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International Primary Care Classifications: the Effect of Fifteen Years of Evolution

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To better understand the development of primary care classifications over the past 15 years, 10 primary care databases have been retrospectively analysed using the structure of the International Classification of Primary Care (ICPC) as the basis. All datasets were based on routine data collection using different classification systems by several family physicians during all encounters with their patients over considerable periods of time, in most cases one year. The prevalences or the rates of the available diagnostic—and reason for encounter—classes were distributed over four frequencies. With a few exceptions the distribution of diagnostic labels referring to common diseases is surprisingly similar. The use of ICPC however results in a quantum leap in the use of symptom and complaint diagnoses. Because of this shift primary care physicians now have available a classification with 400 diagnostic classes used with a prevalence of $\geqslant 1/1000$ patient-years or per 1000 visiting patients per year. The classification of reasons for encounter allows the physician to identify over 300 reasons for encounter used $\geqslant 1/1000$ patient years or per 1000 visiting patients per year. Family physicians have been successful in the development of new primary care classifications. Rag bag rubrics which are the result of the structure of ICPC are used relatively often and deserve more attention from primary care taxonomers.

INTRODUCTION

In the 1970s primary care practice underwent cathartic change. Its most extreme manifestation was in North America, where the discipline of General Practice, which had been in decline for 20 years, finally disappeared and was replaced both in society and in some medical schools by the new specialty of Family Medicine.[1]

Elsewhere, especially in the Northwest of Europe, Australia and New Zealand, general practice remained in being, but new demands were also placed upon the areas of research and education which required more and better information on the morbidity of the populations under the care of practicing generalists. Until then, research in community based practice settings had been limited primarily to general practitioners in the UK, the Netherlands, Denmark and Norway. Mainly through these efforts, by the early 1970s there was sufficient international experience in the methods of data collection in general practice and in the use of classification systems based on the various iterations of the International Classification of Disease (ICD) to allow new and more effective morbidity studies to be undertaken. The great need for culture and language-specific data on the demand for care from populations served by family physicians led to a virtual explosion of information in the 15 years between 1975 and 1990 derived from national or large regional morbidity surveys in several countries.[2-10]

During this period of time the 8th and 9th iterations of ICD were extant: the primary care classifications based on these had evolved to meet the manifold deficiencies identified in the parent classifications.[11-20] It became obvious that the results of the available studies, while broadly equivalent, could only be compared insofar as the main similarities in the content of family practice in several countries could be established, but the characteristic differences could not be sufficiently interpreted.[21-24]

THE INTERNATIONAL CLASSIFICATION OF PRIMARY CARE (ICPC)

WONCA (World Organization of Family Doctors) provides the international forum to define the frame of reference of general practice/family medicine, which for the purpose of this paper is used synonymously with primary care. It has developed and field tested

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several primary care classifications, resulting in the International Classification of Health Problems in Primary Care-2-Defined (ICHPPC-2—Defined) and the International Classification of Process in Primary Care (IC-Process-PC), which together with the Reason for Encounter Classification form the basis of ICPC.[11-14,25] (Figure 1) ICPC is a system developed to classify simultaneously three of the four elements of the problem oriented construct - SOAP:

S - the (subjective) experience by the patient of the problem, the patient's demand for care and reason for encounter as this is clarified by the provider.
O - Objective findings—these cannot be classified with ICPC.
A - the assessment or diagnostic interpretation of the patient's problem by the provider.
P - the process of care, representing the diagnostic and therapeutic interventions.

ICPC is a biaxial classification system based on chapters and components (Figure 1). It uses three digit alphanumeric codes with mnemonic qualities, facilitating its day to day use. It can be used for decentralized coding with hand-written records as well as for central coding in a computerized sytem.

Seventeen chapters each with an alpha code, form one axis, while seven components with rubrics bearing a two-digit numeric code form the second axis. The system was strongly influenced by experiences with other classifications (Figure 2).

Component 1, Symptoms and Complaints, drew upon the experience of the National Ambulatory Medical Care Survey/Reason for Visit Classification (NAMCS/RVC) and on the results of the field trial of the Reason for Encounter Classification (RFEC), which has now been replaced by ICPC.[9,10,19]

Components 2-6 contain the main rubrics of the IC-Process-PC and are identical throughout the chapters.[25] These components also reflect an important element in the distribution of reasons for encounter because patients often formulate these in the form of a request for a certain diagnostic or therapeutic procedure.

