The International Classification of Primary Care (ICPC): new applications in research and computer-based patient records in family practice

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The International Classification of Primary Care (ICPC) has now been available to the family medicine community for a decade as the main ordering principle of its domain. Research data and practical experiences with ICPC, as well as the development of new concepts in family medicine, have resulted in new applications. The structure of episodes of care to be included in a computer-based patient record has been further developed and refined. ICPC as the ordering principle of patient data is now available in 19 languages. Its conversion structure with the International Classification of Diseases (ICD-10) allows the highest possible level of specificity in a patient's problem list necessary in patient care, while the compatibility of the ICPC drug codes with the Anatomic Therapeutic Chemical Classification Index allows the systematic inclusion of data on prescription.

Keywords. Family practice, classification, computer-based record, episode of care, ICPC.

Introduction

The International Classification of Primary Care (ICPC) was developed 15 years ago, and consequently reflects concepts and ideas from the early 1980s.[1] Research and experiences with ICPC in many countries have since led to new applications. At the same time, a shift in the interest for primary care can be observed, which is reflected in the new Institute of Medicine (IOM) definition: "Primary care is the provision of integrated accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients and practising in the context of family and community."[2]

This definition has been made operational by choosing the 'episode of care' as the appropriate unit of assessment. Episodes of care are distinguished from episodes of disease in a population. An episode of care is a health problem or disease from its first presentation to a health care provider to the completion of the last encounter for that same health problem or disease (Figure 1).[3] Reasons for encounter, diagnoses and in-

terventions form the core of an episode of care consisting of one or more encounters, including changes in their relations over time ('transitions'). An episode of care, consequently, refers to all care provided for a patient with a discrete disease or health problem. The 'large majority of personal health care needs', the degree of 'integration' of 'accessibility', and 'accountability' can be assessed when episodes of care are classified with ICPC in a computer-based patient record.

Developments in the last decade

Since its availability together with a manual for use in relevance studies (1985), and its formal publication by Oxford University Press in 1987,[1] ICPC has become increasingly popular in the international community of family doctors. The classification has been translated into 19 languages and has been published as a book in several of these languages (Table 1).[4-12]

The European Community funded a comparative study in nine countries which has emphasized that ICPC does allow primary care clinicians in different settings to structure patients' episodes of care over time with ICPC.[13,14] In this study, characteristic epidemiological and clinical similarities and differences between the various sites were established. Also, the concept of reason for encounter proved to be an innovative and
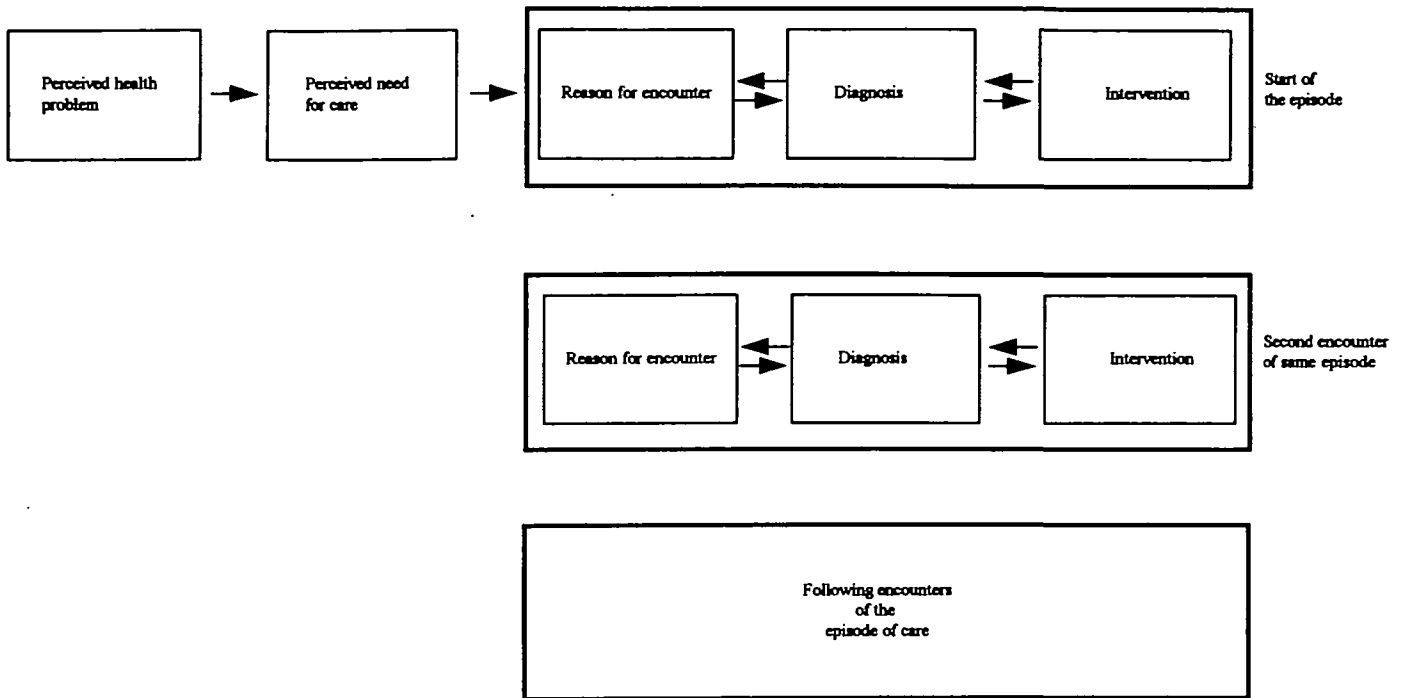
FIGURE 1   *An episode of care*

