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ICPC-2-E: the electronic version of ICPC-2. Differences from the printed version and the consequences

IM Okkes, M Jamoulle[a], H Lamberts and N Bentzen[b]

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Background. In 1998, ICPC-2 was published as a book. In the process of translating the book, and preparing an electronic version of chapter 10 (the actual classification), ICPC-2 proved to contain many errors and inconsistencies. Particularly, major problems were identified in the conversion between ICPC-2 and ICD-10, which could lead to major errors when used in electronic patient records.

Objectives. We prepared an electronic version of chapter 10 of ICPC-2, ICPC-2-E, with all necessary corrections, to be published on the Oxford University Press web site as a part of this article.

Methods. Errors and inconsistencies were redressed, including particularly those in the conversion structure with all consequences on the level of inclusion and exclusion criteria, through a process of careful checking.

Results and conclusion. ICPC-2-E, the electronic version of chapter 10 of ICPC-2, is specifically to be used in an electronic patient record and for research purposes. It is to be used together with the first nine chapters of ICPC-2, since the book is indispensable to make a correct use of ICPC.

Keywords. Family Practice, general practice, classification, electronic patient record, ICPC, ICD-10.

Introduction

The first edition of ICPC, the *International Classification of Primary Care*, published in 1987 by Oxford University Press, was accompanied by an electronic text file; also, the mapping or conversion structures from ICPC to ICHPPC-2, the Royal College Codes and the ICD-9 were included.[1] The limitations of the mapping were stated explicitly: only the conversion between ICPC and ICHPPC-2 could be relied upon as complete. The relationship with ICD-9, and consequently with the Royal College Codes and ICD-9-CM, was incomplete and only worked from ICPC towards ICD-9 and its related systems, whereas many gaps existed in the other direction. Consequently, the conversion structure was to be used mainly for reimbursement purposes, and not for episode-oriented epidemiological purposes, morbidity studies or patient documentation.[2,3]

The ICPC–ICD relationship underwent a substantial change when Oxford University Press published *The International Classification of Primary Care in the European Community* (1993), with a reliable and complete electronic conversion in both directions between ICD-10 and ICPC (the ICD chapters on external causes were not included).[4] Through a careful use of the signs 'plus' (indicating a class with a larger clinical content), 'minus' (indicating a class with a smaller clinical content) and 'R' (for rest categories), the editors made sure that the mapping contained no errors other than those based on arbitrary interpretations by the individuals responsible for comparing the two systems.[5,6] The most important advantages of this mapping were that it provided access to ICD-10 as a nomenclature for ICPC, and allowed both the multilanguage layer of ICPC and the national translations of the book to relate to the translations of ICD-10.[4,7–12]

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Academic Medical Centre/University of Amsterdam, Division of Public Health, Department of Family Practice, Meibergdreef 15, 1105 AZ Amsterdam, The Netherlands, [a]General Practitioner, Jumet, Belgium and [b]Institute of Public Health, Department of General Practice, Winslowsparken 19, DK-5000 Odense, Denmark.

ICPC is the ordering principle of the domain of international family practice, providing logically structured classes for this domain's common symptoms, complaints, diagnoses/health problems and interventions. It lacks, however, the specificity needed for documentation at the level of an individual patient in electronic patient records; ICD-10, as a nomenclature with ~12 000 labels that cover medicine at large, obviously provides far more detail.[13–16] Family physicians who use this mapping can be certain that the diagnostic label chosen from ICD-10 is included in the clinical content of the related ICPC class. In fact, ICD-10 thus serves as a terminology for ICPC because of the careful mapping of the clinical content rather than only the coding structure of both systems.[6]

ICPC contains many 'rag-bag' rubrics, in most of which many ICD-10 classes are included: these contain specific disorders as well as ICD-10 'rag bags'. Obviously, in an electronic patient record, a patient should not be labelled with a 'rag-bag' diagnosis, but with a specific diagnosis attached to an ICPC code to structure the database, and an ICD-10 label for additional specification.[14,17–22] Of course, even ICD-10 labels often will not suffice for the documentation of the full medical history of an individual patient, and free text will be necessary.

