Investigation of Physicians' Attitudes Concerning the Implementation of International Classification Systems of Diseases as a Precondition for Evidence-based Policy Making

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Abstract

This study investigated the main factors affecting physicians' attitudes toward the implementation of international classification systems of diseases. A cross-sectional study was carried out during September 2010. The sample consisted of 158 physicians older than 24 years who were working in a public hospital and a private hospital in central Greece. A questionnaire was drawn up based on the relevant literature. Results indicated that younger physicians and those who worked in the public hospital were most familiar with classification systems. Female physicians and specialists with more than 10 years of experience (since qualifying as a specialist) were not particularly familiar with these systems (58 percent and 56 percent, respectively). Both having a master's degree and attending conferences or seminars had a remarkable impact on knowledge of these systems. Almost all physicians (98 percent) holding a master's degree or a PhD believed that these systems contribute to the compilation of valid statistical data. The majority of physicians would like to use these systems in the future, as long as they are provided with the appropriate training.

Keywords: International Classification of Diseases, Clinical Modification, knowledge, health statistics, classification system

Introduction

The development of computer technology has substantially increased the need for communication among the various healthcare professions, and as a result, it has become essential to use a common language. This need was the point of departure for the process of classifying the individual terms that make up medical terminologies. As William Farr stated in 1856, "Classification is a method of generalization. Several classifications may, therefore, be used with advantage; and the physician, the pathologist, or the jurist, each from his own point of view, may legitimately classify the diseases and the causes of death in the way that he thinks best, adapted to facilitate his inquiries and to yield general results."[1]

Classification denotes the process of arranging concepts or objects in groups in a standardized fashion, with clear and specific criteria for the use (or absence) of a code for each specific unit. In most

healthcare classifications, codes are arranged in groups so that selecting an individual code will predetermine prognosis, survival, or some other factor.[2]

A classification system of diseases must consist of a restricted number of categories that are mutually exclusive and capable of covering the entire range of ailments. Any specific pathological entity that occurs frequently and is of special significance for public health must have its own separate category. Each disease or ailment must have its own clearly predetermined place in a series of categories.[3]

The most widely disseminated classification systems are the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10), the International Classification of Primary Care, Second Edition (ICPC-2), and the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM), followed by the European Diagnostic Manufacturers Association (EDMA) classification, the Global Medical Device Nomenclature (GMDN), and the International Classification of Health Interventions (ICHI).

Each classification serves different purposes. ICD-10 was developed to allow for systematic analysis of records, as well as interpretation and comparison of mortality and morbidity data.[4] It provides a codification of illnesses, symptoms, and abnormal findings and of social circumstances and external causes leading to injury and illness, as classified by the World Health Organization, using an alphanumeric code consisting of a letter at the beginning and numbers in the second, third, and fourth places.[5] The main goal of the ICPC-2 is the collection and analysis of patient data and clinical activity in the areas of general and family medicine and primary healthcare.[6] ICPC-2 is a biaxial classification system consisting of 17 chapters within one axis and seven components in the other. The chapters correspond to capital letters of the Latin alphabet, and the components are the same for each chapter, comprising terms, or the classification rubrics, which are represented by two-digit numbers from 01 through 99.[7] The ICD-10-CM classification is a clinical modification of ICD-10, and it is used to classify diagnoses, the reasons for visits in all areas of healthcare, and ailments leading to surgical intervention.[8] Its code consists of three to seven characters, wherein the first is alpha, the second is numeric, and the third, fourth, fifth, sixth, and seventh can be alpha or numeric.[9]

The EDMA classification was introduced in order to classify in vitro diagnostic products and correlates a code to each type of product or category of products. According to the EDMA codification, each term is characterized by a code configured as "AA.BB.CC.DD", in which the combination "AA" stands for the category, "BB" for the group, "CC" for the subgroup, and "DD" for the serial number within the hierarchical structure.[10] The GMDN classification system is a unified taxonomy for medical devices. Today it is the most modern and widely accepted nomenclature of its kind. Its codification system consists of five digits, and its classification structure consists of three basic levels within the nomenclature structure.[11] Finally, the aim of the International Classification of Health Interventions (ICHI)is to provide a clearer and more complete record of medical practice no matter where it is carried out, whether in or out of a hospital setting and whether in the public or private sector. The International Classifications of Health Interventions (ICHI) consists of a catalog of medical terms corresponding to specific codes describing medical practices. The medical practice catalog is divided into categories and subcategories according to predetermined rules.[12]

The applications of an integral classification and codification system for medical data cover a wide area. Classifications and codifications are applied in clinical practice, epidemiology, and research, where they are linked to the patient's electronic health record. These systems can also be applied to the codification and classification of primary healthcare services as well as to specialized medical practice. Furthermore, codification and classification systems are applied in the area of healthcare in general, with respect not only to the care provided by physicians, but also to that provided by nurses and other healthcare providers, to which the appropriate classification can and must be applied.[13]

Physicians are called upon to choose from among many different classification systems, each of which are used for different reasons, and our study examines the factors influencing physicians' attitudes in this respect. Some studies have been carried out in the past with respect to the various choices made by

physicians. It is important to note that only a few similar studies were found in the literature, and moreover these studies concerned the codifications for psychiatric diseases.

