Refereed paper

Prometheus: the implementation of clinical coding schemes in French routine general practice

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ABSTRACT

Background Clinical data are most useful, both at the individual level and collectively, if they are coded according to a standard classification system. However, clinicians often have little motivation to routinely code their consultation data. The main classification systems available in French primary care are the International Classification of Primary Care (ICPC) and the Dictionary of Consultation Results (DCR).

Objective To assess the feasibility of using the ICPC-2 and the DCR for coding health problems managed in routine general practice in France.

Methods Between December 2001 and June 2003, 61 volunteer general practitioners (GPs) from the Paris area prospectively recorded the health problems they managed at consultations, using either the ICPC (36 GPs) or the DCR (25 GPs), for a period of six months. They were equipped with one of three proprietary medical software applications specifically adapted for the study, or one open source utility, interfacing with five other, non-adapted, proprietary software programs. They had a two-day training session, were financially compensated, and were provided with electronic feedback.

Results The mean reported coding time per consultation was 2.5 minutes, but 28 physicians (46%) judged the coding time excessive and reported a maximum acceptable time of 1.2 minutes. Coding consultation data was considered more useful at the collective level (by 95% of physicians) than at the individual practice level (by 69%). Only 34 physicians (56%) expressed willingness to carry on routine coding after the end of the study. Some results differed depending on the classification system used, especially due to confounding factors, as some physicians could have previously used the given system.

Conclusions Coding health problems on a routine basis proved to be feasible. However, this process can be used on a more widespread basis and linked to other management data only if physicians are specially trained and rewarded, and the software incorporates large terminologies mapped with classifications.

Keywords: classification, coding, health problems

Introduction

In addition to entering textual data, standardising, that is, coding, clinical data in electronic patient healthcare records is increasingly acknowledged to be a critical process, in particular in primary care.[1]

After being collected and aggregated into large databases, coded data can be used for auditing, quality improvement, health service planning and research.[2] At the individual practice level, clinical coding is expected to facilitate decision-making systems and record sharing.[3] However, general practitioners (GPs) often prove to be under-motivated to code their consultation data.[4] Following in the footsteps of other countries, French community physicians are increasingly using computers in their daily practice, especially since 1996, when a new regulation required them to implement electronic billing.[5] However, whereas the Read codes are commonly used for coding primary care health problems in the UK,[6] as are the ICPC codes in the Netherlands,[7] routine clinical coding is very limited in France. In 1999, although 94% of computerised participants in a large descriptive study reported entering consultation data, only 13% were coding either diagnoses or procedures.[8]

The main coding systems used throughout Europe are the International Classification of Diseases (ICD-9 or ICD-10, World Health Organization [WHO]), the International Classification of Primary Care (ICPC-1 or ICPC-2, WONCA), and the Read codes (National Health Service [NHS]), which are migrating to the Systematized Nomenclature of Medicine-Clinical Terms (SNOMED-CT, NHS and CAP).[9] In France, the coding systems available are the French translation[10] of the ICPC,[11] the Dictionary of Consultation Results (DCR),[12] developed by the French Society of General Practitioners (SFMG), and the ICD. The main

characteristics of the first two systems, which were designed specifically for primary care, are presented in Table 1. The DCR has been primarily used within a clinical network of around 130 French GPs throughout the country.[13] Until now, the ICPC has been used in France mainly for research purposes.[14]

A number of studies from the UK suggest that a high quality of coding can be achieved, although most of them were conducted with practices selected based on their particular interest or training in morbidity coding.[6] The aim of the Prometheus study was therefore to assess the feasibility of using the ICPC-2 and the DCR for coding health problems managed during routine general practice in France.

