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INDEXING NURSING LITERATURE: COMPARATIVE ANALYSIS IN THE LIGHT OF THE STANDARD NURSING TERMINOLOGY ICNP® 2.0

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The article analyses the possibility of using the Standard Nursing Terminology (ICNP) as a source of standardised terminology for information retrieval languages. Profound differences between the dictionaries are identified together with internal inconsistencies in some information retrieval languages concerning terminology (orthography, synonyms) and grammar.

Key words: classification, the Standard Nursing Terminology (ICNP), thematic processing, terminology.

The international community of nurses has been witnessing a systematic development of The International Classification for Nursing Practice®[1] for decades. With it's beginnings in the mid-80ties of the 20th century, it evolves continuously, aiming in an optimal verbal reflection of a complex nursing practice. It's reliability as a professional terminological tool for this sphere of health care has been approved by the World Health Association, by inclusion of the ICNP® to the WHO's Family of Classification in the beginning of 2009, the same where the ICD-10, ICF, and other specialist terminologies can be found. Also projects concerning cross-mapping the ICNP® and SNOMED CT® terms have been realized for several years[2]. Such studies are undertaken to enhance the role of the ICNP® among other health vocabulary tools, as the one representative for the nursing specifics.

The purpose of this study is to analyze the potential of the International Classification for Nursing Practice® as a source of unified vocabulary to be applied in different information-retrieval languages (IRLs). The survey comprised of the following terminological sources:

– the ICNP® 2.0, available in the ICN C-Space Browser (the ICNP® users' portal);

– the keywords accompanying the original articles from *The International Nursing Review* (INR), volumes 54–56 for the years 2007–2009, and the clinical, scholarly and research papers from the *International Journal of Nursing Practice* (IJNP), volumes 13–15 for the years 2007–2009, the MeSH (Medical Subject Headings) vocabulary, and the headings accepted in science full-text databases (in individual example only).

These two journals mentioned above were selected regarding their relation and convergence with the ICNP®. The first one – as the title edited by the International Council of Nurses, being also the patron of the ICNP® Programme, and though supposedly putting

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[1] International Council of Nurses [Internet source]. – http://www.icn.ch/pillarsprograms/international-classification-for-nursing-practicer/ [cited 27.10.2010]

[2] International Council of Nurses [Internet source]. – http://www.icn.ch/images/stories/documents/news/bulletins/icnp/ICNP_Bulletin_Dec_2006_eng.pdf [cited 27.10.2010]; Park H. A., Lundberg C. B., Coenen A., Konicek D. J. Evaluation of the Content Coverage of SNOMED-CT to represent ICNP Version 1 Catalogues // *Connecting Health and Humans. Proceedings of NI2009.* – Vol. 146: Studies in Health Terminology and Informatics. – 2009. – P. 303–307.

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special attention to the vocabulary sphere of information indexing. The second – as reflecting in the title and contents the idea of the classification being surveyed – strong relation to the practical side of everyday nursing care. Both journals are published in English language, which is also the original language for the classification (either it is being continuously translated into many other languages from all over the world).

Last but not least, the ICNP® terms were mapped to the MeSH vocabulary, to follow the consistency of terminology being used in indexing professional nursing literature.

In the result of the first stage of survey, 1286 keywords were listed (653 for INR and 633 for IJNP), 104 of them were identical in form and contents for both titles. All the keywords were then mapped to the ICNP® 2.0, terminology, using the ICNP® Browser available at the ICNP® C-Space[3]. Only 195 terms (15% of the whole list) from both journals were consisted with the ICNP®, including 97 from among those identical for both titles (see *Table 1*). In further survey, 150 of terms found in the ICNP® were consisted with the MeSH terminology, including 25 from among the group of keywords identical for all sources.

Table 1.

INR and IJNP keywords vs. ICNP®. Source: own study

2005−2009	Total number of	Identical for both titles	Consisted with the ICNP®	%
INR keywords	653	104	65 (with INR only)	33
			33 (with INR and IJNP both)	17
IJNP keywords	633		97 (with IJNP only)	50
Total	1286		195	100

These results implicates many questions and observations.

