Interface Terminologies: A Case Study on the International Classification of Primary Care

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Abstract—The International Classification of Primary Care (ICPC), which belongs to the WHO Family of International Classifications (WHO-FIC), has a low granularity, which is convenient for describing general medical practice. However, its lack of specificity makes it useful to be used along with an interface terminology. An international survey has been performed, using a questionnaire sent by email to experts from 25 countries, in order to describe the terminologies interfacing with ICPC. Eleven interface terminologies have been identified, developed in Argentina, Australia, Belgium (2), Canada, Denmark, France, Germany, Norway, South Africa, and The Netherlands. Globally, these systems have been poorly assessed until now.

Keywords—Terminology, controlled vocabulary, thesaurus, classification, International Classification of Primary Care.

I. INTRODUCTION

THE International Classification of Primary Care (ICPC-1 or ICPC-2, Wonca) is a member of the Family of International Classifications of the WHO (WHO-FIC) [1]. ICPC-2 classifies patient data and clinical activity in the domains of general/family practice and primary care. It allows classification of the patient's reason for encounter, the health problems managed, the process of care undergone and prescribed, and the ordering of these data in an episode of care structure [2]. Other main systems used for coding data in the primary care setting are the International Classification of Diseases (ICD-9 or ICD-10, WHO) and the Read codes (NHS). [3]. In 2003, the Read codes Version 3 (Clinical Terms Version 3) have become a part of the Systematized Nomenclature of Medicine-Clinical Terms (SNOMED-CT, NHS and CAP) [4].

With around 1,400 rubrics, based on the prevalence of health problems managed (at least once per 1,000 patients per year), ICPC has a low granularity, which is well suited to classify consultation data in primary care [5]. Moreover, ICPC-2 has been mapped historically to ICD-10, which allows for labeling health problems rarely seen in this setting [6]. However, the need for interface terminologies to classifications has been more and more recognized, for

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making data entry easier at the point of care [7], and to enhance the retrieval of data for quality assessment or research [8]. To our knowledge, there is no largely approved definition for an interface terminology. It has been defined by Rosenbloom as a systematic collection of health-care related phrases (terms) that supports clinicians' entry of patient-related information into computer programs [9]. It can also simply be defined as a terminology classified or mapped to a classification and possibly also to a reference terminology (a defined list of all approved terms for describing and recording observations) [10]. As a terminology, interface terminologies include all terms of a professional domain [11].

The aim of this survey was then to identify and describe the various terminological systems developed worldwide as interfaces for classifying consultation data according to ICPC.

II. METHODS

The data were collected in 2005, using an electronic questionnaire sent to the 41 members of the Wonca International Classification Committee (WICC) [12]. This committee includes experts in medical information and terminologies relating to primary care, belonging to 25 countries at that time. Another expert from South Africa participated in the survey, although not a member of the WICC but known by several of its members.

The questionnaire asked to each expert whether any terminology interfacing with ICPC was available in his or her country. If any, the questionnaire included questions on the structure of this terminological system and on its current practical use. For open questions, additional information was requested if deemed necessary.

III. RESULTS

Eleven interface terminologies have been identified and described (Table I). They were developed between 1994 and 2004 in nine countries, namely Argentina, Australia, Belgium (2 different systems), Canada, Denmark, France, Germany, Norway, South Africa, and The Netherlands. Five of these systems were presented as thesauri, two as an extension of the ICPC classification (including one with some modifications), one as a lexicon, one as a controlled vocabulary, one as a terminology, and one as an interface terminology. All of these systems allowed the classification of complaints/symptoms and diagnoses/diseases, and 7 out of them the classification of the process of care. In five cases, the interface terminology had been developed by a professional organization (especially

TABLE I
GENERAL FEATURES OF INTERFACE TERMINOLOGIES TO ICPC

Name	Country	Type	Domain	Creation	Organization
LOCAS	French-speaking Belgium	Controlled vocabulary	S, P, D	1994	FMM
ICPC-Plus	Australia	Interface terminology	S, P, D	1995	FMRC, Sydney University
Danish ICPC extension	Denmark	Thesaurus	S, P, D	1995	Danish College and Organization of GPs
ICPC2-ICD10GM	Germany	Thesaurus	S, P, D	1996	DIMDI
Encode-FM®	Canada	Terminology	S, D, O	1998	Insite-FM Inc.
ICPC2-ICD10 Thesaurus	Netherlands	Thesaurus	S, P, D	2001	Dutch Collège of GPs
Nautilus	France	Lexicon	S, P, D, O	2001	URML
Indications of tradi-medicines	South Africa	Extension + modifications	S, D	2002	Dpt of Pharmacology, Cap Town University
HIBA Thesaurus	Argentina	Thesaurus	S, D	2002	Hopital Italiano, Buenos Aires
3B-Thesaurus	Belgium	Thesaurus	S, P, D	2002	Belgium Ministry of health
Norwegian Alphabetical index	Norway	Extension	S, D	2004	KITH / Norwegian College of GPs

