

# How Nurses are Using the International Classification of Functioning, Disability and Health: An Integrative Review

## ABSTRACT

**Aim:** The purpose of this study is to report the results of an integrative review of use of the International Classification of Functioning, Disability and Health (ICF) by nurses. This review is justified by the need for further investigation into use of the ICF in nursing, by nurses, so as to contribute to dialogue for the development of global, interdisciplinary and classification system comprehension. **Methods:** This integrative review included studies from 2001 to May 2015 in peer-reviewed journals. Two reviewers independently screened titles and abstracts for inclusion and completed data extraction. The papers were sourced from a number of electronic databases: MEDLINE/NML/PubMed, Web of Science, LILACS, CINAHL and SCIELO. **Results:** Twenty-six articles were included. Three themes on use of the ICF were identified: clinical nursing practice; teaching nursing students and nurses; and nursing research. **Conclusion:** This review helps nurses to visualise how and in what care environments the ICF is being used. It demonstrates the ICF has been used specifically in the rehabilitation nursing field, but offers some evidence of its use in occupational health as well.

## KEYWORDS

International Classification of Functioning, Disability and Health; nursing research; review; delivery of health care; nursing (source: DeCS, BIREME).

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# *Cómo las enfermeras están utilizando la Clasificación Internacional del Funcionamiento, la Discapacidad y la Salud: una revisión integrativa*

## RESUMEN

**Objetivo:** el propósito de este estudio es reportar los resultados de una revisión integrativa de la utilización por parte de las enfermeras de la Clasificación Internacional del Funcionamiento, la Discapacidad y la Salud (ICF, por su sigla en inglés). Esta revisión se justifica por la necesidad de una mayor investigación sobre el uso de la ICF en enfermería, a cargo de las enfermeras, a fin de contribuir al diálogo para el desarrollo de la comprensión global e interdisciplinaria del sistema de clasificación. **Métodos:** revisión integrativa que incluyó estudios del 2001 a mayo del 2015 publicados en revistas revisadas por colegas. De forma independiente, dos revisores inspeccionaron los títulos y los resúmenes para su inclusión y completaron la extracción de datos. Los trabajos se obtuvieron a partir de una serie de bases electrónicas de datos: MEDLINE/NML/PubMed, Web of Science, LILACS, CINAHL y SCIELO. **Resultados:** veintiséis artículos fueron incluidos en el estudio. Se identificaron tres temas en cuanto al uso del ICF: la práctica clínica de enfermería; la enseñanza a los estudiantes de enfermería y a las enfermeras; y la investigación en enfermería. **Conclusión:** esta revisión ayuda a las enfermeras a visualizar cómo y en qué entornos de atención se está aplicando la ICF. Demuestra cómo la ICF se ha utilizado específicamente en el campo de la enfermería de rehabilitación, pero también ofrece alguna evidencia de su uso en salud ocupacional.

## PALABRAS CLAVE

Clasificación Internacional del Funcionamiento, la Discapacidad y la Salud; investigación en enfermería; revisión; prestación de asistencia en salud; enfermería (fuente: DeCS, BIREME).

# *Como as enfermeiras estão utilizando a Classificação Internacional do Funcionamento, da Deficiência e da Saúde: uma revisão integradora*

## RESUMO

**Objetivo:** o propósito deste estudo é relatar os resultados de uma revisão integradora da utilização, por parte das enfermeiras, da Classificação Internacional do Funcionamento, da Deficiência e da Saúde (ICF, por sua sigla em inglês). Esta revisão se justifica devido à necessidade de uma maior investigação sobre o uso da ICF em enfermagem, sob a responsabilidade das enfermeiras, a fim de contribuir com o diálogo para o desenvolvimento da compreensão global e interdisciplinar do sistema de classificação. **Métodos:** revisão integradora que incluiu estudos de 2001 a maio de 2015, publicados em revistas revisadas por colegas. De forma independente, dois revisores analisaram os títulos e os resumos para sua inclusão e completaram a coleta de dados. Os trabalhos foram obtidos a partir de uma série de bases eletrônicas de dados: MEDLINE, NML, PubMed, Web of Science, LILACS, CINAHL e SciELO. **Resultados:** 26 artigos foram incluídos neste estudo. Identificaram-se três temas a respeito do uso do ICF: a prática clínica de enfermagem; o ensino aos estudantes de enfermagem e às enfermeiras; a pesquisa em enfermagem. **Conclusão:** esta revisão ajuda as enfermeiras a visualizarem como e em que ambientes de atenção está sendo aplicada a ICF. Demonstra como a ICF tem sido utilizada especificamente no campo da enfermagem de reabilitação, além de oferecer alguma evidência de seu uso em saúde ocupacional.