Methods

Recruitment of physicians

We initially contacted the 10 250 private GPs registered in the Ile-de-France (Paris) region via a mass-mailing campaign. Of these, 470 expressed an interest in participating in the study. From this group, we selected the 100 physicians who had had computer equipment, including medical software and an internet connection, for the longest time. Between November 2001 and April 2002, 90 of them attended one of four training meetings, focusing on each main type of medical software involved. Because participants were experienced in using a computer, each meeting consisted of a two-day training programme that included targeted sessions on the specific classification system, its practical use along with the corresponding medical software, and the operation for transmitting the coded data to the centralised server.

Table 1 Characteristics of the two classification systems used for classifying health problems managed in general practice: ICPC and DCR

Classification system	ICPC-2	DCR
Type	Classification	Dictionary
Structure	2 axes (17 body systems, 7 components)	1 axis (4 levels of diagnostic specification)
Spectrum	Health problems, reasons for contact, process of care	Health problems (including a few processes of care)
Size	1360 rubrics	296 rubrics
Possible interface	Nomenclatures/thesauri	Not considered
Audience	International (20 languages)	French

Intervention

The participating physicians were asked to classify prospectively all health problems they managed during their consultations over a period of six months, using either the ICPC or the DCR (see above), and to transmit the coded data anonymously via the internet on a daily basis. They were financially compensated for their attendance at the training session and their participation in the study. Between December 2001 and June 2003, 70 general practitioners actually participated in the study, including 61 during the expected full six-month period. The study was spread out over 19 months due to the time required by the three proprietary medical software publishers who agreed to co-operate to adapt their product to the study.

The technical adaptations essentially involved making it possible to extract and export the coded data from the software. Four main medical software programs supported one classification system or the other, including three specially adapted proprietary software applications (Easyprat[®], Eo Médecins[®], Megabaze[®]) and one 'universal' open source utility (Episodus[®]). The latter system, able to classify and extract data from any electronic medical record, was used as an interface with five other proprietary software programs, which were used without any adaptation (see Table 2). These five software programs either did not include the ICPC or the DCR, or their publisher declined to adapt it to the study. Two of the computer systems, Eo Médecins[®] and Episodus[®], incorporated a rudimentary interface terminology, each including a few thousand terms relating to health problems. These terminologies were used for coded data entry via an initial character-matching process followed by split menu selection. In Easyprat[®] and Megabase[®], health problems were coded directly upon entry by split menu selection.

Data storage and feedback

Collected data were anonymously stored in a centralised server, in compliance with the French Committee for Informatics and Freedom (CNIL) guidelines. The server was supported by a Linux operating system, and included a MySQL relational database. A descriptive analysis of the data was performed on a daily basis and fed back onto a website.

Evaluation

Each participating GP completed a paper questionnaire within one month following the end of his or her period of participation in the study. This questionnaire collected information on the way the physicians had been using the classification system involved, their satisfaction with the process, and their expectations regarding the coding of consultation data. A special questionnaire was also sent to the 29 recruited physicians who did not complete the study, including 20 who declined to participate after having been trained and nine who participated for less than six months. Questionnaire responses were entered in an Access[®] database and statistical analyses were performed using SAS[®] software.

Table 2 Distribution of the two classification systems and medical software used

Software	Classification system		Total n (%)
	ICPC-2 n (%)	DCR n (%)	
Easyprat[®]	–	17 (68.0)	17 (27.9)
Eo Médecins[®]	16 (44.4)	–	16 (26.2)
Mégabaze[®]	–	8 (32.0)	8 (13.1)
Episodus[®] (in combination with)	20 (55.6)	–	20 (32.8)
Hellodoc[®]	5 (13.9)		
dBMed[®]	5 (13.9)		
Medigest[®]	4 (11.1)		
Coccilog[®]	1 (2.8)		
Axisanté[®]	5 (13.9)		
Total	36 (59.0)	25 (41.0)	61 (100.0)

Statistical analyses

For qualitative variables, crude comparisons were performed using the Pearson chi-square test, or, if it was not applicable, a Fisher exact test. The Student *t*-test was used for quantitative variables. For stratified comparisons we adjusted the analyses of qualitative variables using the Mantel-Haenszel chi-square test (after applying the Breslow and Day test for homogeneity of the odds ratio to check the absence of interaction), and the analyses of quantitative variables using the Wald test within a bivariate logistical regression model.[15]

Results

Compared with all of the GPs practising in the same region, the physicians who participated fully in the study were less likely to have a special clinical interest or an individual practice, and had 18% less clinical activity (see Table 3).