by the national college of general practitioners); in other cases, the organization which developed it was either an university, a ministry, an hospital, an institute, or a company.

The size of the interface terminologies varied from 1,500 to 64,000 items, i.e., terms or phrases (Table II). Two systems included keywords, namely LOCAS (2,000) and ICPC-Plus (4,100). Apart from the Indications of tradi-medicines, which was not assigned any code, six systems had alphanumeric codes (all but one significant) and four had numeric codes (all non-significant). Four interface terminologies were primarily derived either from the vernacular terms used by GPs, two from the ICD-10 index, two from a former ICPC2-ICD10 thesaurus (itself derived from the ICD-10 index), two from various published documents, and one ex nihilo by individual experts. All but the older Belgian system were interfaced with the ICPC-2 version. Nine terminologies were also linked to ICD-10, and four (ICPC-Plus, Danish ICPC extension, HIBA Thesaurus, Norwegian Alphabetical index) are being mapped to SNOMED-CT. Both ICPC-Plus and the ICPC2-ICD10 Thesaurus are included in the UMLS.

TABLE II
ORGANIZATION OF INTERFACE TERMINOLOGIES TO ICPC

Name	Items	Keywords	Code[a]	Source(s)	Relations to ICPC	Other relations	Inclusion in UMLS
LOCAS	4,500	2,000	AN and NS	Experts	ICPC1	-	No
ICPC-Plus	8,100	4,100	AN and S	GPs	ICPC2	ICD10-AM, (SNOMED-CT)[b]	Yes
Danish ICPC extension	10,000	-	AN and S	GPs	ICPC1, ICPC2	ICD10, (SNOMED-CT)[b]	No
ICPC2-ICD10GM	50,000	-	N and NS	ICD10 thesaurus and experts	ICPC2	ICD10-GM	No
Encode-FM®	9,900	-	AN and S	GPs	ICPC2	ICD9-CM, ICD10	No
ICPC2-ICD10 Thesaurus	90,000	-	N and NS	ICD10 index and ICPC2	ICPC2	ICD9, ICD10	Yes
Nautilus	50,000	-	AN and S	French medical dictionaries and GPs	ICPC2	ICD10, CCAM[c]	No
Indications of tradi-medicines	1,500	-	No code	Books and reports	ICPC2	TRAMED[d] III	No
HIBA Thesaurus	23,000	-	N and NS	GPs	ICPC2	ICD10, (SNOMED-CT)[b]	No
3BT-Thesaurus	64,000	-	N and NS	ICPC2-ICD10 Thesaurus	ICPC2	ICD9, ICD10, ICF	No
Norwegian Alphabetical index	8,000	-	AN and S	ICD10 index	ICPC2	ICD10, (SNOMED-CT)[b]	No

[a]AN denotes 'alphanumeric', and N 'numeric'; NS denotes 'non-significant', and S 'significant'. [b]Mapping in progress. [c]French classification of medical process used for billing purpose. [d]South African Traditional Medicine Database.

All interface terminologies were currently in use. The actual users were mainly general practitioners, but these terminologies were also sometimes used by other primary care professionals or even in secondary care. All terminologies but one were used for primary coding, i.e., by the health provider at consultation time; only the HIBA Thesaurus was only used for secondary coding, i.e., by another professional from free text. These terminologies covered eight different languages, namely English, French, Danish, German, Dutch, Flemish, Spanish, and Norwegian. Seven terminologies were considered as open source systems. Nine out of the 11 interface terminologies benefited from a regular updating process.

