internet-based survey program. The instrument was developed using researcher-written questions and questions using sample online quizzes for ICD-10-CM and ICD-10-PCS.[5-7] It consisted of 20 multiple-choice and true/false questions (10 on ICD-10-CM and 10 on ICD-10-PCS), in addition to referential questions concerning previous ICD-10-CM/PCS training and previous knowledge of ICD-9-CM. The level of ICD-9-CM knowledge was self-reported on a six-point scale with 0 equal to no experience, 3 equal to some education or training, and 5 equal to professional experience.

Questions were chosen from reputable industry sources that addressed basic concepts of ICD-10-CM/PCS, including questions on organization, structure, guidelines, and definitions that would be expected knowledge for someone who has attended ICD-10-CM/PCS training. The survey link was provided to 120 potential participants via e-mail and a social networking posting and remained open for one week. The research protocol and instrument were approved by the university institutional review board, and participants were asked to give consent prior to beginning the survey.

Results

Of the 39 surveys that were started, 31 responses (25.8 percent response rate) were used in the analysis (the other responses were dropped because of missing data or previous training on ICD-10-CM/PCS). Of the 31 responses, 11 respondents indicated ICD-9-CM knowledge at level 0 (35.5 percent); no respondents indicated level 1; 2 respondents indicated level 2 (6.5 percent); 14 respondents indicated level 3 (45.2 percent); 3 respondents indicated level 4 (9.7 percent); and 1 respondent indicated level 5 (3.2 percent). Because the distribution of responses was not representative of a normal distribution, respondents were divided into two groups: Group 1 consisted of those with no knowledge of ICD-9-CM (as indicated at level 0), and Group 2 consisted of those with some knowledge of ICD-9-CM (as indicated at levels 1–5).

The overall average score on the quiz was 49.2 percent. An independent-samples *t*-test was conducted to determine whether there was a significant mean difference in quiz scores as a function of group membership. The results of this test showed that respondents in Group 1 had significantly lower quiz scores ($M = 8.0909$) than respondents in Group 2 ($M = 10.8000$), $t(29) = -2.620$, $p = .014$ (see Table 1).

Table 1
Mean Differences between Group 1 and Group 2 in Overall ICD-10-CM/PCS Quiz Score

	Mean	SD
Group 1 (*n*=11)	8.0909	1.9212

Group 2 (*n*=20)	10.8000	3.1052

Note: Group 1 = no knowledge of ICD-9-CM (as indicated at level 0); Group 2 = some knowledge of ICD-9-CM (as indicated at levels 1–5).

Subscale scores were created for questions related to ICD-10-CM compared to those related to ICD-10-PCS. The overall average scores were 53.87 percent for ICD-10-CM and 44.52 percent for ICD-10-PCS. A paired-sample *t*-test was conducted to determine whether there was a significant mean difference in subscale quiz scores. The results of this test showed that ICD-10-CM subscale scores ($M = 5.3871$) were significantly higher than ICD-10-PCS subscale scores ($M = 4.4516$), $t(30) = 2.584$, $p = .015$ (see Table 2). Independent-samples *t*-tests were conducted to determine whether there was a significant mean difference in subscale ICD-10-CM and ICD-10-PCS quiz scores as a function of group membership. The results of this test showed that respondents in Group 1 had significantly lower ICD-10-CM subscale scores ($M = 4.0909$) than respondents in Group 2 ($M = 6.1000$), $t(29) = -2.009$, $p = .002$ (see Table 3). However, no statistical significance was found in ICD-10-PCS subscale scores between Group 1 ($M = 4.000$) and Group 2 ($M = 4.7000$), $t(29) = -.7$, $p = .304$ (see Table 4).

Table 2
Mean Differences between ICD-10-CM and ICD-10-PCS Subscale Scores

	Mean	SD
ICD-10-CM	5.3871	1.8381
ICD-10-PCS	4.4516	1.7859

Table 3
Mean Differences between Group 1 and Group 2 in ICD-10-CM Subscale Quiz Score

	Mean	SD
Group 1 (n=11)	4.0909	1.4460
Group 2 (n=20)	6.1000	1.6512

Note: Group 1 = no knowledge of ICD-9-CM (as indicated at level 0); Group 2 = some knowledge of ICD-9-CM (as indicated at levels 1–5).

Table 4
Mean Differences between Group 1 and Group 2 in ICD-10-PCS Subscale Quiz Score

	Mean	SD
Group 1 (n=11)	4.000	1.1832
Group 2 (n=20)	4.700	2.0287

Note: Group 1 = no knowledge of ICD-9-CM (as indicated at level 0); Group 2 = some knowledge of ICD-9-CM (as indicated at levels 1–5).