## PALAVRAS-CHAVE

Classificação Internacional do Funcionamento, da Deficiência e da Saúde, pesquisa em enfermagem, revisão, prestação de assistência em saúde, enfermagem (fonte: DeCS, BIREME).

## Introduction

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The International Classification of Functioning, Disability and Health (ICF) provides a unified language and constitutes a framework for describing health and health-related states. The ICF offers definitions of functioning and disability, based on the understanding that the term encompasses all aspects of the body's functions, activities and restrictions to participation (1).

The current ICF model was approved by the World Health Assembly in May 2001, after several test versions. This model is based on the articulation of social and biomedical models, using a bio-psycho-social approach to visualise the integration of various dimensions of health (biological, individual and social) (1, 2). The concepts of the ICF introduce a new paradigm of work impairment and disability, which are determined by health conditions/illness, context (physical and social environment), different cultural perceptions and attitudes towards disabilities, and the availability of services and legislation (3).

Functionality is prioritised as a health component within the ICF, considering the environment both as a facilitator and as a barrier to performing activities and for participation. Thus, disability is the result of a series of situations and conditions that include the environment, health and personal conditions (1).

From this perspective, it is understood that healthcare professionals/nurses, along with other members of society, share responsibility in the planning and development of technology that constitutes facilitators for activities and the participation of people in different life situations. Understanding, therefore, that the performance of these people can be enhanced by environmental changes, such as physical, social and/or attitudinal, it offers different perspectives of an expanded view of health: biological, individual and social.

In the rankings of the World Health Organization (WHO), health states (including diseases and disorders) are classified according to the International Classification of Disease. The tenth revision (ICD-10) provides a structured aetiological basis. Functioning and disability associated with health conditions are classified in the ICF. Thus, ICD-10 and the ICF are complementary and provide a significant and broader view of human health, which may contribute to decision making (1).

According to WHO (1), the ICF is being used as a statistical, investigative, clinical, social and pedagogical tool. The ICF is used in clinical practice for several specialties, assisting in both assessment and decision making. Its socio-political application is evident in some countries within the framework of legislative changes or policy and social regulation. It also is used in the educational system as a conceptual framework for teaching/learning or for curricular units (4).

The number of published papers related to the ICF is increasing, but they are only evident in the areas of rehabilitation, paediatrics, care of the elderly, chronic disease, stroke, spinal cord injury and mental illness. These papers are written mainly by speech therapists, occupational therapists, physicians and physiotherapists (5).

This review is justified by the need for further investigation into use of the ICF in nursing, by nurses, to contribute to dialogue for the development of global, interdisciplinary and classification system comprehension. Clearly, the ICF is an important tool for nurses working in a number of different areas. It is, therefore, necessary to discover how it is used and how its use contributes to the work of nurses. Three study questions were defined: How is the ICF used by nurses? In what environments is the ICF being used? And, how does the ICF contribute to the work of nurses?

## Aim

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The purpose of the study is to report the results of an integrative review of use of the International Classification of Functioning, Disability and Health (ICF) by nurses.

## Design

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It is an integrative review that offers the opportunity for a comprehensive understanding of certain phenomena by analysing specific theoretical or empirical literature. An integrative review has the potential to expand nursing science, informative research and practice and policy initiatives, through a synthesis of evidence (6).

Evidence can be classified hierarchically, according to the methodological approach used in studies. In this integrative review, the following classification of level of evidence was adopted: level 1 – evidence from a systematic review or meta-analysis of randomised controlled trials or evidence derived from clinical

guidelines based on systematic reviews of randomized controlled trials; level 2 – evidence from at least one well delineated randomised controlled trial; level 3 – evidence from well-designed clinical trials without randomization; level 4 – evidence from cohort and case-control well delineated trials; level 5 – evidence from a systematic review of descriptive and qualitative studies; level 6 – evidence from a descriptive or qualitative study and; level 7 – evidence from the opinions of authorities and /or reports by expert committees (7). Knowledge of this evidence classification in publications related to the ICF system is crucial to be able to critically assess the results derived from these surveys, assisting in decision-making about the incorporation of evidence into clinical practice (8).