TABLE 1   *Availability of ICPC in different languages*

Basque	Hungarian
Danish*	Italian
Dutch*	Japanese*
English*	Norwegian*
Finnish*	Polish
French*	Portuguese*
German	Russian
Greek*	South African
Hebrew	Spanish*
Swedish	

*Indicates that a separate edition exists translated into that language.

practical operationalization of the patients' perspective and his/her demand for care; the validity of the reason for encounter as it was coded by family doctors when compared with the patient's point of view after the encounter was consistently very high.[15-17] The European study also resulted in a multilanguage layer of ICPC, the complete conversion structure between ICPC and ICD-10 and an Anatomic Therapeutic Chemical Classification Index (ATC)-compatible ICPC drug code, illustrated in Tables 2–4.[18-21] Also, a study concerning the use of functional status indicators in the framwork of ICPC was included, using an instrument developed by the World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians (WONCA).[22-24]

ICPC is by now the official classification system for family practice in several countries (Norway, The Netherlands, Finland), and in several other countries it is the preferred classification used in research. ICHPPC-2 nowadays has practically disappeared as a classification system;[25] and ICD-9, to which it is related, is now used mainly for reimbursement purposes, like in the USA.[26-29] In British general practice, however, the READ nomenclature is in use in computer-based patient records; a conversion to ICPC is now being developed, but it will be some time before a reliable and authorized version is available.[30]

The new International Glossary of Primary Care defines the content of family practice and gives rules to structure episodes with ICPC in order to allow epidemiological standard retrievals, and to make them comparable in different countries.[31]

New inclusion criteria for the use of ICPC as a diagnostic classification are being developed by the WONCA Classification Committee using the conversion structure to ICD-10 as a nomenclature.[19,32] ICPC applied in its recent form, allows optimal representation of the content and process in family practice including reimbursement and administrative requirements and offering a high specificity on the level of the individual patient.