ICPC-2

In 1993, the WONCA International Classification Committee (WICC) started the preparation of ICPC-2, and, in doing so, faced several problems.[23] The first goal was to replace the old inclusion criteria of ICHPPC-2-Defined which were widely used together with ICPC.[24] These criteria did not always fit well, primarily because many users of ICHPPC-2-Defined did not realize that they were not diagnostic criteria but classification criteria, and second because the criteria were not related reliably to a mapping with ICD-9. It was decided, therefore, in an early stage of preparing ICPC-2 that the inclusion criteria should only be used as criteria to use the classification system optimally and to assign each episode of care to the best ICPC class available. By adding to each ICPC class the mapping to ICD-10 as explicit inclusions, ICPC-2 could in principle support the diagnostic process in family practice in an indirect way. The list of specific diseases from ICD-10, related to a far less detailed ICPC class, could thus serve as a terminology.

This, however, led to a new complication. The WICC now had to deal with the fact that the existing conversion structure of ICPC-1 did not aim at the highest level of specificity to use ICD-10 as a nomenclature, but at the lowest level of specificity to establish clinical compatibility.[25,26] As a consequence, an ICPC rubric was, whenever possible, mapped to one or more three-digit ICD-10 rubrics, instead of to all the four-digit rubrics included; four-digit ICD-10 rubrics were included only when necessary.

Translations

In the European study, 18 translations of the ICPC short titles (34–36 digits) were established. The collaborative effort to achieve this was substantial, and the process highlighted that the meaning of common terminology in family practice may shift considerably when represented in different languages. The use of synonyms and a more detailed terminology in the various languages was necessary in order to characterize the content of ICPC as an international classification system.[4] The comparative studies with ICPC in different languages helped to focus the attention of the WICC on this phenomenon. At the same time, the availability of ICD-10 and its large alphabetical index (>50 000 entries) in several languages induced a better understanding of the problems that needed to be solved. All translations of ICPC should, if possible, relate to various national translations of ICD-10 and its alphabetical index as a nomenclature for individual patient records, and as a terminology to better structure patient records based on ICPC; also, transmural data communication between GP/family physician and hospital specialists would be enhanced.[27]

ICPC-2 was published as a book in 1998, with inclusions, exclusions, criteria and considerations, together with the least specific conversion to ICD-10. The extent to which the mapping between ICPC-2 and ICD-10 could form the basis for the use of ICD-10 as a nomenclature in electronic patient records was at the time still unclear. Also, it was decided implicitly to give priority to ICPC as a diagnostic classification, although ICPC is also used as a classification for reasons for encounter and for interventions.

ICPC-2-E: the electronic version

Immediately after the publication of ICPC-2 as a book in English, preparations started for the provision of an electronic version in English, and of translations of the book and the electronic version in other languages. Much more than with the first edition, the need for an electronic version to be used in electronic patient records was acknowledged: the necessity to publish ICPC in book form in a specific language is often less pressing than the need to make it available in an electronic form with an alphabetical index with as much specificity as possible, based on ICD-10 (or ICD-10-CM) in that language, with the mapping structure allowing simultaneously coding with ICPC and ICD. The latter requirement is logical, since in many countries it currently is, or will be in the near future, the responsibility of family doctors to guard the continuity of episodes of care-oriented patient

CODE	D70
COMP	7
TEXT	GASTROINTESTINAL INFECTION
SHORT	GASTROINTESTINAL INFECTION
ICD-10	A00, A01, A02, A03, A04, A05, A06, A07, A08, A09
CRIT	a symptomatic patient with isolation or serological evidence of pathogenic bacteria, virus, or protozoan from either the stool or from food ingested
INCL	gastrointestinal infection/dysentery with specified organisms including campylobacter, giardia, salmonella, shigella, typhoid, cholera
EXCL	contact with/carrier of infective/parasitic disease A99; gastroenteritis presumed infection D73
CONS	gastroenteritis presumed infection D73
NOTE	
ICPC2	–1

FIGURE 1 *A print-out of rubric D70 in ICPC-2-E*

information over the years; this, of course, requires a seamless coding interface with electronic patient records of hospital specialists.