The search strategy included literature from 2001 to May 2015 found in MEDLINE/NML/PubMed, Web of Science, LILACS, CINAHL and SCIELO. The search terms were the “International Classification of Functioning, Disability and Health” and “Nursing”. The inclusion criteria were: 1) full papers available electronically in MEDLINE/NML/PubMed, Web of Science, LILACS, CINAHL and SCIELO, which met the aim of the research, 2) papers published since May 2001 with the approval of the current model of the ICF by the World Health Assembly (1), 3) papers with at least one nurse among the authors, 4) summary presentation for initial examination, and 5) articles in Portuguese, English or Spanish. The items excluded were: abstracts published in proceedings, book chapters, theses, dissertations and editorials.

The abstracts were read and analysed in order to refine the sample and select the articles according to the inclusion / exclusion criteria. Articles repeated in more than one database were only considered once. Table 1 lists the articles and their respective databases.

The search strategy yielded a total of 130 references, many of which were duplicates. From the full analysis, a total of 26 articles were obtained: 17 from MEDLINE/NLM/PubMed, four from Web of Science, two from LILACS, two from SCIELO and one from CINAHL.

The studies were initially divided into groups, according to the methodological approach (quantitative, qualitative, theoretical discussions, critical and a theoretical model). They were evaluated independently by the lead author and a research assistant, using a quality appraisal checklist developed by Bowling (9) and modified by Desborough, *et al.* (10). Discussion resolved any dis-

crepancies to reach a 100% consensus. As appropriate for an integrative review, this appraisal included clarity in aims, methods, statistics, discussion and implications.

The methods suggested by Whittemore & Knafl (6) were followed for the data abstraction and synthesis. Two tables were developed to synthesise the data. Table 1 lists: author, year, country, knowledge area, aims, methodological approach, results and database. Table 2 lists: author, year, country, subject numbers, ICF use, ICF related instruments, environments in which the ICF was used and ICF contributions to the work of nurses. The format of the tables made the comparative analysis of the extracted information and patterns apparent, enabling identification of the themes.

## Results

The studies originated in Germany/Switzerland (n=6), Brazil (n=5), the Netherlands (n=3), Australia (n=2), Sweden (n=2), Canada (n=1), the USA (n=1), the USA/Canada (n=1), Finland (n=1), Norway (n=1), Switzerland (n=1) and Taiwan (n=1). The articles are dated between 2004 and 2015, with the largest number of publications in 2005 and 2013.

The principal authors of the publications are: Boldt C, with seven publications and Stucki G, with five. Most of the papers appeared in the following journals: *Journal of Advanced Nursing* (n=5), with an impact factor of 1.477, and *Disability and Rehabilitation* (n=4), with an impact factor of 1.498 (11). Sixteen were quantitative, four were qualitative, three were theoretical discussions, one was critical, one was a theoretical model and one was reflective. Regarding the strength of the evidence, twenty articles (76.92%) were evidence level 6 and six articles (23.07%) were evidence level 7. Seventeen articles presented research subjects and seven of these were conducted with patients, six with nurses, two with expert groups, one with undergraduate students, and one with healthy workers. The subject numbers in the studies ranged from one to 469.

## Defining Themes

Three themes were identified from the literature review: ICF use in clinical nursing practice, ICF use in teaching nursing students and nurses, and ICF use in nursing research.

## ICF Use in Clinical Nursing Practice

Evidence showed there are attempts to apply the ICF in clinical nursing practice in fourteen selected articles (12-26). In most articles (n=9), ICF application in clinical practice is defined in the Rehabilitation Nursing area (13, 15-21, 26), directed primarily to nursing interventions (n=4) with patients in acute and post-acute situations requiring rehabilitation (13, 17) and patients with spinal cord injury (16, 21, 26).

The study by Boldt (13), which sought to determine if the ICF covers the goals of nursing interventions and to identify areas of functioning, disability and health most relevant to nursing practice, found that one hundred and eighteen different nursing interventions were documented. For each intervention, nine ICF categories were identified. Nursing intervention goals were linked to 67 different ICF categories at the second level. Of the 67 categories, 30 belong to the component Body Functions, 19 to the component Body Structures, 13 to the component Activities and Participation, and five to the component Environmental Factors. All registered nursing interventions could be related to at least one ICF category.