The classification in chapters P (psychological) and Z (social) of psychological and social problems, drew upon the work by the Triaxial Classification group of the Mental Health Division of WHO.[26]

The rubrics of ICHPPC-2-Defined with inclusion criteria are virtually all included as such.[13] In ICPC, however, morphology and localization (body systems) take precedence over aetiology, so that infectious diseases, neoplasms, injuries and congenital abnormalities, do not form separate chapters as in ICD-9 and ICHPPC-2, but are represented in component 7 of each chapter.

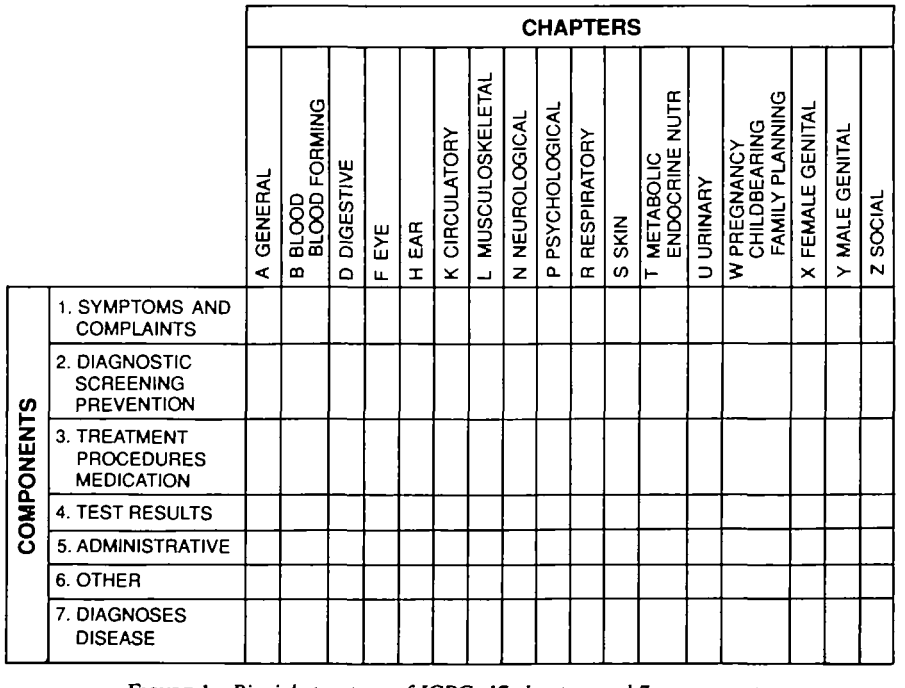

FIGURE 1 *Biaxial structure of ICPC: 17 chapters and 7 components*

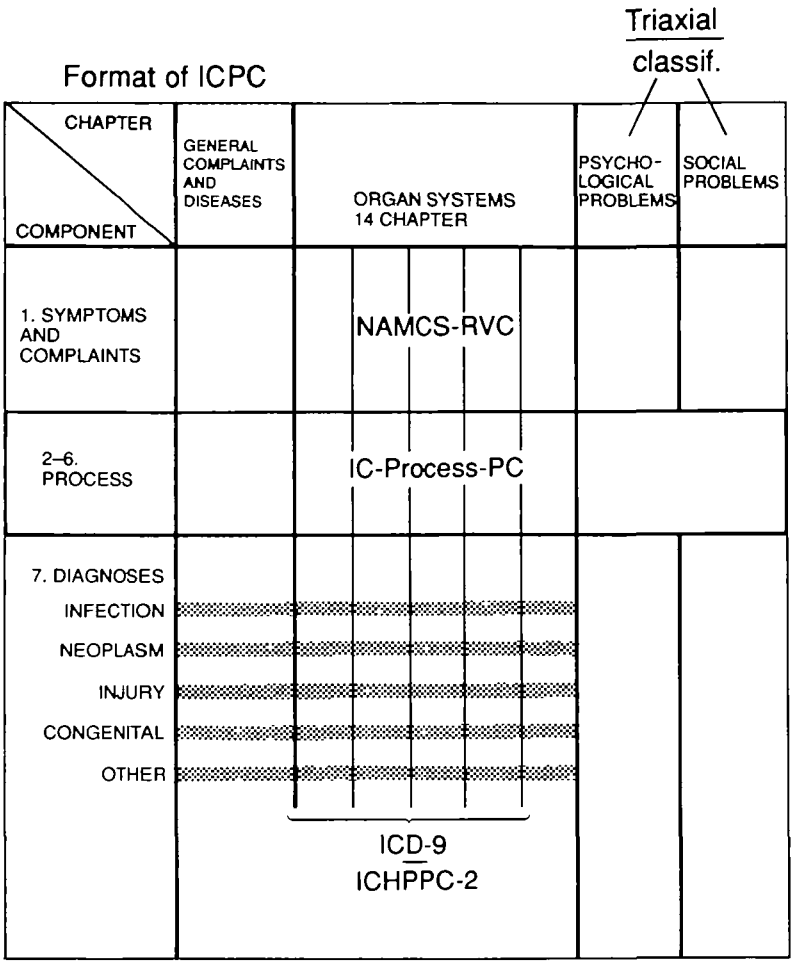

FIGURE 2 *Relation of ICPC with other systems*

DIAGNOSTIC CATEGORIES

During the development of ICPC much attention has been given to the fact that family physicians use several different diagnostic categories (Figure 3).[24] Pathological and pathophysiological diagnoses form the backbone of the medical curriculum and are given the highest professional authority. Because they lack an undisputable pathological or aetiological basis, nosological diagnoses depend on medical consensus. Consequently they have an intermediate position between 'established' diseases and the other diagnostic categories in Figure 3. Nosological diagnoses are often based on combinations of symptoms and complaints (e.g., neuro-vegetative imbalance, premenstrual tension syndrome, post-natal depression, irritable bowel syndrome fibromyalgia syndrome, minimal brain damage, somatization disorder and many other psychiatric diagnoses). In due course nosological diagnoses are expected to be included in a 'higher'

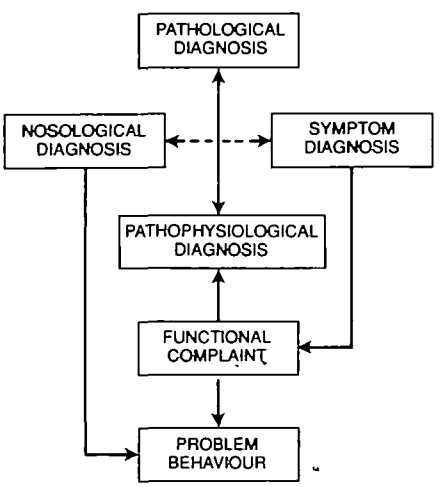

FIGURE 3 *Diagnostic categories used in family practice*