As for the reasons why physicians choose to use specific systems, studies can be cited. For example, in research carried out in 1994 on a sample of 653 French psychiatrists, it was observed, in a comparison of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-III-R*; not investigated in our study) with ICD-10, that the former was used primarily in scientific studies while the latter was applied more often to patient caregiving.[14] Another study, undertaken from 1993 to 1995 in 10 different countries (six in Europe, two in Asia, one in North Africa, and one in Latin America) on a sample of physicians from 19 psychiatric wards, with the aim of defining the factors influencing the use of the ICD-10 system, pointed to 10 categories that represented 40 percent of all major psychiatric diagnoses, while 32 other categories were never used at all. Because "undefined" categories were also found to have been used, this study showed that the degree of difficulty inherent in a system has an influence on whether it is likely to be used by physicians. This finding emphasized the need for enhanced training as well as for a revision of the system with a view to making it more user friendly.[15]

Finally, in another study carried out in the year 2000 in 66 countries, the factors likely to influence the choice of various classification systems were examined through the use of a questionnaire. The sample consisted of 205 individuals (51 psychiatrists from the United States, 89 from Europe, 26 from Africa and the Middle East, and 39 from Asia and the South Pacific). It was observed that the diagnostic system used most often were ICD-10 and its modifications (86 percent of the psychiatrists applied it to clinical treatment, 72 percent applied it to training, and 63 percent applied it to research). The International Classification of Diseases, Ninth Revision (ICD-9) was applied above all to clinical treatment, according to 27 percent of respondents. Other diagnostic systems were used less often and were used primarily for clinical treatment (51 percent), research (78 percent), and training (60 percent) purposes.[16]

In Greece, a new system was implemented in 2011 concerning the reimbursement of hospitals based on diagnosis-related groups (DRGs). The reimbursement per patient is determined according to the ICD-10 category of the disease and the type of medical intervention. According to an encyclical letter edited by the General Secretary of the Ministry of Health, in 2011 each hospital was obliged to record, both in the discharge note and on the invoice sent to the social security funds, the discharge diagnosis according to the ICD-10 system. Therefore, it is essential for physicians to be familiar with the use of the ICD-10 system in order to classify (in collaboration with administrative personnel) each patient encounter to the appropriate DRG.

Moreover, these classification systems play a significant role in evidence-based health policy because they make it possible to map the demand side of healthcare in a consistent way. By implementing these systems, a country gains the ability to report reliable statistics about discharges in each disease category and also about the prevalence of diseases in the entire country. If each patient's diagnosis is classified into an ICD-10 category, then it is easy for a national statistical authority to create a reliable epidemiological database that can be used for national and international diachronic comparisons. Keeping these data in mind, policy makers may set the priorities of the healthcare sector in a systematic way.

Methods

In order to examine the attitudes of physicians working in central Greece with respect to the use of international classification systems for diseases and the clinical modification ICD-10-CM, a questionnaire was drawn up. (ICD-10-CM was included in the study because the study was carried out in September 2010. In 2011, the Ministry of Health mandated the use of ICD-10.) The sample selection procedure chosen was convenience sampling, a type of nonprobability sampling according to which each member of a population is not equally likely to be included in the sample and is included in the study when he or she happens to be "in the right place at the right time."[17] The questionnaire was addressed to physicians over 24 years of age working at a public or private hospital in central Greece. This area was chosen because it includes the country's only university department of biomedical informatics. Because of this, it was supposed that physicians in this area would be much more familiar with these classification systems than physicians in other areas of the country. The content validity of the questionnaire was tested on the basis

of a pilot study in which physicians at a general hospital ($N = 28$) responded to the questionnaire. The internal consistency of the questionnaire was assessed by using the Cronbach reliability coefficient, which was found to be 0.7. After the pilot study was completed, the main study was carried out at the aforementioned healthcare units during September 2010, with a response rate of 76 percent (158 out of 207). The questionnaire included two parts. The first part was related to the international classification systems (ICD-10, ICD-10-CM, ICPC-2, and ICD-9, which was included because, as the former version of ICD-10, it was expected to be widely known) and examined the respondents' knowledge about the classification systems, information sources, knowledge of existing Greek translations of the systems, and the use (or non-use) of classification systems, as well as the reasons for using them or not using them. The second part dealt with the demographic and social aspects of the study population.