TABLE III
USE OF INTERFACE TERMINOLOGIES TO ICPC

Name	Current use	Users[a]	Coding	Langage	Open source	Updating
LOCAS	Yes	GP, EP	Iary	Fr	No	Yes
ICPC-Plus	Yes	GP, CHC	Iary or IIary	E	No	Yes
Danish ICPC extension	Yes	GP	Iary or IIary	Da	Yes	Yes
ICPC2-ICD10GM	Yes	GP, HP	Iary	G	Yes	No
Encode-FM®	Yes	GP, CHC, HCP	Iary	E, Fr	No	Yes
ICPC2-ICD10 Thesaurus	Yes	GP	Iary	Du, Fr, E	Yes	Yes
Nautilus	No	(CP, HP)[b]	Iary	Fr	Yes	No
Indications of tradi-medicines	Yes	PC	Iary	E	Yes	
HIBA Thesaurus	Yes	GP, HP	IIary	S	No	Yes
3B-Thesaurus	Yes	GP	Iary	Fl, Fr	Yes	Yes
Norwegian Alphabetical index	Yes	Yes	Iary	N	Yes	Yes

[a]GP denotes 'general practitioners', EP 'emergency physicians', CHC 'community health centers', HP 'hospital physicians', HCP 'home care providers', CP 'community physicians', PC 'primary care'. [b]Expected users.

IV. DISCUSSION

Through an international survey targeting experts in information systems in primary care, we identified 11 terminologies interfacing with ICPC, especially ICPC-2. These terminologies have been developed in countries from all the continents apart from Asia, although members from Asiatic countries (Japan, Singapore, India, Sri Lanka) have been surveyed. With the production of seven of them, Europe was overrepresented, which is probably due to the large use of the ICPC in European countries like Belgium, Denmark, The Netherlands, or Norway [3]. These terminologies cover eight different languages, representing only a fraction of the 22 languages in which ICPC has been translated [13]. Whereas ICPC requires a copyright license at national level (already purchased by Belgium, Finland, Norway, Portugal, Switzerland, and Brazil), most interface terminologies can be used as open source systems.

Five interface terminologies were defined as thesauri, which implies the inclusion of synonyms, and the six remaining as other kinds of terminologies [14]. Five were developed by a medical organization. Their size was highly variable, from about the size of the ICPC classification itself (1,500 terms in the Belgian LOCAS) up to a large thesaurus of 64,000 lines (in the Belgian 3BT). Apart from the terminology on tradi-medicines developed in South Africa, both the LOCAS and the 3BT have been implemented in African countries, in particular in Cameroon [15] and in Rwanda [16]; and it is likely that the use of an interface terminology can sometimes avoid making local adaptations or even modifications to the classification [3]. Almost all terminologies interfacing with ICPC are also mapped to ICD-10, which is a standard classification. This double mapping allows, by a double coding, to share data with other health professional involved, particularly between the community and the hospital settings [6]. Actually, in countries such as Germany, The Netherlands, Belgium, and Norway, the interface terminology has been developed directly from the ICD, which probably makes the mapping between ICPC and ICD much reliable. However, it can be debated as to whether the best option to develop an interface terminology is based on a "top-down approach", using the controlled vocabulary of the ICD index, or on a "bottom-up approach", starting from the diverse dialects of general/family practice [17].

The mapping between some interface terminologies, like ICPC-Plus, and SNOMED-CT (reference terminology) is in progress [18]. When achieved, such mapping may allow data entry using the interface terminology, data storage and sharing using SNOMED-CT, and data aggregation according to the ICPC classification [19]. In such configuration, SNOMED-CT may allow the labeling of rare health problems included in the residual rubrics ("not elsewhere classified") of the ICPC, overcoming this weakness of classification systems [20]. SNOMED-CT terms may also appropriately represent the clinical problems in patient records [21]. However, SNOMED-CT is very large and includes aspects of medicine not related to general practice (e.g., veterinary medicine) and levels of specifity not required by general practitioners (in areas such as pathology). Moreover, the human coder will still need to validate the results in a list of matching candidates from the reference terminology. For these reasons, a subset of SNOMED-CT specific to primary care would probably be more convenient than the whole terminology [5], [22].

Globally, terminologies interfacing with ICPC have been poorly assessed until now. For some of them, descriptive data only have been published [23]-[25]. To our knowledge, only the Belgium 3BT thesaurus and the Canadian Encode-FM® have been assessed, respectively for validity and reliability in a survey performed in a hospital in Rwanda [16], and for reliability in Canadian primary care [26]. When assessing further these interface terminologies to ICPC, attention should be paid to distinguishing effects of the interface terminology and user interface attributes on usability [9].

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