Of the respondents, those who indicated level 0 knowledge of ICD-9-CM scored an average of 40.5 percent, those who indicated level 2 knowledge scored an average of 55 percent, those who indicated level 3 knowledge scored an average of 53.9 percent, those who indicated level 4 knowledge scored an average of 55 percent, and the one respondent indicating level 5 knowledge scored 50 percent (see Table 5). The combined average for those indicating at least some formal education in

ICD-9-CM (level 3 and up) was 54.9 percent. The highest score, 85 percent, was achieved by a respondent indicating level 4 knowledge, and the lowest score, 25 percent, was achieved by a respondent indicating level 3 knowledge. The two highest-scoring questions, Q10 and Q16, were answered correctly by 84 percent of respondents, and the lowest-scoring questions, Q3 and Q19, were answered correctly by only 16 percent (see Table 6).

Table 5
Average Scores Based on ICD-9-CM Knowledge Level

	Level 0 (*N* = 11)	Level 1 (*N* = 0)	Level 2 (*N* = 2)	Level 3 (*N* = 14)	Level 4 (*N* = 3)	Level 5 (*N* = 1)
Average score (%)	40.5	NA	55	53.9	55	50

Note: Level of ICD-9-CM knowledge was self-reported on a six-point scale with 0 equal to no experience, 3 equal to some education or training, and 5 equal to professional experience. NA = not applicable.

Table 6
Overall Scores by Question

ICD-10-CM		ICD-10-PCS	
Question Number	Score (%)	Question Number	Score (%)
Q3	16[a]	Q13	35
Q4	19	Q14	39
Q5	48	Q15	58
Q6	65	Q16	84[b]
Q7	55	Q17	48
Q8	61	Q18	35
Q9	77	Q19	16[a]
Q10	84[b]	Q20	42
Q11	45	Q21	48
Q12	68	Q22	39

[a]Lowest-scoring questions (Q3 and Q19).
[b]Highest-scoring questions (Q10 and Q16).

Discussion

Although the overall average quiz score was low (49.2 percent), the significant results may refer to the transfer of knowledge of ICD-9-CM to ICD-10-CM/PCS, as discussed in the cognitive learning theory. In this theory, learning occurs when new information is processed, is retained in long-term memory, and warrants retrieval at a later time. Ausubel further describes meaningful learning, in which information is related to the learner's previous knowledge, a process known as encoding. This process makes the information more relevant for the learner, providing a framework to house new knowledge.[8-9] According to this theory, because of previous experience with ICD-9-CM and because those educated in the current system will find more meaning in the new system, participants were able to transfer their knowledge of ICD-9-CM concepts and apply this knowledge to ICD-10-CM/PCS. The higher ICD-10-CM subscale score and statistically significant difference between groups

is further supported by this theory in that ICD-10-CM shares many more similarities with ICD-9-CM than ICD-10-PCS does. Respondents in Group 2, who had at least some knowledge of ICD-9-CM, may have been able to transfer that knowledge to the ICD-10-CM concepts easier than to ICD-10-PCS concepts. For example, in the diabetes coding question (Q12), although the codes look different, the overall method of coding is similar to that used in ICD-9-CM. Furthermore, already having knowledge of ICD-9-CM and some of its shortcomings, this group is probably aware that ICD-10-CM/PCS is intended to be an improvement and thus may have inferred the answers to questions on episode of care (Q6), laterality (Q7), and "Excludes2" notes (Q8). The scores on the ICD-10-PCS portion, however, do not indicate the same level of knowledge transfer. Group 1, those without any ICD-9-CM knowledge, actually scored higher than Group 2 on Q17 and Q19, both of which ask about root operations and include terminology that might be familiar to someone with a background in ICD-9-CM but has slightly different definitions. Respondents may have used their knowledge of test taking after years of school, transferring that knowledge to a new situation. This exam, however, may have been missing key trigger statements to allow all respondents to recall previous knowledge, a factor in the low overall average. The low score on Q3, referring to the organization and structure of ICD-10-CM, may reflect a cognitive perspective in that the only option that would be true of ICD-9-CM was the last one, which was not the correct answer. This perspective may also explain the results on Q19, a question about a root operation, as none of the options lent themselves to a reference to ICD-9-CM. This may explain why the average score of those with some knowledge of ICD-9-CM (54 percent) was not drastically higher than those with no knowledge (40.5 percent).

Social-cultural theory, which extends cognitive learning, assuming that knowledge comes from social interaction through active participation with experts in the field, may also be supported by the statistically significant results.[10-11] The majority of participants in Group 2 (90 percent) indicated having at least some education or training in ICD-9-CM, which would suggest that they are a part of the coding community in some way, thus providing them a context for ICD-10-CM/PCS. Unfortunately, with only one level 5 respondent, this suggestion may be harder to analyze. Furthermore, the survey/quiz was taken individually and out of the context of the normal work setting. A group assessment or more practical application may have resulted in even more significant findings. In addition, the high number of correct answers on Q10, which asks if the United States will be the first to adopt this system, may show a social-cultural perspective in that the overall topic of ICD-10-CM/PCS is talked about in the health information management field and coding community on a regular basis and is a generally well-known concept. Even those in the healthcare community outside of health information management are generally aware of this topic.