Irregularities in journals' keywords. The very first surprise was the difference between keywords found in INR and IJNP journals. Disregarding a few inconsistencies in keywords management in both titles (see below), these information-retrieval languages were compatible with each other only in approximately 16%. Such a poor conformity can illustrate actual scope differences between these two titles. *International Nursing Review* does not concentrate on such practical aspects of nursing care as the other one. Most of those 104 compatible keywords are of general (neither specific nor professional) character, like: *evaluation, family, health, innovation, knowledge, patients, qualitative research, social support, violence*.

However, more careful analysis shows, that these incompatibilities result also from grammatical inconsistencies in keyword IRL in both titles. We can found many examples of:

a) terms in both singular and plural forms (like *attitude – attitudes*, *health professional – health professionals*, *nurse – nurses*, *patient – patients*);

b) inconsistencies in using singular and plural in general (keywords in different forms accepted in one journal);

c) adjectives accepted as independent keywords (*Heideggerian*, *international*, *narrative*, *pediatric*);

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[3] International Council of Nurses [Internet source]. – http://icnp.clinicaltemplates.org/ [cited 21.10.2010].

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d) different spelling (*breast-feeding – breastfeeding*, *paediatric – pediatric*, *health care – healthcare*);

e) grammatical forms which shall not be accepted in any IRL as an individual term, like *children's*;

f) synonymous terms (*geriatric nursing – gerontological nursing*);

g) very expanded phrases, which ideally shall not be accepted as keywords (like *men who have sex with other men* (INR); *comparison between USA and Jordan nursing informatics*, *fathers in teenage pregnancy* (IJNP)).

All of these inconsistencies impede the process of information retrieval. However, it shall be mentioned, that current guidelines for authors' submissions clearly define also requirements concerning keywords: their number, alphabetical order, and in case of the IJNP, also consistency with MeSH terms.

Specific and geographical names in keywords. Significant part of keywords' vocabulary belongs to specific and geographical names. The first type consists of:

a) people's names (and sometimes even adjectives, like *Husserl*, *Heidegger* and *Heideggerian*);

b) names of institutions (like *Aga Khan Health Service*, *International Council of Nurses*, *Royal Australian Army Nursing Corps*);

c) names of research tools (ex. *Paediatric Asthma Quality of Life Questionnaire*) or

d) theoretical concepts (*Orem's model*).

Geographical names (see *Table 2*) can be found in both titles, however with different frequency. They are much more often used in the *International Nursing Review* (65 from among 653 keywords in total) than in the *International Journal of Nursing Practice* (17 terms only). This difference can be reasoned by more "international character" of the previous title, as a publication of an entity of global range.

An analysis of a geographical dispersion of articles' contents can be interesting (although it does not fit to the scope of this article). Can anyone make any conclusions, reading the list of nations and states being described in there? African and Asiatic countries are more popular than European ones, indicating possibly current intensity of professional nursing research and practice development?

Table 2.

Geographical keywords in surveyed volumes of "International Nursing Review and International Journal of Nursing Practice"

International Nursing Review	International Journal of Nursing Practice
Africa: Arabic-Israelis, Arabic, Botswana, Cameroon, Jordan, Kenya, Madagascar, Malawi, Nigeria, Rwanda, Sierra Leone, South Africa, Sudan, Swaziland, Uganda, Zambia Americas: Amerindian, Brazil, Canada, Central and South America, Ecuador, Guyana, Mexico, Ontario, Peru, United States of America, USA Asia: China, Chinese, Hiroshima, Hong Kong, India, Iran, Israel, Japan,	Africa: Botswana, Cape Town, South Africa Americas: Canada, Hawaii Asia: China, India, Iran, Jordan, Jordanian, Malaysia, Philippines,

Korea, Kuwait, People's Republic of China, Philippines, Republic of Georgia, Singapore, Syria, Taiwan, Tajikistan, Thailand, Turkey, Viet Nam, Vietnamese Australia: Australia, New Zealand Europe: Balearic Islands, Denmark, England, Finland, Former Soviet Republic, Hungary, Ireland, Italy, Norway, Republic of Ireland, Slovenia, Sweden, UK, United Kingdom	Taiwan, Thailand Australia: Australian, Papua New Guinea Europe: European Union
Total: 65	Total: 17

One can also find a few inconsistencies in geographical keywords' management, regarding usage of different grammatical forms (like *China – Chinese* in INR, *Jordan – Jordanian* in IJNP) and different versions of country names (like *China – People's Republic of China*, *Ireland – Republic of Ireland*, *UK – United Kingdom*, *United States of America – USA* in INR). This can lead to misunderstandings among the users looking for articles concerning particular countries.