Unfortunately, in the process of translating and preparing the electronic version, it soon became clear that the hard copy of ICPC-2 contained many errors. In particular, major problems were identified in the conversion between ICPC-2 and ICD-10. The mapping of process codes to ICD-10 had to be removed and the ICD-10 asterisk codes which had been deleted had to be re-installed, also to better prepare for the use of ICD-10-CM in electronic patient records since family physicians in several countries already anticipate the introduction of ICD-10-CM as the system to be used routinely by hospital specialists (Figure 1). The decision not to assign '+' and '–' signs to the mapping resulted in a substantial number of errors found in a later stage. Moreover, a substantial number of other errors and inconsistencies became clear in the meticulous process of translating and back translating into Dutch, French, Spanish and Danish, a phenomenon well known from the literature.[28] These consisted of typographical errors, erroneous inclusions and exclusions and inconsistent referencing between rubrics.

It is in itself not unusual for a first edition of a new classification to contain numerous printing errors and other small lapses. This also occurred with the publication of ICPC-1, where the reprint was announced specifically by Oxford University Press as a corrected version. For ICPC-2 in its electronic version, this problem is even more important, since here relatively small imperfections can result in major errors in electronic patient records and in the use of the alphabetical index to ICD-10.

It was decided, therefore, that for the electronic version of ICPC-2, it was necessary to redress all errors and inconsistencies, including particularly those in the conversion structure with all consequences on the level of the text of the inclusion and exclusion criteria. Each conversion had to be checked painstakingly in both directions on a continuous basis, and a computer program warned every single time that a change in one direction resulted in an inconsistency in the reverse direction.

Discussion

The best decisions are always made with hindsight. The WICC at first underestimated the need to be exact and precise if ICPC-2 was to be used in an electronic format in patient records. The mapping between ICPC-2 and ICD-10 in particular contained too many errors; still, this was quite understandable. Two systems incorporating different ordering principles and characterizing different domains cannot be mapped perfectly in both directions. Whenever two different systems are mapped and their relationships are formalized, a host of arbitrary decisions are necessary, dealing with the numerous instances where a conversion problem occurs. For ICPC-1, these decisions were supported by sophisticated software and by a small group of experienced taxonomers who, while fully realizing that they sometimes were making arbitrary