The questionnaire consisted mainly of closed-ended questions, in which the respondents chose from a list of possible answer choices. However, it also included open-ended questions in which respondents provided their own answer (e.g., their area of specialization). Continuous variables are presented as mean (± standard deviation), while categorical variables are given as absolute and relative frequencies. The normality of continuous variables was checked with the Kolmogorov-Smirnov test and histograms. Statistical analysis included the chi-square test, the *t*-test for independent samples, the Mann-Whitney test, and multivariate logistic regression analysis. In the case of logistic regression, the dependent variables were knowledge of classification systems and future use of these systems, while the model applied was that of stepwise regression with backward elimination of variables. In logistic regression models, we calculated odds ratios, 95 percent confidence intervals for odds ratios, and *p*-values. Statistical significance was determined to be equal to 0.05. Data analysis was performed with SPSS version 18.0.

Results

Table 1 shows the demographic characteristics of the sample. The mean age was 43 years (±10.7). The mean numbers of Greek and international conferences attended were 8 (±5.7) and 4 (±3.7), respectively.

Table 2 and Table 3 show data with respect to the physicians' knowledge of the classification systems as well as their use thereof, while Table 4 cites the statistically significant factors influencing knowledge of classification systems in correlation with their demographic and social characteristics. Table 2 also includes the results concerning the knowledge of physicians about the translations into Greek of the ICD-10 and ICPC-2 systems conducted by the Ministry of Health.

The majority of physicians stated that they believe that classification systems of diseases contribute to drawing up valid statistical healthcare data on a national level, and that provided they were given appropriate training, they would like to use one of the existing classification systems in the future. Furthermore, most of these physicians were not using these classification systems because they believed they were difficult to apply.

In bivariate analysis, we found that physicians who worked in the public hospital ($\chi^2 = 7$, $p = 0.008$), younger physicians ($t = 4.9$, $p < 0.001$), male physicians ($\chi^2 = 2.856$, $p = 0.091$), specialists ($\chi^2 = 18.2$, $p < 0.001$), physicians with an additional postgraduate degree ($\chi^2 = 9$, $p = 0.003$), and physicians who had attended a statistically significant higher number of Greek and international conferences ($U = 1{,}700$, $p < 0.001$, and $U = 2{,}204$, $p = 0.001$, respectively) had greater knowledge of classification systems (Table 4).

Table 5 shows that physicians in public hospitals ($\chi^2 = 5.823$, $p = 0.016$), younger physicians ($t = 3.7$, $p < 0.001$), specialized physicians ($\chi^2 = 10.6$, $p = 0.005$), physicians with an additional postgraduate degree ($\chi^2 = 11.3$, $p = 0.001$), and physicians having attended a statistically significant higher number of Greek conferences ($U = 972$, $p = 0.002$) believed that classification systems for diseases help them draw up valid statistical healthcare data.

Table 6 shows that younger physicians ($t = 4.6$, $p < 0.001$), physicians with an additional postgraduate degree ($\chi^2 = 2.9$, $p = 0.09$), and physicians having attended a statistically significant higher number of Greek conferences ($U = 1{,}270$, $p = 0.006$) were those who would most like to apply classification systems in the future.

Table 7 and Table 8 present the results of multivariate logistic regression. In Table 7 and Table 8, the dependent variable was the knowledge of classification systems (yes = 1, no = 0) and the future use of these systems (yes = 1, no = 0), respectively. The independent variable found to be statistically significant was, in both cases, age, which explained 44 percent and 33.1 percent of the variability of the dependent variable ($R^2 = 0.44$ and $R^2 = 0.33$), respectively. Younger physicians had greater knowledge of classification systems and would most like to apply classification systems in the future.

Discussion

The present study confirms that of the population studied, 48 percent of physicians know nothing whatsoever about any of the classification systems. Of those who are aware of at least one, most physicians know of ICD-10 (42 percent). Of the physicians who are familiar with classification systems, most of them were informed about these during the course of their academic training (33 percent), followed by those who informed themselves at conferences, seminars, and workshops (28 percent).