Keywords' compatibility with the ICNP®. Browsing the ICNP® V. 2.0 resulted in 195 terms (15 % of total list) found only, which could have been accepted as equivalents of the keywords selected during the first stage of the study. Among these 195, 65 were compatible with INR keywords only, 97 with IJNP ones, and 33 with the keywords representative for both journals. This result can be strongly influenced by the practical character of the classification, which original and primary application is in electronic patient records. The prevalence of the IJNP keywords with their ICNP® equivalents confirms, that the declared range of this journal is much closer to the ICNP® area of interest than the INR (as it could be assumed referring to their titles).

However, cross-mapping keywords and ICNP® terms was not a mechanical search for the concepts identical in both form and contents. It required careful analysis and selection, as the ICNP® terms are ordered in a multiaxial structure. This ordering itself is a kind of interpretation, for example whether *drug abuse* is "a focus" of nursing practice ("Focus" is one of seven fundamental ICNP® axes) or a "diagnosis" (diagnoses are being formulated in special catalogues from the terms derived from the axes).

One of the goals in this study was to find the ICNP® terms most compatible with the keywords found. The author was trying to reject the terms with suggested, limited application, i.e. used in phrases naming particular nursing diagnoses. In research practice it means for example, that the keyword *falls* (found in INR) does not have its ICNP® equivalent, as it exists in diagnostic phrases only (*teaching fall prevention, assessing risk for falls, teaching the family about falls prevention, demonstrating falls prevention*). This form of presence in the classification is not accepted as an equivalent, regarding its suggested interpretation of the concept and its application. However, if the keyword *fall* could have been used in the journal, it could also be found in the ICNP® focus axis (as a type of event, episode or symptom).

In cross-searching different singular/plural forms between keywords and the ICNP® were accepted, regarding the fact, that each terminological system has its own grammatical rules. The classification is grammatically coherent, as it accepts singular forms only in its

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axes. However, this is in contrary to the MeSH, where plural forms are accepted (I will return to this later).

There are several other reasons of a poor conformity between keywords and the ICNP®:

– the ICNP® does not comprise of specific nor geographical names, which makes approximately 10 % of the INR keywords, and a bit less part of the IJNP vocabulary;

– names of illnesses are included rather in general forms, and only if they refer to a specific nursing care. For example one cannot find the *Alzheimer's disease*, nor the *diabetes mellitus type 1* (or 2), but *diabetes* itself is a term from the "Focus" axis;

– terms referring to research activity, naming procedures, techniques, or tools (*like qualitative inquiry, qualitative interview, qualitative methods, qualitative research, qualitative study*), are not listed in the classification, as it's primary goal is to describe practice, not research activities.

This poor result of terminological compatibility can be seen as an indication for the ICNP® development trends, to be discussed in the conclusion section below.

Problematic duplication of information-retrieval languages? All the phenomena and questions described above are accompanied, and probably increased, by inconsistencies in indexing information. The articles described with the keywords according to the editors' guidelines (and in accordance with the MeSH terminology) and journal publisher's rules, are very often indexed again by the editors of science literature databases, with quite different selection of terms.

For example one of the articles from the *International Nursing Review* – titled *Self-reported gastrointestinal and cardiovascular symptoms in female Turkish nurses*[4] – is indexed by the authors with the following terms: *cardiovascular symptoms; gastrointestinal symptoms; lifestyle; nurse; occupational health; Turkey; working conditions*.

However, the EBSCO Academic Search Complete (ASC) indexes this article with the following set: *nurses; health; industrial hygiene; cardiovascular system – diseases; prevention; gastrointestinal system – diseases; lifestyles; work environment; industrial nursing; Turkey*.

As one can see, there is only one term unavoidably identical in both lists: Turkey. The IRL being used in ASC is not a simple keywords indexing, it looks more like a subject heading (regarding grammar, for example), with no alphabetical order kept.

From the one hand, every publisher has a right to choose an IRL for indexing. From the other – isn't it a complication for the users? A complication that they are not even aware of? Using a couple of terms they know, and trying to reach an article via different systems (directly from the Wiley's portal or indirectly – via ASC), they may fail due to vocabulary differences.