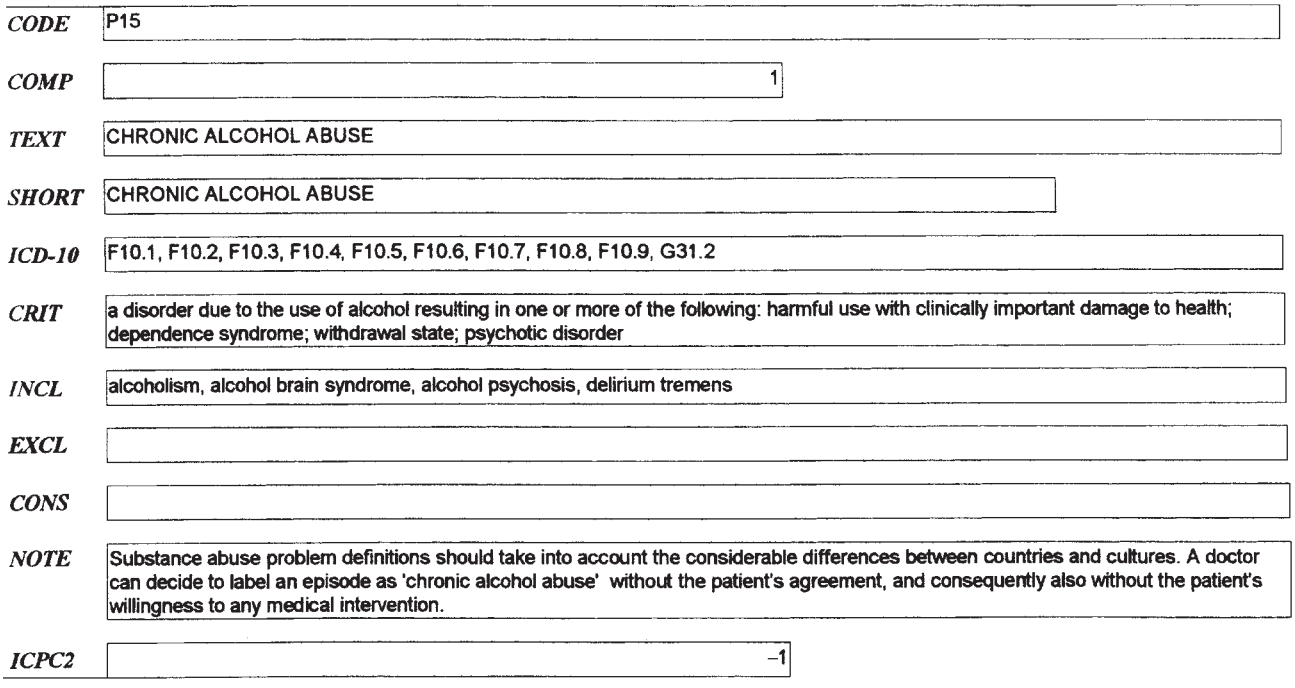

FIGURE 2 *A print-out of rubric P15 in ICPC-2-E*

decisions, tried to be as consistent as possible in doing this. As a consequence, it was difficult for a large international group of family physicians gathered in WONCA's Classification Committee, who all felt that they wanted to contribute to the process and understand the full implications of the work at hand, to agree with arbitrary decisions taken by a small group, a considerable time ago. This resulted in the decision not to 'complicate matters too much' and to focus on the content of the hard copy of ICPC-2, hoping for the best when ICPC-2 was to be used in electronic patient record systems.

It is now evident that this was not realistic. For the electronic version of Chapter 10 of the book, now presented on the Oxford web site as an integral part of this paper, these problems have been solved. Figures 1 and 2 illustrate how the electronic version, ICPC-2-E, looks; Figure 3 shows how ICPC allows the use of ICD-10 as a nomenclature at the level of the individual patient and as a terminology to define the clinical content of ICPC classes optimally, and indicates the differences between ICPC classes with potential overlap. Finally, Figure 4 illustrates the results of an error in ICPC-2, together with those of conceptual changes over the years.

The electronic version of ICPC-2 now available at http://www.fampra.oupjournals.org/content/vol17/issue6/ is completely in line with the first nine chapters of the book, and the book still is indispensable for anyone who wants to make correct use of ICPC. Chapter 10, however, differs at present from the printed version in an essential way. The electronic version is more adequate for use in an individual patient record, and for research purposes, since ICPC-2-E allows a better use of the alphabetical index of ICD-10 and its alphabetical index as an expert system. Within the next few years, ICPC-2 in book format should be realigned with ICPC-2-E; until then, the electronic version is to be considered the standard.