Initial rumors of the new code set left many in the coding workforce feeling overwhelmed at the thought of learning a new and vastly different system. However, the results indicate that those with some ICD-9-CM education may not need to be so intimidated. ICD-10-CM/PCS training for current coding professionals should focus on the differences in the new system, while highlighting the familiar concepts. This focus helps to build confidence, reduce fear and anxiety, and expand previous knowledge by building onto already understood concepts. The curriculum for this population should not be structured as though a brand-new system is being taught, as is done in coding certificate and degree programs. Such an approach will take more time to prepare, will require more training time, and may actually create a disconnect between the two systems, making it more challenging for participants to grasp new concepts. The curriculum should instead be tailored toward emphasizing the differences between the two systems, highlighting the areas in which improvements attempt to overcome the shortcomings of ICD-9-CM, and providing ample practice opportunities to apply these new concepts, including side-by-side comparisons of the two systems. This approach will provide the current coding workforce with context for the new knowledge, allowing for easier comprehension, anticipation of the prospect of more specific and comprehensive codes, and self-assurance in their ability to navigate the upcoming transition.

This research does come with several limitations. Respondents (39) came from a small convenience sample. Only one respondent indicated ICD-9-CM knowledge at level 5; the majority (80.6 percent) of respondents indicated level 3 or level 0. Using a closed-answer survey/quiz with only multiple-choice and true/false questions is a limitation because respondents could guess answers and were limited to giving only the knowledge that was requested, even though the respondent may have had additional knowledge of ICD-9-CM and ICD-10-CM/PCS.

This research points to recommendations for efforts to retrain the coding workforce. As indicated by the low average overall score of Group 2 (54 percent), training on ICD-10-CM/PCS is needed by even the most experienced coders. However, those with ICD-9-CM knowledge may grasp new concepts more easily, be more excited about retraining efforts, and require less training time. The authors recommend that training should be provided in a variety of ways, employing various teaching methods to engage students in meaningful learning that enhances and broadens their skills. Experienced coders may respond to the material at a faster pace, or may encounter additional hurdles when having to equilibrate vastly different new knowledge

with their knowledge of the legacy system. Further research is needed to examine which learning theory applies best to coding education and which is most effective.

Conclusion

In light of the above findings, the authors recommend that ICD-10-CM/PCS training use cognitive and social learning theory methods. The data show a statistically significant difference in scores on an ICD-10-CM/PCS quiz between participants without previous knowledge of ICD-9-CM and those with at least some knowledge of ICD-9-CM. Cognitive learning theory attributes this difference to the idea that those with previous experience were able to find meaning in the new system and relate new ideas to previous knowledge. Social learning theory contributes the idea of situated cognition, in which thought is situated within the environment. Those with previous ICD-9-CM knowledge belong to a community that offers context for ICD-10-CM/PCS. Per the transmission perspective, delivery of content may be done via lecture, readings, videos, or other modes. Memory has major implications for learning, and simple memory improvement techniques, including rehearsal and repetition, grouping, mnemonics, and self-questioning, may be helpful. Instruction should be organized with variable practice and allow learners to have self-control of information processing by activating prior knowledge of ICD-9-CM. Activities should encourage the developmental perspective, emphasizing problem solving and critical thinking skills. Application is the key to social learning theory, so activities like apprenticeships, discussions, and learning communities should be used to enhance trainees' self-efficacy.[12-13] Training for the current coding workforce should focus on the differences between ICD-9-CM and ICD-10-CM/PCS, providing context to participants and allowing them to make connections with previous knowledge.

This research is encouraging for the coding workforce, many of whom are currently overwhelmed at the thought of learning an entirely new system. It also supports the industry claim that all who use ICD-9-CM codes need at least some training on ICD-10-CM/PCS, although the amount of training needed may vary by job duties. The need for training reinforces the recommendation that facilities and other institutions should support retraining efforts, both financially and systematically. With the implementation deadline of 2013 already delayed an additional year because of a lack of industry readiness, it is imperative that facilities begin preparing for these retraining efforts soon, in order to be ready for implementation in 2014.[14] These efforts can be supported using the above learning theories, including activities such as guideline and vocabulary review, relation of new concepts to previous knowledge, and practical application of knowledge.

Jaime N. Sand, MA, RHIT, CCS, is an assistant professor of health informatics and information management in the Department of Community and Environmental Health, College of Health Sciences, at Boise State University in Boise, ID.

Patt Elison-Bowers, PhD, is a professor and department chair in the Department of Psychology, College of Social Sciences and Public Affairs, at Boise State University in Boise, ID.

Notes

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