Analysis of the journals' keywords, and mapping them to the ICNP®, demonstrates current status of this information-retrieval language, as well as the classification's potential application in texts' indexing. The suggestion (in IJNP guidelines for authors) concerning preferred usage of the MeSH vocabulary for indexing articles gives the hope for more organized and coherent tools for successful information searching. Grammatical and spelling irregularities suggest limited awareness of their consequences or carelessness among the authors. Referring to incorrect (too long or too colloquial) expressions, the question arises whether trends of folksonomy influences negatively "the art of indexing" science texts. The

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[4] Yildiz F. A., Esin M. N. Self-reported gastrointestinal and cardiovascular symptoms in female Turkish nurses // *International Nursing Review*. – 2009. – December. – No 56 (4). – P. 491–497.

folksonomy itself cannot be perceived negatively, however its users shall be able to differ this method of tagging information with words or phrases of natural language from the limited vocabulary of an artificial information-retrieval language.

The scope of the ICNP®'s vocabulary has been developed for years, however significantly limited to practical aspects of nursing care. The poor result of mapping emerges firstly in the formal aspect of terms, like differences in grammar and spelling of individual words. Another problem arises regarding keywords consisting of two and more words. Such a phrases are not included in main ICNP® axes. They can be found among phrases of nursing diagnoses, however this can result (as already mentioned) in limitation of their interpretation, depending of the main theme of the diagnoses' catalogue.

Apart from the vocabulary referring strictly to nursing practice, the ICNP® includes neither specific names, nor research terminology (theories, tools, techniques, etc), often listed in indexing articles presenting the results of surveys or studies.

These specifics of the ICNP® described above suggests that it's vocabulary could not be commonly used as simple keywords' source, due to its limitations. Current linguistic and information research[5] suggests, that it would not be profitable, regarding the users' competencies and needs, as well as construction of information-retrieval systems. The latter development trends are mostly based on application of natural, not artificial IRLs.

This "vocabulary modesty" induced me to make one more analysis, i.e. mapping the ICNP® terms found as identical (or very close to) with the keywords, to the lexis of the most popular health information-retrieval language, i.e. MeSh (English version). In the result all the classification terms found their MeSH equivalents – either identical, or synonymous (to be arrived via reference system). The main difference between these two IRLs lies in the grammatical rule – the MeSH includes nouns in plural mostly, the ICNP® - in singular. This uniformity seems to be promising, as one can assume, that a nurse used to the classification shall have no (or less) problems in searching commonly-known health information systems or databases, like Medline. Additionally, editorial requirements for the authors consistently refer them to the MeSH terminology as a source of potential keywords, suggesting strongly the way one shall go, indexing own text.

Basic conclusions from the survey done regard either the keywords or the ICNP® functionality as a lexical tool used for information indexing and retrieval.

The classification has a vocabulary still quite limited, though being developed continuously. We can observe two directions of the ICNP® development. The first refers to permanent enrichment of vocabulary, aiming at holistic reflection of all nursing practice. The other – to facilitate the classification's usage in nursing documentation, thanks to the catalogues of diagnoses prepared for particular nursing specialties. Those catalogues consist of "ready-to-use" phrases or sentences built from individual terms taken from particular axes, naming particular nursing diagnoses. The rules of their construction are formulated mainly in the ISO standard for nursing reference terminology[6]. This facilitation however results also in automatic interpretation of phrases, limiting potential applicability of the ICNP® as an information-retrieval language.

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[5] Bojar B. Języki informacyjno-wyszukiwawcze, wczoraj, dziś czy jutro? // *Zagadnienia Informacji Naukowej*. – 2009. – Nr 1. – S. 3–24; Skalska-Zlat M. Języki nauki o informacji – w poszukiwaniu nowych rozwiązań // *Książka zawsze obecna. Prace ofiarowane Profesorowi Krzysztofowi Migoniowi*. – Wrocław, 2010. – S. 79–88.

[6] *International Standard Organization (ISO) 18104:2003. Health Informatics – Integration of Reference Terminology Model for Nursing*. – Geneva, 2003. – 28 p.