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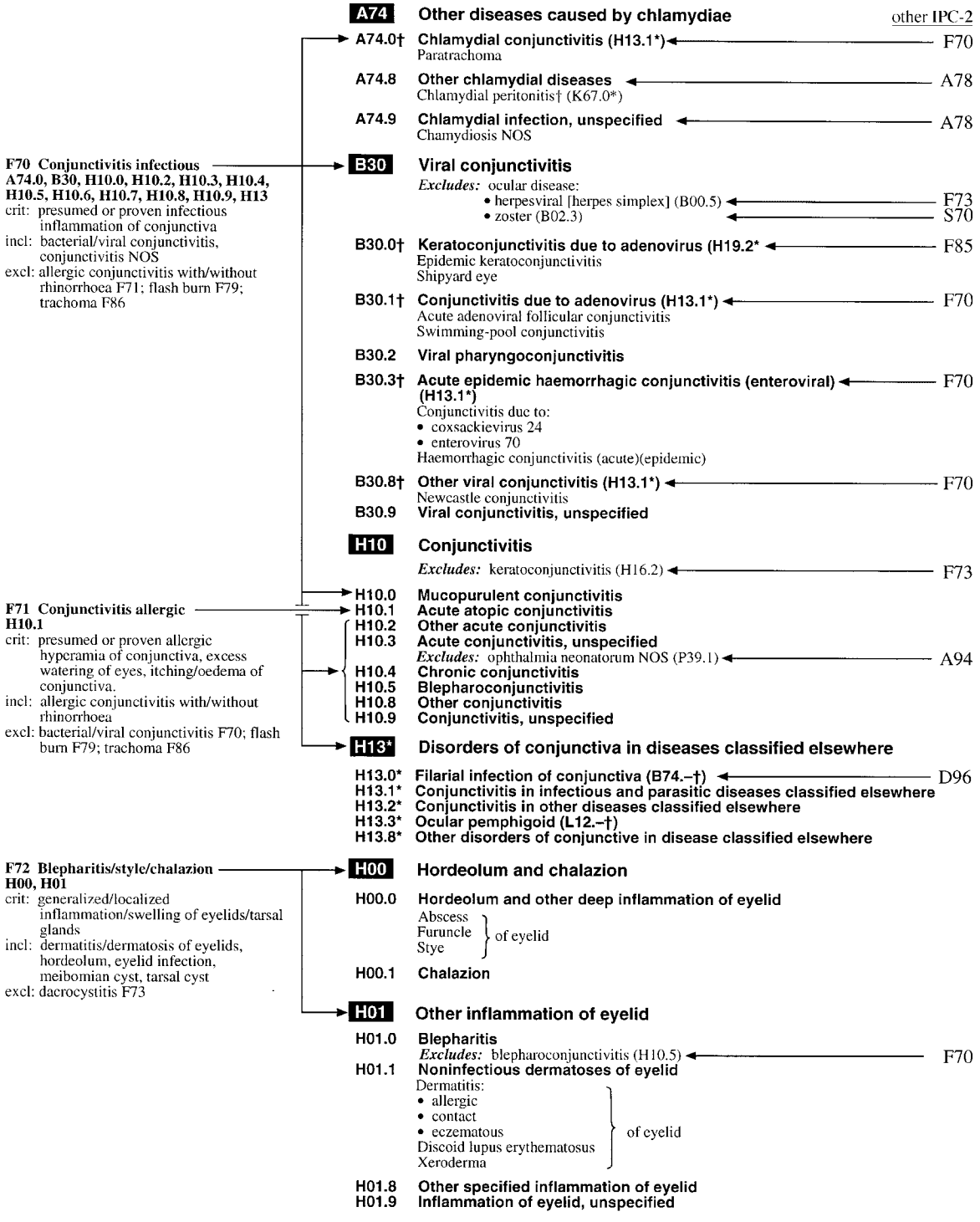

FIGURE 3 *The use of ICPC-2-E together with ICD-10*

The relationship between the ICPC-2 rubrics infectious and allergic conjunctivitis (F70 and F71) and blepharitis (F72) with ICD-10 are shown. Two ICPC-2-rubrics (F71 and F72) have a straightforward conversion structure with ICD-10. Allergic conjunctivitis (F71) has a one-to-one relationship with a four-digit ICD-10 rubric (H10.1). The rest of H10 relates to infectious conjunctivitis (F70). Blepharitis in ICPC-2 (F72) is completely covered by H00 and H01 in ICD-10. For a more specific description at the level of individual patients, H00.0 (hordeolum) can be distinguished from H00.1 (chalazion). Blepharitis (H01.0) can be distinguished from non-infectious dermatosis of the eyelid (H01.1) and other inflammations specified or unspecified (H01.8 and H01.9). The relationship of infectious conjunctivitis (F70) in ICD-10 is more complicated, and illustrates the problems discussed in this article. From other diseases caused by chlamydia (A74), only A74.0† is included (note: the dagger † indicates the underlying disease/aetiology; the asterisk * is used as an optional additional code for the manifestation). Here, both the aetiology and the manifestation are included in F70. The rest of the chlamydial diseases (ICD-10 rubrics A70, A71 and A74 go to A78 in ICPC-2, with the exception of trachoma, which is converted on a one-to-one basis to F86, to which also is added the ICD-10 rubric B94.0 (late effects of trachoma). All of viral conjunctivitis in ICD-10 (B30) is converted to infectious conjunctivitis in ICPC-2 at the level of the dagger: the aetiology. All of the localization (*) goes to F70 in ICPC-2 as well, with the exception of keratoconjunctivitis due to adenovirus (F85). In ICPC-2, keratoconjunctivitis is included in F70 (infectious conjunctivitis); only if the localization is related primarily to keratitis as a specific eye disorder is the relationship with F85 established. This is a good example of one of the dilemmas that have to be solved with the introduction of ICD-10-CM in order to achieve a better relationship with the approach of specialists (e.g. ophthalmologists, internists, dermatologists and paediatricians). All of H10 (conjunctivitis) in ICD-10, with the exception of acute atopic conjunctivitis, is included in H70 in ICPC-2 (infectious conjunctivitis). The exclusions named in ICD-10 are also excluded from F70 in ICPC-2. H13 is a typical asterisk or localization rubric in ICD-10, and the aetiology relates to ICD-10 in a rather complex way. Only H13.1 and H13.2 are converted, because of the localization, to F70 in ICPC-2. Because all helmintiasis (ICD-10 B65–B83) is converted as a cluster to D96 (worms) in ICPC-2, filarial infection of conjunctiva is included there. Finally, when pemphigoid, which is included in the skin chapter of ICPC-2 in the rag-bag rubric S99, is accompanied by an eye problem, it is still included in S99.