New applications

As a consequence of these developments, the original three basic elements of encounters (reason for encounter, diagnosis and interventions) (Figure 1) have now been expanded into six different data entry options

TABLE 2   *Examples of the multilanguage layer of ICPC codes together with their ICD-10 conversion*

ICPC code	ICD-10 conversion	Multilanguage layer
D93	- k58 - k59.1 - k59.4	*Irritable bowel syndrome* Irritabel kolon Spastisch colon/IBS Syndrome du côlon irritable spastisches Colon/Colon irritabile Sindrome del colon irritabile Síndrome do cólon irritável Síndrome de colon irritable
D94	- k50 - k51	*Chronic enteritis/ulcerat colitis* Kronisk enterit/ulcerøs kolit Colitis ulcerosa/chron enteritis Entérite chr/colite ulcéreuse chron entzündliche Darmerkrankung Enterite cronica/colite ulcerosa Enterite crónica/colite ulcerosa Enteritis cr/colitis ulcerosa
D95	- k60 - k61	*Anal fissure/perianal abcess* Analfissur/perianal absces Fissura ani/perianaal abces Fissure anale/abcès périnéal Analfissur/perianaler Abszeß Ragade anale/ascesso perianale Fissura anal/abcesso perianal Fisura anal/absceso perianal
D96	- r16.0 - r16.2	*Hepatomegaly* Hepatomegali Hepatomegalie Hépatomégalie Hepatomegalie Epatomegalia Hepatomegália Hepatomegalia
D97	- b9+2 - k70 - k71 - k72 - k73 - k74 - k75 - k76 - k77	*Cirrhosis/other liver disease* Levercirrose/anden leversygdom Cirrose/andere leverziekten Cirrhoses/autres maladies du foie Zirrhose/sonstige Lebererkrankung Cirrosi/altre malattie epatiche Cirrose/outras doenças hepáticas Cirrosis/otras enf hepaticas
D98	- k80 - k81 - k82 - k83 - k87	*Cholecystitis/cholelithiasis* Galdesten/galdeblærebetændelse Cholecystitis/cholelithiasis Cholécystite/cholélithiase Choleæystitis/Cholelithiasis Colecistite/colelitiasi Colecistite/colelitíase Colecistitis/colelitiasis
D99	- k38 - k52.R - k55 - k56 - k59.R - k62.R - k63 - k65 - k66 - k67 - k85 - k86 - k87 - k90 - k92.R - k93	*Other diseases of digestive system* Anden sygdom i mave/tarmsystemet Andere ziekten spijsverteringsorg Autres maladies syst digestif sonstige Erkrankung Verdauungstrakt Altre malattie sistema digerente Outras doenças aparelho digestivo Otras enf ap digestivo

TABLE 3   *Conversion from ICPC to ICD-10*

ICPC code	ICD-10 code	Text
D93	- k58 - k59.1 - k59.4	Irritable bowel syndrome Functional diarrhea Anal spasm
D94	- k50 - k51	Crohn's disease (regional enteritis) Ulcerative colitis
D95	- k60 - k61	Fissure and fistula of anal/rectal reg Abcess of anal and rectal region
D96	- r16.0 - r16.2	Hepatomegaly not classified elsewhere Hepatomegaly with splenomegaly NEC
D97	- b94.2 - k70 - k71 - k72 - k73 - k74 - k75 - k76 - k77	Sequel oth/unspec/dis/ (viral hepatitis) Alcoholic liver disease Toxic liver disease Hepatic failure NEC Chronic hepatitis NEC Fibrosis and cirrhosis of liver Other inflammatory liver disease Other disease of liver Liver disorders in dis CE
D98	- k80 - k81 - k82 - k83 - k87	Cholelithiasis Cholecystitis Other diseases of gallbladder Other diseases of biliary tract Dis gallbl/bil tr /pancr in dis CE
D99	- k38 - k52.R - k55 - k56 - k59.R - k62.R - k63 - k65 - k66 - k67 - k85 - k86 - k87 - k90 - k92.R - k93	Other diseases of appendix Other noninf gastroenter/colitis Vascular disorders of intestine Paralytic ileus & intest obstr Other functional intestinal disorders Other diseases of anus and rectum Other diseases of intestine Peritonitis Other disorders of peritoneu Disorder of peritoneum in inf dis CE Acute pancreatitis Other diseases of pancreas Disorder gallbl/bil tr/pancr in dis CE Intestinal malabsorption Other diseases of digestive system Disorders of oth dig org in dis CE

(A–F) for computer-based patient records (Figure 2). The following considerations are important.