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The classification has not covered research concepts yet. The ICNP® Programme coordinators could probably consider inclusion of the terminology naming activities, procedures, techniques and tools used in nursing research. This collection would not probably be used in documenting patient care. However, it could be prepared as a source of unified, accepted professional terminology, to be used in publications (both in main texts, abstracts and keywords). Probably a discussion-worth factor is the fact, that more and more nurses realize different studies and surveys in their everyday work, needed for their professional development. The universality of evidence-based nursing also confirms such an idea.

It is obvious that introduction of each new term is being done according to rigorous procedures, requiring time. However we can hope, that the terms like *emergency nursing*, *informal care*, *lifestyle*, *mental health*, *motivation*, *observation*, *osteoporosis*, *refugee camp*, *satisfaction*, *teamwork*, *therapeutic touch* will soon find their place in adequate ICNP® axes. My particular attention has been caught by the issues of nursing care for refugees, immigrants and all other displaced persons. This serious and continuously up-to-date topic deserves not only list of terms, but the whole individual catalogue of diagnoses, I suppose. If there are already synonymous terms in the ICNP®, I would like to suggest again[7] the need and usability of making an index of ascriptors, including the list of those terms which will never be accepted in the classification, with references to descriptors.

Particular analysis of the keywords being used in both surveyed journals resulted in either positive impressions or disappointments. These positive concern mainly the compatibility of many terms with the MeSH vocabulary, regular alphabetical order, variety of concepts. Those negative are related to lacking care for grammatical or spelling correctness, too many synonyms, lacking precision, redundancy of terms. Problems in unconstrained selection of terms can be partially caused by popularity of folksonomies and free tagging, which shall not be accepted in each and every information-retrieval system (but I do not refuse their usability in particular information sources). Carelessness in keywords' selection (by authors and editors) can unfortunately lead to mess and actual losses in information searching. The latter can be dramatically increased by actual duplication of information-retrieval languages, as mentioned above. Maybe the general idea of developing the ICNP® as a source for better (more clear and effective) professional communication, can be also realized in using this vocabulary not directly in indexing literature, but – as an ultimate goal – as a source FOR different information-retrieval languages used for nursing field. Such a solution would be benefitting both for the users and the publishers, resulting in effective and satisfying information searching.

The results of the survey described can be an illustration of phenomena and processes occurring in information-retrieval languages specific for the nursing domain. It's limited range and concentration on selected keywords and the ICNP® enabled isolation and indication of problems and challenges being faced. However, it seems to be a pick of an iceberg only. Potential description of current changes and future of indexing nursing literature would require profound comparative studies of other keywords, subject headings, thesauruses etc. being used by different entities in information work, along with analysis of the users' information competencies and behaviours.

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[7] Kisilowska M. Reorganized structure and other proposals for the ICNP® development // *International Nursing Review*. – 2001. – No 48 (4). – P. 218–223.

ІНДЕКСУВАННЯ ЛІТЕРАТУРИ ПО СЕСТРИНСЬКІЙ СПРАВІ: ПОРІВНЯЛЬНИЙ АНАЛІЗ У СВІТЛІ СТАНДАРТНОЇ ТЕРМІНОЛОГІЇ СЕСТРИНСЬКОЇ СПРАВИ ICNP® 2.0

Малгожата КІСІЛЬОВСЬКА

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Проаналізовано можливість використання Міжнародної класифікації сестринської справи (ICNP) як стандартизованого джерела термінології для інформаційно-пошукових мов. Констатуються значні відмінності між словниками, а також внутрішні неузгодженості у деяких інформаційно-пошукових мовах, які стосуються термінології (орфографія, синонімія) та граматики.

Ключові слова: класифікація, Міжнародна класифікація сестринської справи, тематичне опрацювання, термінологія.

ИНДЕКСИРОВАНИЕ ЛИТЕРАТУРЫ О СЕСТРИНСКОМ ДЕЛЕ: СРАВНИТЕЛЬНЫЙ АНАЛИЗ В СВЕТЕ СТАНДАРТНОЙ ТЕРМИНОЛОГИИ СЕСТРИНСКОГО ДЕЛА ICNP® 2.0

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Проанализирована возможность использования Международной классификации сестринского дела (ICNP) как стандартизированного источника терминологии для информационно-поисковых языков. Констатируются значительные различия между словарями, а также внутренние несогласованности в некоторых информационно-поисковых языках, касающиеся терминологии (орфография, синонимия) и грамматики.

Ключевые слова: классификация, Международная классификация сестринского дела, тематическая обработка, терминология.