category when aetiology and/or pathology are established. Occasionally, nosological diagnoses cease to be considered as diseases (e.g. neurosis, homosexuality) and then are discarded as medical labels.

Symptom diagnoses (e.g. headache, neck pain, fever, tiredness) are very important in primary care: they are often managed at the symptom level over the whole course of an episode without a 'higher' diagnosis being established. This also applies to functional complaints based on bodily sensations related to emotions, such as muscle tensions, abdominal sensations and palpitations. These are presented to the primary care physician as a demand for care but cannot be labelled as pathological entities. Emotions *per se* are not medical entities, a fact which also applies to most problems of daily life. Most emotions and problems are never presented to a physician and are not considered 'diseases'. However, psychological and social problems which are dealt with during a patient–physician encounter as a problem of life (problem behavior) and not as a disease, form an integral part of the daily work in family practice and have to be included in a classification system developed for primary care.[26]

It is evident that treatment goals can differ considerably between the different diagnostic categories in Figure 3, and therefore the expected effects of interventions will vary. A good classificiation system will take these differences into account.

Reliability of diagnostic data

The reliability of the data in morbidity studies in family practice, when such information is available, is surprisingly high (Table 1). The fact that the recording physicians had an explicit interest in the quality of the data and were mostly experienced recorders contributed to this. The fact that the studies were limited in time also probably enhanced the preciseness of the coding.