ICPC-1		Conversion to ICD-10 as given in ICPC-1	ICPC-2	Conversion to ICD-10 as given in ICPC-2	ICPC-2-E	Conversion to ICD-10 as given in ICPC-2-E
X75	Malign. neoplasm cervix ***incl. carc. in situ*** ***incl. PAP IV***	- C53 - D06	Malign. neoplasm cervix ***excl. carc. in situ*** ***excl. CIN III***	C53, D06	Malign. neoplasm cervix ***incl. carc. in situ*** ***incl. CIN III***	C53, D06
X77	Oth malign. neopl. female genital ***incl. other carc. in situ***	- C51,52,54,55,56,57 + D07	Other malign. neoplasm female genital *excl. carc. in situ*	C51,52,54,55,56,57	Malign. neopl. female genital other *excl. other carc. in situ*	C51,52,54,55,56,57
X81	Oth unspec. neopl. female genital.	- D39 - D48.6	Genital neopl. female other/ uncertain ***incl. carc. in situ*** ***incl. CIN III***	D05, D06, D07.0, D07.1, D07.2, D07.3 D39 D48.6	Genital neopl. female other/ unspec. *excl. carc. in situ* *excl. CIN III* *incl. other carc. in situ*	D05, D07.0, D07.1, D07.2, D07.3 D39 D48.6
X85	Cervicitis/ cervical erosion/ other cervical disease	+ A56.0 - N72 - N84.1 - N86 - N88	Cervical disease NOS ***incl. CIN I + II*** ***incl. cervical dysplasia*** *excl. abn. PAP Smear*	N72 N84.1 N86 **N87** N88	Cervical disease NOS ***excl. CIN I + II*** ***excl. cervical dysplasia***	N72 N84.1 N86 N88
X86	Abnormal PAP Smear PAP III A + B	**N87**	Abnormal PAP Smear *incl. CIN I+II+**III*** *incl. cervical dysplasia*	**R87**	Abnormal cervix smear *incl. CIN I+II* *incl. cervical dysplasia*	**N87**
A91	Investigation with abnormal results NOS *incl. abn. findings specimens female genital NOS*	- R83 - **R87** - R89 - R94	Abn. result invest. NOS	E83, R73, R74, R76 - R79, **R83 - R94**	Abn. result invest. NOS	E83, R73, R74, R76 - R79, **R83 - R94**

FIGURE 4 *The 'history' of malignancies of the female genital system in ICPC-1, ICPC-2 and ICPC-2-E*

The results of an error in ICPC-2, together with those of conceptual changes over the years, are illustrated with regard to malignancies of the female genital system, especially of the cervix. It can be seen that either a misunderstanding or a misprint (R87 instead of N87) has caused several problems in the hard copy of ICPC-2. As a consequence, the inclusion and exclusion criteria in ICPC-2 were mixed up and erroneous, probably also because it was not noticed that the change of N87 to R87 implied that the new CIN classification I + II, that by then had replaced the PAP classification, and included cervical dysplasia, was represented twice. Because the conversion structure with ICD-10 was not checked sufficiently, R87 was included not only in A91 but also in X85, which resulted in more misunderstanding. The electronic version of ICPC is now more in line with the earlier conversion structure between ICD-10 and ICPC, with the only difference that the 'other carcinoma *in situ*' in the female genital system is now included in X81 instead of in X77.

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