Mueller *et al.* (17), who identified the ICF categories relevant to nursing care in acute situation and post-acute rehabilitation, showed eighty-seven percent of the categories defined by the ICF may be related to goals of at least one variable of nursing intervention. The nursing interventions that were linked to the highest number of different ICF-categories were "therapeutic intervention", "patient-nurse communication/ information giving" and "mobilizing".

These results suggest the ICF is relevant to Rehabilitation Nursing attempts to relate nursing interventions to the codes of the ICF through the development of Core Sets, which can provide viable inter-professional communication, maintaining the patient's needs as a priority. Thus, the ICF can be a useful tool to define nursing intervention goals (17).

In seeking evidence of whether the ICF covers nursing interventions and identifies the areas of functioning, disability and health most relevant to nursing practice in the treatment of patients with spinal cord injury, the study showed this initiative represented the first step towards identifying a list of categories

relevant to nurses caring for patients with spinal cord injury intervention, according to the language of the ICF (16). This fact has stimulated research in this respect.

This is demonstrated in a study that shows implementation of the ICF helps in the care for people with spinal cord injury, identifying 823 responses that have been linked to 143 ICF categories (21).

The ICF use creates a data set that allows nurses to compare their contributions to patient care with those of other health professionals and on an international basis. However, the authors suggest future research should be conducted to confirm the usefulness of this set of data in clinical practice and to contribute to the process of ICF updating (21).

Such evidence of the ICF in clinical nursing practice, which confirms the identification of its use, has been developed mainly in the field of Rehabilitation Nursing. It is notable among these studies, particularly the study by Machado & de Figueiredo (18), that an assistive technology was planned and developed through the ICF framework to reduce the level of dependency and to assist in the performance of daily activities and self-care for patients with large brain traumatic injury.

Two studies conducted at the University Medical Center showed the applicability of the ICF in nursing, with a focus on processes/nursing diagnoses according to the North American Nursing Diagnosis Association (NANDA) Taxonomy II Nursing Diagnoses, their conceptual relations and their use in clinical practice (12, 14). It was found that the vast majority of topics addressed in nursing diagnoses can be classified by the ICF and that more identified codes were related to the Body Functions and Activities components (12).

To systematically explore ICF use for clinical nurses, it was found that the figures for the three-digit codes in the selected studies were substantial, showing a predominant focus on Body Functions (53%), Activity components (38%), Participation (19%) and Environmental Factors (37%) (14), demonstrating the ICF can be a useful working tool for nurses to classify and report patient functionality aspects.

It should be noted that studies concerning nursing interventions and procedures/nursing diagnoses in relation to the ICF more easily identify the Functions and Structures of the Body components than Activities and Participation and Environmental

factors. This is more prevalent because the nursing care environment in these studies; namely, the hospital environment is inclined towards identifying these components. However, it is understood that nurses' visualization of all ICF components for expanded recognition of the patient's needs in rehabilitation is required.

Lakke *et al.* (22) showed the application of the ICF in clinical practice, unlike other selected studies. The ICF was used in connection with tests of Functional Capacity (FC) in healthy workers, thereby revealing other possible uses. The study showed that material handling FC tests were related to physical factors, but not to the psychosocial factors recorded in this study. The construction of static work FC tests remained largely unexplained. One limitation of the study was that cross sectional design is not suitable for the prediction of future work performance or future work disability.

## ICF Use in Teaching Nursing Students and Nurses

From the literature reviewed, it was found the ICF contributes as a conceptual model for teaching nursing students and nurses. It also presents a comprehensive rhetoric, with numerous possibilities to contribute to nurses' work, but without a well-defined clinical practice application.

The ICF conceptual model encourages undergraduate nursing students to think comprehensively, by considering people as bio-psychosocial beings who are part of groups, such as the family and community. They have roles within these groups that influence and are influenced by these environments. In addition, the ICF model enables re-conceptualisation of the term disability, understanding it as a social, political and cultural human experience (5).