The reliability of morbidity data is generally disappointingly low.[27-30] The coding of mortality on death certificates is notoriously inaccurate: cancer registries sometimes miss 50% of all known cases in a certain area.[31] Multiple morbidity is a common complicating factor in studies focusing on underlying diseases. Studies of autopsies indicate that the diagnosis of major conditions such as arteriosclerosis or cancer proves to be correct (sensitivity) in only 80–90% of cases, while 40–50% of those conditions found by autopsy were not diagnosed while the patient was still alive (specificity).[32-35]

TABLE 1 *Morbidity studies in family practice, published since 1975*

Study	Data collection	Classification system	Patient years	Episodes/ encounters/ RFE's	False(F)/ missing(M) codes
Virginia Study USA[2]	1973–1975	H-ICDA (ICD-8)	176000 estimated	526196 encounters	
Barbados[3]	1977–1978	ICHPPC-1	35143 visitors	53094 encounters	5.2% F
CMR[4] Netherlands	1978–1982	MECS (mod.E-list)	56515 on list	131623 episodes	
Australia[5]	1978–1982 +1985	ICHPPC-2 (mod.)	36222 estimated		
Monitoring[6] Netherlands	1979–1981	ICHPPC-2 (mod.)	33726 on list	98143 episodes	2.5% F 1.0% M
III-Morb.[7] Survey, UK	1981–1982	RCGP Classif.	307803 on list	667933 episodes	3.6% F 5.7% M
Transition[8] Diagnoses Netherlands	1985–1989	ICPC + ICHPPC-2 Defined	40796 on list	110444 episodes	3.9% F 2.6% M
NAMCS[9] RFV, USA	1977–1978	NAMCS-RFV	384850 estimated	1154550 encounters	
RFE[10] Field trial	1983	RFEC	20000 estimated	90497 RFE's	
Transition[8] RFE, Netherlands	1985–1989	ICPC	40796 on list	123808 RFE's	2.1% F 2.6% M

Error rates of 20–30% have been commonly reported for hospital discharge data.[36–38] The use of four-digit ICD codes instead of three-digit codes as might be expected results in more errors.[39,40] The use of the Standard Nomenclature of Pathology (SNOP) or the Standard Nomenclature of Medicine (SNOMED) insufficiently diminishes the numbers of errors in hospital data. Hall found 10–16% errors, of which 75% were irretrievable.[41] Enlander detected 24% of errors in the use of SNOMED.[42]

Psychiatrists have been very active over the past several years in trying to improve the quality of diagnostic data for their specialty. DSM-III is pivotal, but both the use of vignettes and the analysis of clinical data indicate that a 25–30% error rate in the assignment of codes is not unusual in morbidity studies in the field of psychiatry.[43,44]

Anderson, who also used vignettes, concluded in his study with routine data that in family practice under optimal conditions 92–97% of the codes were reliable.[45] Jick *et al.* confirmed that the clinical information on the computer records of general practitioners from the UK was satisfactory for many clinical studies.[46] This observation is very similar to the data presented in Table 1. However, the effect of even a low error rate of 5% is considerable for diseases with a low prevalence, and it is unlikely that errors are randomly distributed over all available codes.

Diagnostic data from the Transition Project illustrate this fact effectively (Table 2). The computer system used for data entry in this project rejected all non-existing ICPC codes to allow correction, but they were well documented.[8] Of all ICPC codes used, 0.3% did not exist, and several of these codes were close to an often used code. This single source of error created prevalences of 0.5–1/1000 patients on the list per year. In addition to other sources of error this results in the rule of thumb that prevalences established in a routine data base below 0.5/1000 patients/year must be discarded as unreliable. The range between 0.5 and 1/1000 patients/year can be considered to have dubious accuracy. Between 1 and 5/1000 patient-years, prevalence data are informative, especially when supported by a minimum data set giving additional information such as sex/age distributions or interventions which support the clinical relevance of the data. Prevalences above 5/1000 patient-years represent the most solid basis for primary care epidemiology, coinciding with common diseases.

TABLE 2 *Distribution of non existing codes (0.3% of all codes) compared with low prevalence diagnoses in 40 796 patient-years*

X89 premenstrual tension syndrome	41
K97 (non existing—close to K96)	41
Y07 impotence non psycholog.	32
R79 (non existing—close to R78)	32
A81 multiple. trauma/internal injuries	18
N78 (non existing-close to N79)	18

FOUR QUESTIONS

In order to understand better the development of primary care classifications over the past 15 years, the following four questions have been posed: How well have the available primary care classification systems over the years succeeded in : (1) producing frequency distributions of diseases and health problems, classified in morbidity studies in family practice?; (2) evolving in the direction of symptom and complaint diagnoses, including social and psychological problems, which are considered characteristic of primary care practice?; (3) introducing a classification of reasons for encounter capable of producing demands for care, classified in morbidity studies in family practice?; (4) dealing with the 'rag bag' problem which is an integral part of the construction of ICD compatible classification systems?