The physicians using the DCR in the study were more likely to have had prior experience with the classification system than those using ICPC (see Table 4). Compared with ICPC users, the physicians using the DCR reported having coded a higher proportion of their consultations. Also, more DCR users perceived routine coding of the process of care as useful and expressed their willingness to carry on routine coding after the end of the study. After adjustment based on the prior use of the classification system, the associations with the usefulness of routinely coding the process of care and with the willingness to carry on routine coding were no longer significant, and the *P* value for the proportion of coded consultations increased. No difference was found regarding the coding of data for physicians working in a group practice compared with solo practitioners (data not shown). Whereas the mean reported coding time per consultation was 2.5 minutes, the subgroup of physicians judging the coding time excessive estimated the acceptable coding time at 1.2 minutes on average, irrespective of the classification system and of its prior use. Only 22 physicians (36.1%) reported having consulted the website for feedback at least once a month, while 28 (45.9%) logged onto it less frequently and 11 (18.0%) never did.

Table 3 Characteristics of the 61 fully participating physicians as compared with all GPs in the Ile-de-France (Paris) region (source of data: Statistical Department, French National Healthcare Insurance Funds)

	Study participants		Ile-de-France GPs		
	n m	(%) (SD)	*n* m	(%) (SD)	*P*
Gender					
Male	45	(73.8)	7267	(70.9)	0.63
Female	16	(26.2)	2980	(29.1)	
Age (yrs)	48.7	(7.1)	48.0		0.47
Practice time*					
Full time	46	(76.7)	7870	(76.8)	
Part time	14	(23.3)	2377	(23.2)	0.98
Type of activity*					
General practice	54	(90.0)	8407	(82.0)	
Special clinical interest	6	(10.0)	1840	(18.0)	<0.0001
Number of consultations*†	3617	(1522)	4273		0.009
Type of practice*					
Individual	26	(43.3)	7022	(68.5)	
Group	34	(56.7)	3225	(31.5)	<0.0001

For quantitative variables (age, number of consultations), the mean value (m) and the standard deviation in the sample (SD) are presented.
* Data were missing for one physician.
† These data denote the number of consultations performed at the surgery in 2001 by each participating physician and on average by all of the GPs of the Ile-de-France (Paris) region.

Table 4 Conditions of use, satisfaction and expectations regarding the coding of consultation data, according to the classification system used, before and after adjustment based on its prior use