(i) The reason for encounter has been established to be a practical source of patient information, also useful for research and education. This will be illustrated by epidemiological data from the Dutch Transition project in the form of standard output, following the rules of the glossary.[35,36] 'Cough' as a reason for encounter (Figure 3) allows the listing of the clinical probabilities of a certain diagnosis at the start and during follow-up of the episode, per standard sex/age group. This is

illustrated by the top 10 diagnoses related to cough at the start and during follow-up for children 5-14 years old and men 65-74 years old (Tables 5 and 6), which show clinically important differences. The reverse procedure is equally relevant from a clinical point of view: what reasons for encounter were presented at the start and during follow-up of a diagnosis in each standard sex/age group? This is illustrated for the episode of 'acute bronchitis', of which incidences and prevalences are presented in Figure 4. The reasons for encounter of the same groups are presented in Table 7,

together with data on comorbidity in Table 8, which documents the clinical differences in far more detail than has until now been possible.

The use of reasons for encounter to estimate prior probabilities is clearly very useful; it is, however, limited by the uncertainty of how often cough, shortness of breath, fever, abnormal sputum or wheezing are in fact presented as a reason for encounter (Figure 2A), and how often they are established by the physician during history taking and physical exam (Figure 2C). ICPC incorporates over 200 symptoms and complaints

TABLE 4 *Example from the ATC-compatible ICPC drug code list*

| ICPC drug code	Drug	ATC Code
D	Alimentary tract	+A
D0	Stomatologicals, mouth preparations	A01
D00	Stomatologicals with corticosteroids	A01AC
D01	Stomatologicals with anti-infectives (antibiotics and chemotherapeutics)	A01AB
D09	Stomatologicals, mouth preparations NEC	A01/
D1	Antacids, antiflatulents, and antipeptic ulcerants	A02
D10	Antacids, antiflatulents	A02A, A02D
D11	H$_2$-antagonists	A02BA
D12	Prostaglandins	—A02BB
D13	Proton pump inhibitors	A02BC
D19	Anti-peptic ulcerants NEC	A02/
D2	Antispasmodic and anticholinergic agents and propulsives	A03
D20	Synthetic antispasmodic and anti-cholinergic agents (including papaverine-derivatives	A03A
D21	Belladonna and derivatives, plain	A03B
D22	Antispasmodics in combination with psycholeptics	A03C
D23	Antispasmodics in combination with analgesics	A03D
D24	Antispasmodics and anticholinergics in combination with other drugs	A03E
D25	Propulsives	A03F
D29	Antispasmodic and anticholinergic agents and propulsives NEC	A03/
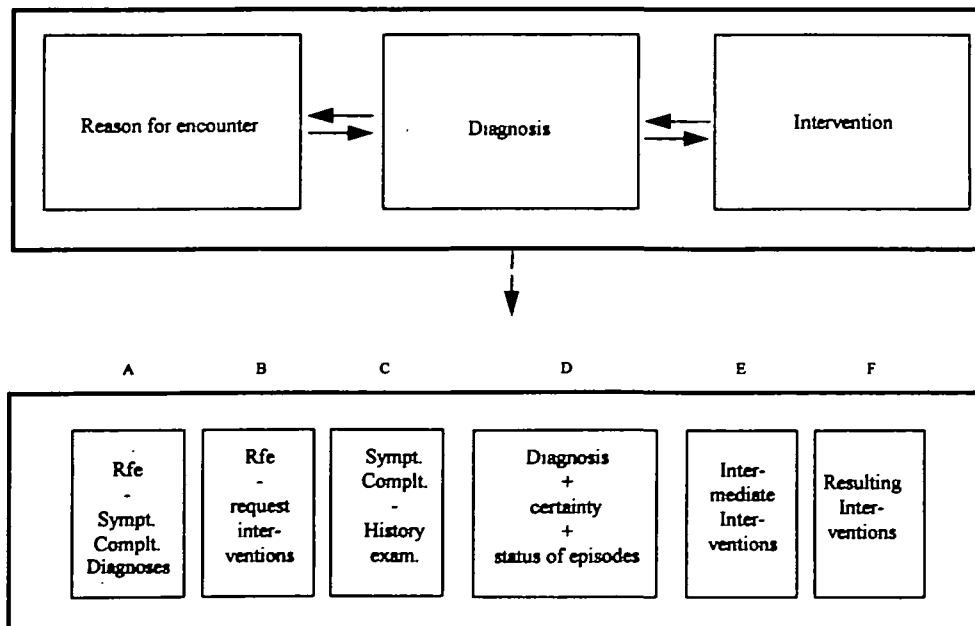
FIGURE 2 *The old and the new structure for describing encounters*