METHODS

To address these questions the data from 10 morbidity studies published since 1975 were analysed, using the structure of the International Classification of Primary Care (ICPC) as the basis for their comparison. This enabled discrimination between two important diagnostic categories: the symptom and complaint diagnoses in the first component and the 'diseases' in the seventh component. The decision whether to include a label in the analysis or to discard it was based on the structure of ICPC (Figure 1). All labels included in the symptom and complaint component of ICPC (Component 1) were included and designated as 'symptoms and complaints'. All labels in the disease component of ICPC (Component 7) were included and designated as 'diseases'. All 'rag bag' rubrics in both categories were counted. All labels referring to a diagnostic or therapeutic procedure or to an administrative reason for encounter (Components 2–6 in ICPC; Fig. 1) were left out of the analysis.

All data sets are based on routine data collection by several physicians during all encounters with their patients over considerable periods of time (in most cases at least 1 year) using different classification systems (Table 1 and Figure 4). Table 1 summarizes characteristics of the following studies: (1) The Virginia Study in the United States;[2] (2) The Barbados Morbidity Study;[3] (3) The Continuous Morbidity Registration of the University of Nijmegen in The Netherlands (CMR);[4] (4) The Morbidity Study of Sydney University General Practice (SUGP);[5] (5) The Monitoring Project in The Netherlands;[6] (6) The Royal College of General Practitioners' (RCGP) Third Morbidity Survey in the United Kingdom;[7] (7) The Transition Project of the University of Amsterdam in

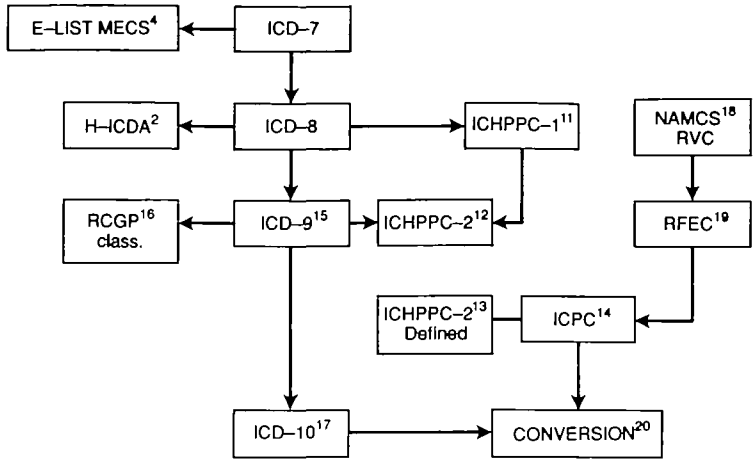

FIGURE 4 *Evolution of ICD-related primary care classification systems*

The Netherlands in its Diagnostic Mode;[8] (8) The National Ambulatory Medical Care Survey/Reason for Visit (NAMCS/RFV) in the United States;[9] (9) The Reason for Encounter (RFE) Field Trial by a WONCA/WHO Working Group;[10] (10) The Transition Project of the University of Amsterdam in The Netherlands in its Reason for Encounter Mode.[8]

Diagnostic classifications

The denominator was established in six studies (2,3,4,5,6,7), allowing the use of the prevalence of diagnoses per 1000 patients on the physicians' lists per year. In the Virginia Study the total number of encounters was used to estimate the number of patient years, allowing the calculation of rates of diagnoses per 1000 attending patients per year.

Reason for encounter classifications

Three studies (8,9,10) deal with the reason for encounter or the reason for visit of patients. For the first two the rate of a reason for encounter per 1000 attending patients per year was calculated. For the Transition project in the RFE-mode the rate per 1000 patients on the physicians' lists was used.

In the analysis of both types of classifications the prevalences and the rates have been distributed over the following four frequencies: 5 or more/1000 patients/year (frequent); 1-5/1000 patients/year (intermediate); 0.5-1/1000 patients/year (marginal); less than 0.5/1000/patients/year (rare).