	All participants n (%) m (SD)	ICPC-2 n (%) m (SD)	DCR n (%) m (SD)	P	Adjusted P*
		Participants using			
Prior use of the classification system					
Yes	17 (27.9)	2 (5.6)	15 (60.0)	<0.001	–
No	44 (72.1)	34 (94.4)	10 (40.0)		
Proportion of coded consultations (%)	87.3 (16.8)	81.8 (19.5)	95.3 (6.4)	0.0004	0.01
Use of the classification system					
In real time	50 (82.0)	28 (77.8)	22 (88.0)		
In deferred time	11 (18.0)	8 (22.2)	3 (12.0)	0.50	0.68
Coding time per consultation (mins)	2.5 (1.5)	2.4 (1.5)	2.7 (1.5)	0.43	0.50
Excessive coding time					
Yes	28 (45.9)	19 (52.8)	9 (36.0)		
No	33 (54.1)	17 (47.2)	16 (64.0)	0.20	0.99
If coding time excessive, acceptable coding time per consultation (mins) (n=28)	1.2 (1.0)	1.0 (0.7)	1.5 (1.4)	0.34	0.28
Individual interest of coding consultation data					
Yes	42 (68.9)	22 (61.1)	20 (80.0)		
No	19 (31.1)	14 (38.9)	5 (20.0)	0.12	0.38
Collective interest of coding consultation data					
Yes	58 (95.1)	34 (94.4)	24 (96.0)		
No	3 (4.9)	2 (5.6)	1 (4.0)	0.78	0.65
Usefulness of routinely coding reasons for consultation					
Yes	33 (54.1)	20 (55.6)	13 (52.0)		
No	28 (45.9)	16 (44.4)	12 (48.0)	0.78	0.14
Usefulness of routinely coding health problems					
Yes	47 (77.0)	26 (72.2)	21 (84.0)		
No	14 (23.0)	10 (27.8)	4 (16.0)	0.28	0.71
Usefulness of routinely coding process of care					
Yes	23 (37.7)	8 (22.2)	15 (60.0)		
No	38 (62.3)	28 (77.8)	10 (40.0)	0.003	0.07

Table 4 Continued

	All participants *n* (%) m (SD)	Participants using			
		ICPC-2 *n* (%) m (SD)	DCR *n* (%) m (SD)	*P*	Adjusted *P**
Usefulness of displaying an updated list of health problems[†]					
Yes	55 (90.2)	31 (88.6)	24 (96.0)		
No	5 (8.2)	4 (11.4)	1 (4.0)	0.39	0.86
Willingness to carry on routine coding					
Yes	34 (55.7)	15 (41.7)	19 (76.0)		
No	27 (44.3)	21 (58.3)	6 (24.0)	0.008	0.32

For quantitative variables (age, number of consultations), the mean value (m) and the standard deviation in the sample (SD) are presented.
* Adjustment based on prior use of the classification system.
[†] Data were missing for one physician.

Compared with those who did not complete the study, the physicians who participated fully had more experience in epidemiological or clinical research or in computerised data collection, and more of them were clinical teachers or members of a scientific organisation (see Table 5). Moreover, no difference was found for age, gender, practice time (full time or part time), type of activity, number of consultations and type of practice (data not shown).

The database included 118 734 health problems taken from 55 287 consultations. Among these problems, 42 787 had been classified according to the ICPC and 75 947 according to the DCR. On average, 2.1 health problems were recorded per consultation, with a higher ratio when using the DCR (3.0) rather than the ICPC (1.4) ($P < 0.0001$).

Discussion

Coding health problems is perceived as a time-consuming task

The participating physicians reported a mean time of 2.5 minutes per consultation for coding the managed health problems, that is, 1.2 minutes on average per problem. This time is similar to that observed in a previous French study, where GPs reported a median time of 2 minutes for coding the health problems using ICPC in order to generate hospital referrals.[16] However, our estimate needs to be interpreted with caution, as it is only declarative. It by far exceeds the time of 1.2 minutes per consultation (that is, around half a minute per problem) considered as the acceptable maximum by 46% of the participating physicians, and represents a substantial fraction of the mean consultation time, estimated at 15 minutes in general practice in France.[17] A coding time as short as 30 seconds per problem has been quoted in the literature, but this probably involves highly trained professionals and better integrated systems.[18] Moreover, although classifying data according to a classification system when the data are entered is a time-consuming process, it may save the physician time in the longer term, as it helps to create a more readable summary of patient data. The use of an interface terminology, including common colloquial terms and synonyms, is critical to make the clinical data entered into the record more specific, as well as to shorten the coding process.[19] In this study, only two computer systems included interface terminologies, and these terminologies were of limited extent. The availability of a large interface terminology might be essential for the vast majority of hesitant or even reluctant physicians, if not for those most motivated to use clinical coding. Several such terminologies mapped with the ICPC have been developed worldwide.[20–22] The integration of a large (bilingual) thesaurus mapped with ICPC and ICD is one of the criteria required by the Belgian Ministry of Health for accreditation of medical software.