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TABLE 5　Top 10 episode titles linked to RfE R05 at the start of an episode (Cough) (prior probabilities)

Code		n	%
Children aged 5-14 (n = 1267)			
R74	URI (head cold)	456	35.6
R78	Acute bronchitis/bronchiolitis	261	20.4
R05	Cough	159	12.4
R77	Acute laryngitis/tracheitis	110	8.6
A77	Other viral diseases NOS	54	4.2
R96	Asthma	40	3.1
R81	Pneumonia	33	2.6
R75	Sinusitis acute/chron	30	2.3
R80	Influenza (proven) wo pneumonia	24	1.9
R71	Whooping cough	22	1.7
Total top 10		1189	92.8
Total		1281	100.0
Men aged 65-74 (n = 646)			
R78	Acute bronchitis/bronchiolitis	256	39.1
R74	URI (head cold)	155	23.7
R05	Cough	65	9.9
R77	Acute laryngitis/tracheitis	45	6.9
R75	Sinusitis acute/chron	22	3.4
K77	Heart failure	15	2.3
R96	Asthma	13	2.0
R91	Chr bronchitis/bronchiectasis	12	1.8
R81	Pneumonia	10	1.5
R95	Emphysema/COPD	9	1.4
Total top 10		602	92.0
Total		654	100.0

TABLE 6　Top 10 episode titles linked to RfE R05 during follow-up

Code		n	%
Children aged 5-14 (n = 342)			
R96	Asthma	105	30.5
R78	Acute bronchitis/bronchiolitis	63	18.3
R74	URI (head cold)	53	15.4
R05	Cough	26	7.6
R77	Acute laryngitis/tracheitis	23	6.7
R71	Whooping cough	16	4.7
R81	Pneumonia	11	3.2
R75	Sinusitis acute/chron	10	2.9
R95	Emphysema/COPD	8	2.3
R90	Hypertrophy/chr infect T & A	7	2.0
Total top 10		322	93.6
Total		344	100.0
Men aged 65-74 (n = 274)			
R78	Acute bronchitis/bronchiolitis	71	25.3
R95	Emphysema/COPD	53	18.9
R91	Chr bronchitis/bronchiectasis	44	15.7
R96	Asthma	30	10.7
R74	URI (head cold)	22	7.8
R05	Cough	15	5.3
R84	Malignant neopl respir syst	13	4.6
K77	Heart failure	6	2.1
R75	Sinusitis acute/chron	6	2.1
R77	Acute laryngitis/tracheitis	6	2.1
Total top 10		266	94.7
Total		281	100.0

Source: Transition Project.

TABLE 7　Top 10 reasons for encounter in an episode of acute bronchitis/bronchiolitis (R78)

Code		n	%
Children aged 5-14 (n = 377)			
R05	Cough	321	46.1
A03	Fever	98	14.1
R31	Med exam/health evalua/partial	64	9.2
R02	Shortness of breath dyspnea	43	6.2
R74	URI (head cold)	24	3.4
A04	General weakness/tiredness	18	2.6
R03	Wheezing	17	2.4
R64	Provid init episode new/ongoing	17	2.4
R78	Acute bronchitis/bronchiolitis	13	1.9
R21	Sympt/complt throat	9	1.3
Total top 10		624	89.5
Total		697	100.0
Men aged 65-74 (n = 422)			
R05	Cough	324	39.4
R02	Shortness of breath dyspnea	133	16.2
R78	Acute bronchitis/bronchiolitis	100	12.2
R31	Med exam/health evalua/partial	79	9.6
A03	Fever	34	4.1
R25	Abnormal sputum/phlegm	23	2.8
R64	Provid init episode new/ongoing	21	2.6
R74	URI (head cold)	14	1.7
A04	General weakness/tiredness	13	1.6
R01	Pain attrib to respir system	8	1.0
Total top 10		749	91.1
Total		822	100.0

Source: Transition Project.