Results of the analysis of diagnostic data

The results in raw numbers are presented in Tables 3-7 and in Figures 5 and 6. In the first column of each table the total number of labels available in the classification and included in the analysis is presented. In the following columns the four frequency ranges as mentioned above are represented. Tables 3-7 thus present the frequency distributions for the complete classification and for component 1 (symptoms and complaints), for component 7 (diseases) and for the 'rag bags' separately.

It is striking that in spite of the differences in the studies and the classifications used, in most databases roughly 100 diagnoses have a prevalence of $\geqslant 5/1000$ patients/year. In the Transition Project, the use of ICPC helped to increase the number of frequently diagnosed conditions to a total of 140.

TABLE 3 *Distribution of prevalences of all available diagnostic classes in seven studies/1000 patients per year*

	Total	<0.5	0.5-1	1-5	>5
Virginia study	547	220	63	149	115
Barbados	356	155	57	102	42
CMR	411	132	58	129	92
Australia	365	85	66	131	83
Monitoring	360	44	53	143	118
Third Morb.Survey	391	59	62	171	99
Transition-diagnoses	646	154	91	261	140

TABLE 4 *Frequently used (prevalence >5) diagnostic classes in the seven studies/1000 patients/year*

	5-10	10-15	15-20	20-50	>50
Virginia study	61	19	14	14	7
Barbados	19	10	5	7	1
CMR	40	11	13	17	11
Australia	50	17	4	8	4
Monitoring	70	31	15	31	5
Third Morb.Survey	42	26	9	19	3
Transition-diagnoses	63	38	14	21	3

TABLE 5 *Distribution of the prevalences of the diagnostic classes corresponding with the content of the seventh component of ICPC ('hard' diagnoses)/1000 patients/year*

	Total	<0.5	0.5–1	1–5	>5
Virginia study	347	126	42	102	77
Barbados	248	103	43	69	33
CMR	336	95	44	115	68
Australia	265	64	50	91	60
Monitoring	252	33	34	106	79
Third Morb.Survey	351	59	55	152	85
Transition-diagnoses	331	79	37	131	84

TABLE 6 *Distribution of the prevalences of diagnostic classes corresponding with the content of the first component of ICPC (symptoms and complaints)/1000 patients/year*

	Total	<0.5	0.5–1	1–5	>5
Virginia study	200	94	21	47	38
Barbados	108	52	14	33	9
CMR	75	37	10	14	14
Australia	100	21	16	40	23
Monitoring	108	11	19	39	39
Third Morb.Survey	40	-	7	19	14
Transition-diagnoses	315	75	54	130	56

TABLE 7 *Distribution of the prevalences of 'rag bag' diagnostic classes/1000 patients/year*

	Total	<0.5	0.5–1	1–5	>5
Virginia study	76	17	9	23	27
Barbados	50	23	10	14	3
CMR	57	14	18	13	12
Australia	40	2	10	19	9
Monitoring	29	3	4	15	7
Third Morb.Survey	44	10	9	16	9
Transition-diagnoses	91	33	12	34	12

In most studies listed in Table 1 the number of diagnoses with an intermediate prevalence (1–5/1000 patients/year) is somewhat similar: approximately 140 'intermediate' diagnostic labels. The use of ICPC, as in the Transition Project, however, results in a considerably higher number of intermediate diagnoses: a total of 261.

The increase in the number of 'frequent' and 'intermediate' diagnoses together to 401, which occurs when ICPC is used, as compared to 154–270 in the other studies, is mainly the result of the availability of new coding possibilities derived from the first component of ICPC: symptoms and complaints (Table 3). It is important that the potential of ICPC to increase the use of symptom diagnoses does not result in a concomitant diminished use of disease labels in component 7 (Table 5).

The number of diagnoses with a prevalence <0.5/1000 patients/year (Table 3) is considerable in all studies with the exception of the Monitoring project (using ICHPPC-2) and the Third Morbidity Survey (using the RCGP classification): only 15–18% of all available diagnostic codes in these classifications relate to seldomly occurring (rare) diseases.