Furthermore, of all physicians responding to the questionnaire, 85 percent answered that they believed that classification systems for diseases contribute to the drawing up of valid statistical data in the healthcare sector on a national level. Concerning the demographic characteristics of physicians who declared this attitude, it is interesting that they are mainly physicians working in public hospitals, younger physicians, specialized physicians, physicians with an additional postgraduate degree (master's degree and/or PhD), and physicians having attended a statistically significant higher number of Greek conferences.

Finally, we observed that the overwhelming majority of physicians (88 percent) are not aware of the fact that the Greek Ministry of Health has translated ICD-10 and ICPC-2 into Greek.

Most of the sample physicians (93 percent) do not use a classification system, and in most cases (49 percent) this is because they believe the systems are difficult to apply. This belief may be related to the fact that 48.1 percent of the questioned physicians declared that they had no information about these systems. On the other hand, only a small percentage (5 percent) believed that the classifications serve no purpose. Of the physicians using no classification system, 78.4 percent replied that they would like to use a classification system in the future if they were provided with appropriate training.

Furthermore, of the 10 physicians who stated that they used one of these systems, most of them used it for research purposes (90 percent), followed by patient treatment and training (40 percent each). These results correspond to those of similar studies. One study, which was carried out in 1994 in France with a sample of 653 psychiatrists, reports that classification systems were used mainly for the purpose of research studies and treatment of patients.[18] In another study, carried out in the year 2000 on a sample of psychiatrists from a total of 66 countries, it was found that the majority of physicians used these systems for research and training purposes, followed by clinical healthcare with a much smaller percentage.[19]

Finally, a remarkable percentage of physicians questioned who actually use a classification system stated that they know the codification rules of the ICD-10 classification very well (40 percent), while the same percentage of this group stated that they know very little about ICPC-2 classification. Finally, 70 percent of the physicians who use classification systems would like the translations of classification terms to be improved in the future in order to make them easier to use.

In general, the determining factor most likely connected to the attitude of healthcare professionals with respect to international classification models for diseases and surgical interventions seem to be directly linked to age. Increased age of physicians was associated with decreased knowledge of these systems and decreased intention to use them in the future.

The fact, that at present, approximately half of the sample physicians know nothing about these classifications systems can be considered an obstacle both for the appropriate implementation of the DRG reimbursement system and for the development of a reliable epidemiological database. Consequently, these facts present problems for health policymaking.

On the other hand, we found that most of the sample physicians would like to use one of the existing classification systems in the future, provided that they are granted access to appropriate training. In

addition, we observed that older physicians would prefer not to use classification systems, whereas physicians who had attended a fair number of conferences are interested in doing so. These observations point toward the need for additional training and education of physicians on the benefits and use of disease classification systems.

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Notes

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Table 1

Demographic Characteristics of the Sample

	N	**%**
Gender		
Male	106	67.1
Female	52	32.9
Hospital		
Public	117	74.1
Private	41	25.9
Area of specialization		
Pathological specialties	87	55.1
Surgical specialties	57	36.1
Laboratory specialties	14	8.9
Category of professional experience		
Specialized (under training in order to obtain a specialization)	33	20.9
Specialist (<10 years of experience)	41	25.9
Specialist (≥10 years of experience)	84	53.2
Type of graduate degree (in addition to the basic medical degree)		
None	104	65.8
Master's degree	28	17.7
PhD	12	7.6
Master's degree and PhD	14	8.9
Location of medical school		
Greece	93	58.9
European country	59	37.3
Other countries	6	3.8

Table 2

Knowledge of Classification Systems of Diseases

	N	**%**
Knowledge of system		
ICD-10 (and ICD-10-CM)	67	42.4
ICPC-2	8	5.1
ICD-9	43	27.2
None	76	48.1
Source of information about the classification systems		
Academic training	52	32.9
Conferences/seminars and workshops	44	27.8
No information	75	47.5
Knowledge of the existing translations in Greek		
ICD-10 yes, ICPC-2 yes	7	4.4
ICD-10 yes, ICPC-2 no	12	7.6
ICD-10 no, ICPC-2 no	139	88
Use of systems[a,b]		
ICD-10	6	3.8
ICD-10-CM	3	1.9
ICD-9	4	2.5
None	147	93.0

Note: Respondents could choose more than one answer.

[a] None one of the physicians answered No for ICD-10 and Yes for ICPC-2

[b] The question concerning the use of the classification systems also included ICPC-2. However, none of the physicians used this system.