TABLE 8　Comorbid episodes for patients with R78, acute bronchitis/bronchiolitis

Code		n	%	Prev.
Children aged 5-14 (n = 329)				
R74	URI (head cold)	90	9.6	274
H71	Acute otitis media/myringitis	57	6.1	173
R78	Acute bronchitis/bronchiolitis	48	5.1	146
R96	Asthma	37	3.9	112
A97	No disease	32	3.4	97
S03	War	29	3.1	88
A77	Other viral diseases NOS	21	2.2	64
R76	Tonsillitis acute	20	2.1	61
S18	Laceration/cut	20	2.1	61
D73	Presumed GI infection	17	1.8	52
Total top 10		371	39.6	1128
Total		938	100.0	2851
Mean number of comorbid episodes = 2.9				
Men aged 65-74 (n = 350)				
R78	Acute bronchitis/bronchiolitis	72	4.7	206
A97	No disease	56	3.7	160
R95	Emphysema/COPD	47	3.1	134
K86	Uncomplicated hypertension	46	3.0	131
R74	URI (head cold)	46	3.0	131
K77	Heart failure	35	2.3	100
A85	Adv effect med agent proper dose	30	2.0	86
H81	Excessive ear wax	30	2.0	86
K76	Other/chron ischaemic heart dis	30	2.0	86
T90	Diabetes mellitus	25	1.6	71
Total top 10		417	27.4	1191
Total		1521	100.0	4346
Mean number of comorbid episodes = 4.3				

Prev. = number of comorbid episodes per 1000 patients with R78.
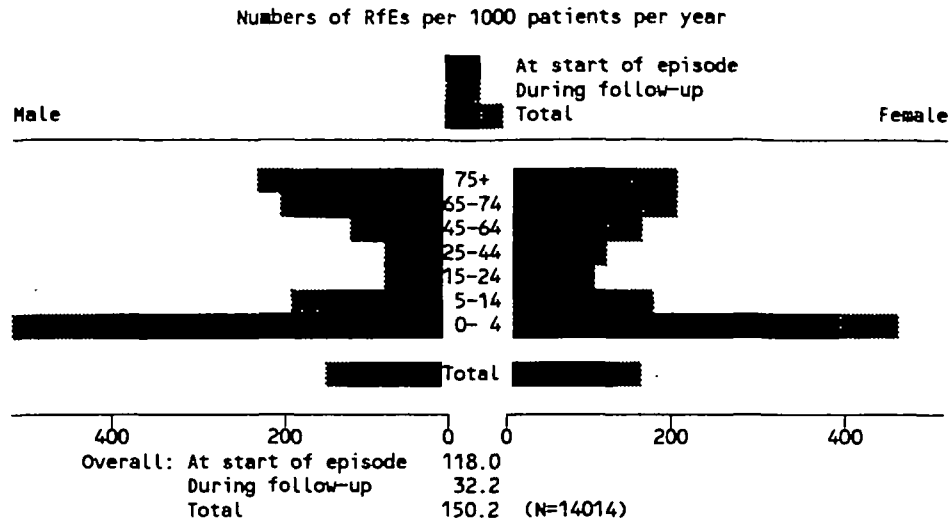Source: Transition Project.