When the availability of diagnostic labels from the first component (symptoms and complaints) is compared with those in the seventh component (diseases), the effect of the use of ICPC in routine data collection becomes more impressive. The classifications used in most studies simply do not allow differentiated coding of symptoms and complaints: this is especially the case in the Third Morbidity Survey and the Continuous Morbidity Study. The classification used in the Virginia Study allowed more coding possibilities but compared with the use of ICHPPC-2 in the Monitoring Project and in Australia, the doubling of the available codes did not result in an important increase in the number of frequent and intermediate symptom diagnoses.

The distribution of 'rag bag' rubrics is mixed (Table 7 and Figure 6). All systems contain approximately 14% of rag bag rubrics, but it is disappointing that a considerable number of these rubrics represent 'intermediate' and 'frequent' conditions. The Virginia Study and the Transition Project especially suffer from this problem. ICHPPC-2, used in the Monitoring Project, appears to be the most efficient in this respect as its rag bags contain the least proportion of 'intermediate' and 'frequent' conditions.

Results of the analysis of Reasons for Encounter (RFE) data

In this analysis reasons for encounter referring to the process components have not been included. Only reasons for encounter from the first and the seventh component of ICPC, which are also included in the diagnostic mode of ICPC, are dealt with. Three studies report on the concept of reason for encounter with sufficiently large databases and only one of them reports data on RFE as well as on diagnoses (Table 1 and Tables 8–10). The method used to analyse these was the same as that reported for diagnoses and the results are as follows.

It is evident from all three studies that 250–300 labels, especially those available in the first component with symptoms and complaints have an intermediate (1–5) or high (>5) frequency. The NAMCS/RFV study includes different specialties and by 'rag bagging' does not allow for low frequency reasons for encounter. The 'reason for encounter' field trial which provided the baseline data for ICPC produced a relatively high proportion of intermediate and frequent labels. Also in that field trial the number of

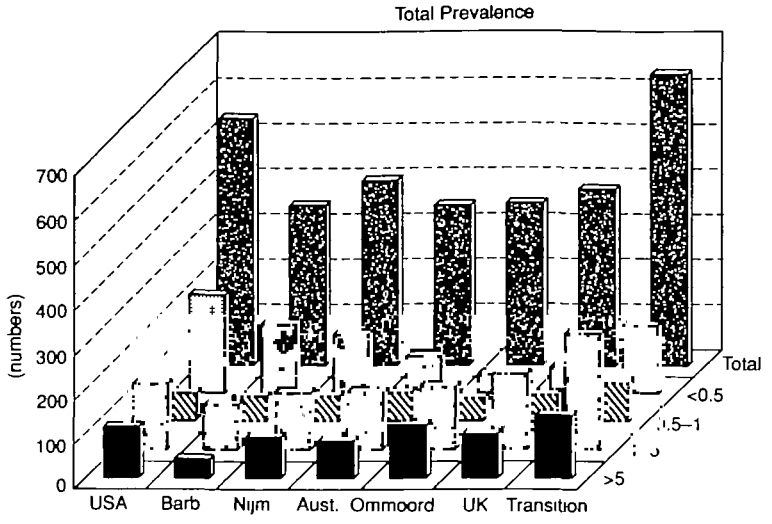

FIGURE 5 *Distribution of prevalences of all available diagnostic classes in seven studies per 1000 patients per year*