Table 5 Academic or research involvement of the 61 fully participating physicians compared with the 29 recruited physicians who did not complete the study

	Full participation*		
	Yes n (%)	No n (%)	P
Supervising teacher[†]			
Yes	23 (37.7)	4 (14.3)	
No	38 (62.3)	24 (85.7)	0.03
Member of a scientific organisation[†]			
Yes	27 (44.3)	3 (10.7)	
No	34 (55.7)	25 (89.3)	0.002
Experience in epidemiological studies[†]			
Yes	31 (50.8)	7 (25.0)	
No	30 (49.2)	21 (75.0)	0.02
Experience in clinical trials[†]			
Yes	30 (49.2)	11 (39.3)	
No	31 (50.8)	17 (60.7)	0.38
Experience in a network for computerised data collection[†]			
Yes	24 (39.3)	5 (17.9)	
No	37 (60.7)	23 (82.1)	0.04
Classification system used			
ICPC	36 (59.0)	19 (65.5)	
DCR	25 (41.0)	10 (34.5)	0.55

* The 29 physicians who did not complete the study were those who had been recruited and trained but either never participated in the trial (20) or participated for a period of less than six months (nine).
[†] Data were missing for one physician.

The need for incentives

The 61 general practitioners who completed the study were not fully representative of other GPs in the Paris area, because they were (intentionally) selected based on their higher level of computerisation, and also because they had a lighter clinical workload. Compared with the 29 physicians who were recruited but did not complete the study, they had a more academic profile. They deemed the coding of consultation data to be more useful at the collective level, that is, for public health, than at the individual level, that is, for medical practice. In prioritising the routine coding of consultation data, top priority was given to the health problems managed; this was consistent with their interest in displaying the updated list of the patients' health problems. Finally, 56% expressed some willingness to carry on coding health problems on a routine basis.

These results stress the need to give physicians greater benefit from the process. Firstly, because coding clinical data is time-consuming, it is likely that many French physicians would not comply with coding in the long run without being financially rewarded. Indeed, French community physicians are remunerated according to a fee-for-service system, and traditionally ask to be specifically compensated for any additional task. Secondly, the feedback available online in this exploratory study was very simple, and should be improved in order to meet GPs' expectations. Major improvements could be made by complementing and automatically linking the codes assigned to diagnoses with other management data, such as prescriptions or reasons for encounter. For instance, such linkage can facilitate the collation of markers for quality improvement,[23] and can also be integrated into decision support systems for diagnosis[24] or treatment.[25] In Norway, ICPC has been the official standard for classification of diagnoses in general practice since 1992, and the codes assigned in electronic patient records can be used for billing for services.[26]

Influence of the classification system and confounding factors

Compared with the physicians coding with ICPC, those using the DCR reported coding more systematically and expressed greater willingness to carry on coding on a routine basis. However, we observed that prior use of the classification system was 10 times more frequent with the DCR than with the ICPC, and actually acted as a confounder for these associations. This result is consistent with a training effect in the use of classification systems. Whereas ICPC has been included in the WHO family of international classifications and is increasingly recognised worldwide as a standard classification, it has yet to be used on a widespread basis in France, and very few GPs were using the standard or were even aware of it before this study. Conversely, the DCR benefited from more highly experienced users.[27]

Conclusions

Routine coding of health problems by volunteer GPs, using either the DCR or the ICPC, proved to be feasible. However, the widespread use of the clinical coding process, extended to hesitant or reluctant physicians, is critical for sharing electronic patient healthcare records. This can be achieved only if physicians are specially trained and rewarded (clinically and probably also financially in the French context), and if the software applications incorporate large terminologies mapped with the classification systems in order to make the process less time-consuming.

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CONFLICTS OF INTEREST

None.

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