Numbers of RfEs per 1000 patients per year

FIGURE 3 Sex–age distribution of RfE cough (R05) per 1000 listed patients per year (source: Transition Project)

Prevalences and incidences per 1000 patients per year
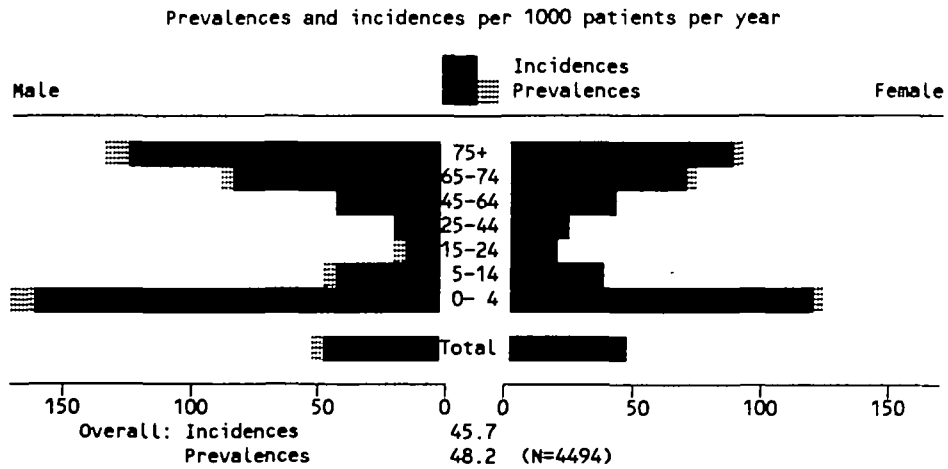

FIGURE 4 Sex–age distribution of episodes of acute bronchitis/bronchiolitis (R78) per 1000 listed patients per year (source: Transition Project)

TABLE 9 List of episodes of care of a patient; italics indicate the patient-specific additional text

ICPC code	ICD-10 code	Text with patient-specific additions	From	Until
D99	k65	Peritonitis after laparosc.ectomie	23.03.95	
D98	k80	Cholelithiasis/pigeon egg/ectomie	12.03.95	19.03.95
A97	z71.1	Cervical smear/yearly/request	25.02.94	12.07.95
S79	d23	Fibroma/pendulum left shoulder/1cm	08.12.93	09.01.94
R75	j01	Acute sinusitis maxil/$R>L$	22.04.93	12.05.93
W78	z32.1	Pregnancy/twins	06.11.92	15.07.93
S82	d22	Melanocytic naevus/R cheek/3mm	31.08.92	06.09.92

serving the classification of reasons for encounter and of clinical findings equally well. Both applications can be included in the encounter and episode structure of a computer-based patient record (Figure 2A and C). Together they especially allow better calculation of prior probabilities, while the difference between a symptom expressed by the patient as a reason for encounter, or established by the physician, is retained.

(ii) Reasons for encounter in the form of symptoms, complaints or diagnoses should be distinguished explicitly from those in the form of requests for interventions such as a prescription, an x-ray, a referral, an advice, etc. Requests for a certain intervention are often followed by this intervention being performed: when patients ask for medication or a blood test, they often receive it.[17] Patients do indeed actively influence the content of care provided by family doctors and it is important to explicitly document this, also in order to obtain a better understanding of compliance.

(iii) ICPC can distinguish between diagnostic and therapeutic interventions during the encounter ('intermediate': Figure 2E) and those that will follow ('resulting': Figure 2F). The difference between what has in fact been done by the family doctor at the time of the encounter and what is expected to follow is important for the analysis of utilization data, interdoctor variation and, once more, compliance. It also allows to better understand the shift from prior probabilities in the first encounter of an episode of care to the posterior probabilities during follow-up. In many countries, the specificity of the three-digit ICPC code to classify intermediate interventions appeared to be sufficient; resulting interventions, however, often need more specificity, especially when drugs are prescribed. For this reason, the use of the -50 code of ICPC (medication) is expanded into the ICPC drug code which is ATC-compatible (Table 4). The same applies to the differentiation in the use of blood tests and other investigations, but here no standard ICPC classifications for family practice are yet available.