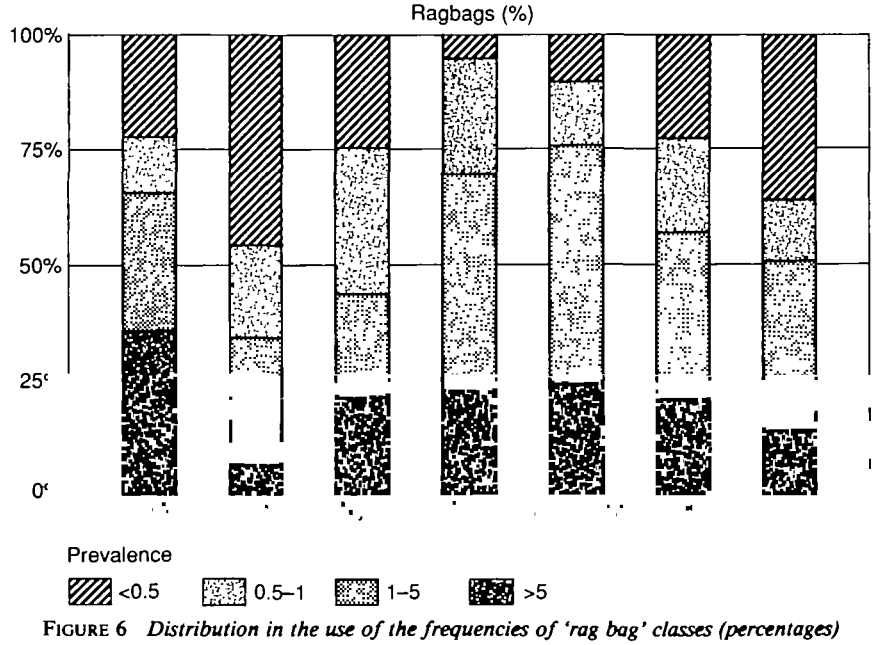

FIGURE 6 *Distribution in the use of the frequencies of 'rag bag' classes (percentages)*

TABLE 8 *Distribution of the prevalence of all available reason for encounter classes in three studies per 1000 patients per year*

	Total	<0.5	0.5–1	1–5	>5
NAMCS-RFV	237	-	-	142	95
RFE field trial	499	146	61	160	132
Transition-reason for encounter	646	239	90	191	126

TABLE 9 *Distribution of the prevalence of reason for encounter classes available in the first component of ICPC (symptoms and complaints) per 1000 patients per year*

	Total	<0.5	0.5–1	1–5	>5
NAMCS-RFV	155	-	-	73	82
RFE field trial	222	15	22	83	102
Transition-reason for encounter	315	41	35	130	111

labels that were used infrequently is limited compared with the results achieved by the use of ICPC in the reason for encounter mode in the Transition Project (Tables 8–10). The specificity of component 7 (diseases) is the main reason for this: patients only use a limited number of the available disease labels as their reason for encounter (Table 10).

TABLE 10 *Distribution of the prevalence of reason for encounter classes as available in the seventh component of ICPC (diseases, 'hard' diagnoses) per 1000 patients per year*

	Total	<0.5	0.5–1	1–5	>5
NAMCS-RFV	82	-	-	69	13
RFE field trial	277	131	39	83	23
Transition-RFE	331	198	55	61	17

DISCUSSION

It is significant that in the studies shown in Table 1, with the exception of the Barbados Study the distribution of diagnostic labels referring to diseases in component 7 is surprisingly similar. The yield of 'intermediate' or 'frequent' diagnostic rubrics of classification systems in primary care appears to be relatively independent of the classification used as well as of the study population. Classification of diagnoses with ICPC as in the Transition Project, however results in an increase of approximately 35% in the use of such diagnostic rubrics.

ICPC has been used as a norm in this study because of the advantages which can be expected from its development. Comparison of data from different studies using different classifications with those with ICPC-data, tends to be 'unfair'. It is evident, however, that the use of ICPC may lead to a quantum leap in the use of the diagnostic category characteristic for primary care settings, namely symptoms and complaints. The shift towards symptom diagnoses offered by ICPC provides primary care physicians with approximately 140 more intermediate and frequent diagnostic categories, without a decrease in the number of intermediate or frequent 'disease' categories. It is not possible to decide here on the value of diagnostic labels with a prevalence of 0.5–1/1000 patients/year in the studies shown in Table 1. A more detailed analysis of the data sets together with additional patient oriented information is necessary to understand the clinical importance of including these diagnostic labels in a primary care classification system.

The number of labels in a classification that result in frequencies below 0.5/1000 patients/year should be limited, because they attract coding errors while at the same time not contributing to our knowledge of morbidity in the community. 'Rag bag' rubrics deserve more attention by primary care taxonomers. ICPC, especially appears to have included too many 'rag bags'. Use of ICPC for the classification of reasons for encounter, allows the physician to identify over 300 'frequent' or 'intermediate' reasons for encounter apart from reasons for encounter in the process components of ICPC.

This study has allowed better insight into the problems inherent in the evolution of classifications specially designed for use in primary care settings. Such insights may be useful during the continuing evolution of these instruments, which are essential for research and clinical practice in family medicine. This is of particular importance at the moment the tenth iteration of the ICD becomes operational. The relationship between ICD-10 and its family members, represented in primary care by ICPC, must have established in a way which allows both compatibility throughout the medical community and a sufficient primary care orientation.[47]

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