Table 3

Use of Classification Systems of Diseases (*N* = 10)

	N	**%**
Reasons for use		
Patient treatment/clinical treatment	4	40
Teaching/training	4	40
Research	9	90
Knowledge of classification rules of ICD-10		
Not at all	3	30
Very little	1	10
Average	0	0
Enough	2	20
Yes, very well	4	40
Knowledge of classification rules of ICPC-2		
Not at all	3	30
Very little	4	40
Average	1	10
Enough	0	0
Yes, very well	2	20
Knowledge of classification rules of ICD-9		
Not at all	3	30
Very little	4	40
Average	2	20
Enough	1	10
Yes, very well	0	0
Future changes		
Improving the Greek translations	7	70
Improving the specialization of the system	3	30
Improving training of physicians	3	30
Development and provision of a usage guide	3	30

Note: We decided to investigate only these three systems, which are more widely known.

Table 4

Bivariate Analysis between Knowledge of Classification Systems and Demographic Characteristics of Physicians

	Knowledge of Classification Systems		
	No	**Yes**	
	***N* (%)**	***N* (%)**	***p*-value**
Workplace			0.008
Public hospital	49 (41.9)	68 (58.1)	
Private hospital	27 (65.9)	14 (34.1)	
Gender			0.091
Male	46 (43.4)	60 (56.6)	
Female	30 (57.7)	22 (42.3)	
Category of professional experience			<0.001
Specialized (under training in order to obtain a specialiazation)	5 (15.2)	28 (84.8)	
Specialist (<10 years of experience)	24 (58.5)	17 (41.5)	
Specialist (≥10 years of experience)	47 (56)	37 (44)	
Type of graduate degree (in addition to the basic medical degree)			0.003
None	59 (56.7)	45 (43.3)	
Master's degree or PhD or both	17 (31.5)	37 (68.5)	
Age	46.8 (9.55)*	39.2 (10.41)*	<0.001
Number of Greek conferences	5 (5)**	10 (8)**	<0.001
Number of international conferences	2 (3)**	4 (4)**	0.001

* Values are expressed as mean (standard deviation).

** Values are expressed as median (interquartile range).

Table 5

Bivariate Analysis between Positive Attitude Concerning the Contribution of Classification Systems to Drawing up Valid Statistical Data at a National Level and Demographic Characteristics of Physicians

	Drawing Up Valid Statistical Data at a National Level		
	No *N* **(%)**	**Yes** *N* **(%)**	***p*-value**
Workplace			0.016
Public hospital	13 (11.1)	104 (88.9)	
Private hospital	11 (26.8)	30 (73.2)	
Category of professional experience			0.005
Specialized (under training in order to obtain a specialization)	1 (3)	32 (97)	
Specialist (<10 years of experience)	3 (7.3)	38 (92.7)	
Specialist (≥10 years of experience)	20 (23.8)	64 (76.2)	
Type of graduate degree (in addition to the basic medical degree)			0.001
None	23 (22.1)	81 (77.9)	
Master's degree or PhD or both	1 (1.9)	53 (98.1)	
Age	50.4 (8.22)*	41.6 (10.58)*	<0.001
Number of Greek conferences	5 (3)**	8 (5)**	0.002
Number of international conferences	1.5 (5)**	3 (4)**	0.103

* Values are expressed as mean (standard deviation).

** Values are expressed as median (interquartile range).

Table 6

Bivariate Analysis between Future Use of Classifications Systems and Demographic Characteristics of Physicians

	Future Use of These Systems		
	No	**Yes**	
	***N* (%)**	***N* (%)**	***p*-value**
Type of graduate degree (in addition to the basic medical degree)			0.089
None	26 (25.5)	76 (74.5)	
Master's degree or PhD or both	6 (13)	40 (87)	
Age	50.1 (8.88)*	40.81 (10.46)*	<0.001
Number of Greek conferences	5 (2)**	8 (6)**	0.006

* Values are expressed as mean (standard deviation).

** Values are expressed as median (interquartile range).

Table 7

Logistic Regression Analysis with Knowledge of Systems as Dependent Variable

Independent Variable	OR	95% CI of OR	*p*-value
Age			
25–35 (reference category)			
36–45	0.663	0.166–2.646	0.561
46–55	0.185	0.036–0.961	0.045
56–65	0.010	0.019–0.411	0.004

Note: OR, odds ratio; CI, confidence interval.

Table 8

Logistic Regression Analysis with Future Use of Systems as Dependent Variable

Independent Variable	OR	95% CI of OR	*p*-value
Age			
25–35 (reference category)			
36–45	1.180	0.200–6.943	0.855
46–55	0.138	0.040–0.476	0.002
56–65	0.072	0.019–0.276	0.000

Note: OR, odds ratio; CI, confidence interval.