(iv) The complete conversion between ICPC and ICD-10 is a major innovation (Tables 2 and 3).[16,18] Good computer-based patient records need ICPC to structure the episode-oriented database—also for retrieval purposes or for the use of expert systems—while the specificity of the individual diagnostic labels requires a large nomenclature such as ICD-10. ICPC provides specific labels for the 'common episodes' (prevalence 1 per 1000 patients per year) in family practice, e.g. acute bronchitis, sprain of ankle, acne, pregnancy, migraine. On the level of the individual patients' problem list, however, the

much higher specificity which is the result of the conversion between ICPC and ICD-10 allows an optimal description of his clinical problems. Table 3 illustrates the conversion structure between ICPC and ICD-10 both for relatively homogeneous classes (D98, D96) and for 'ragbags' (D97, D99). It is evident that, for example, the conversion between D98 and the underlying ICD-10 structure is important for the documentation of the actual problem of a patient with cholelithiasis. The conversion between D99 (peritonitis) and ICD-10 illustrates the necessity to include the highest level of specificity in a computer-based record. Evidently, ICD-10 at the three- or four-digit level sometimes does not provide sufficient specificity, and it may be necessary to add more details to the description in the patient's record, such as 'left shoulder, 3 mm'. An example of a problem list (Table 9) illustrates that ICPC can be used to order patient data and to structure the database, at the same time allowing the use of ICD-10 together with free text in order to be as specific as necessary in daily practice.

(v) The status of the episode in an encounter can be specified in two ways. Does the episode of care start during this encounter, does it already exist for some time, but is it for the first time that the episode shows up in the registration, or is it a follow-up encounter (Figure 2D)? A good computer-based patient record warns the family doctor when he tries to enter a follow-up encounter for an episode that has not yet been established in the database or whenever he starts a new one in case an episode with the same title already exists. This is, obviously, vital for the quality of day-to-day recording. While quality control in the handwritten record used to be very cumbersome, especially when it grew thicker and thicker over the years, a computer-based patient record with an explicit episode structure allows the instant assessment of data quality.

Another important aspect of the status of an episode of care is whether or not the family doctor is certain that his diagnosis is correct (vi). The inclusion criteria of ICHPPC-2 (where available) have been adopted for use in ICPC in pop-up screens. The new definitions and inclusion criteria for ICPC as they are now being prepared by the WONCA Classification Committee will support this far better. Pop-up screens can be extended to signs, symptoms, objective findings, functional status assessment and other essential elements of the encounter that have to be recorded systematically to allow full documentation.

(vi) The core of a computer-based patient record on the basis of ICPC is, preferably, language independent: this enhances the use of practice

records for a comparison of data from different countries, and it supports the development of family medicine towards an internationally well developed profession with a well defined and empirically based frame of reference. The availability of ICPC in 19 languages and the growing number of translations of ICD-10 accompanied by alphabetical indexes will allow family doctors in many countries to incorporate a detailed language specific thesaurus in their system, at the same time using ICPC to systematically structure their records and the database in a more standardized way.

Discussion

Labelling health problems in family practice requires that the available labels reflect the characteristics of its domain: family medicine.[19] Classification systems do not primarily provide names but they provide a structure to order objects in classes according to established criteria. Identification of an object (like a diagnosis) requires a correct name (label). A nomenclature represents the professional jargon of medicine, and a thesaurus is a storehouse of knowledge like an encyclopaedia or computer tape with terms with a large index and synonyms.[15] ICPC, on the other hand, reflects the characteristic distribution and content of health problems in primary care. The richness of medicine at the level of the individual patient needs a nomenclature and thesaurus which includes ICPC, ICD-10 and systems like ATC.

Over the years there have been frictions in the relation between the available primary care classifications (ICHPPC and ICPC) and the iterations of ICD because of conceptual and taxonomical problems. ICD-10, however, now provides a nomenclature of diseases recognized by the international medical community, that much less suffers from these problems. Although ICD-10 as such is not the most appropriate tool for a primary care classification,[19,32] its conversion with ICPC as the ordering principle opens a royal route to good computer-based patient records allowing for the exchange of patient data with specialists and hospitals.

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