The study searched for ICF evidence in assessing patients in rehabilitation, which was carried out by graduate students in nursing. It found there is evidence of the building blocks of the ICF in the assessments. The assessments were designed using the form of daily activities to sustain life and/or participate in life. The documentation of information was found to be higher in relation to the Body Function and Personal Factors components, rather than Activities and Participation, supporting the suggestion that there is resonance between the building blocks of the ICF and nursing (27). This demonstrates a possible ICF contribution in

assessing and planning of the health needs of people with disabilities who are under the care of nurses (27).

Another aspect that became evident was that the bio-psychosocial approach to the ICF is required for all aspects of care. This approach provides the rehabilitation nurse with a look at the environmental, personal, external and internal factors, which can be modified to reduce, for example, the risk of pressure ulcers and frailty in the elderly (28).

In presenting a discussion of ICF conceptual relations and practices, NANDA and their use in nursing practice, Boldt *et al.* (29) showed NANDA enables compliance with requirements that are exclusively related to nursing, and application of the ICF is useful for nurses to communicate nursing problems with other health professionals in a common language. For nurses, sharing knowledge with other health care workers can contribute to a broader understanding of patients' situation.

## ICF Use in Nursing Research

The ICF contributes as a theoretical framework for nursing research (30-32). It could play a part in the following: expanding the attitude towards the risk factors of pressure ulcers in frail elderly patients (28); understanding the process of disability caused by osteoarthritis (33); broadening nurses' perspectives when caring for stroke survivors (15); and defining the goals of nursing intervention (17), as well as investigating the conceptual relationships and practices of the International Taxonomy of Nursing Diagnoses (29). It also contributes to the International Classification for Nursing Practice (35) and to discussions of how the ICF can be useful in furthering social change through health promotion and health education for all persons with disabilities (35).

However, five of these pieces of research (28, 29, 32, 33, 35) demonstrate results through methods with evidence level 7, which means evidence from the opinion of authorities (7). This is a weak factor for the immediate inclusion of this evidence into clinical practice. However, these findings provide insights for future research by incorporating methods that provide stronger levels of evidence. In quality analysis performed with a specific instrument (9, 10), six of the nine studies presented above reported discussions about the limitations of the study and the method used, which takes advantage of the verification of weaknesses and potential issues for further research.

Studies (17, 19) highlighted the ICF contribution to nursing research through the development of Core Sets for nursing interventions (17) and rheumatoid arthritis (19), which may facilitate clinical practice implementation in the specific area of Rehabilitation Nursing.

The ICF can serve as an instrument to clarify the measurement model of the scales of the Paediatric Evaluation of Disability Inventory (PEDI) and as taxonomy to describe and clarify the content of the functional scales item (36). It also contributes to the construction of an evaluation tool adapted to the context of psychiatric nursing (37) and to testing the relationship between FC tests in healthy workers (22).

## Discussion

The results of this integrative review show publications about the ICF were most likely to be produced by joint research teams from Germany and Switzerland (n=6). Most of these researchers were part of WHO's ICF Collaborating Centre for Research in Germany, which has been one of the driving forces in Europe for implementation and dissemination of the ICF since 2004 and supports its pension scheme in the standings, despite initial difficulties in translating its concepts and construction (38).

The years 2005 and 2013 had the highest number of publications (n=4). Another study, which carried out a literature review on use of the ICF in 2007 and analysed 243 publications in different fields, also found the largest number of publications was in 2005 (n=64) (39).

Most of the studies used a quantitative methodological approach. When it came to strength of evidence, twenty articles presented evidence derived from a single descriptive or qualitative study (evidence level 6) and six articles presented authoritative opinions, (evidence level 7) (7). Another relevant aspect is the number of subjects in the selected articles, which ranged from one to 469, demonstrating it is possible to conduct ICF-related research with a variable number of subjects.

The results of this study identified ICF use in clinical nursing practice, in teaching nursing students and nurses, and in nursing research, with emphasis on use of the ICF in the Rehabilitation Nursing area in 18 publications.

It is stressed that the area of rehabilitation is one of the fastest growing areas in publications related to the ICF (39), providing a common language between the disciplines of generic rehabilitation health code information. It also promotes a common basis for understanding the functional states associated with health conditions and comparing data across countries (5, 40). The results of this study have shown a growth in ICF literature on rehabilitation nursing.

Despite the fact that WHO (1) emphasizes the ICF can be used for various areas of knowledge, these results indicate such a perspective is rarely explored in clinical nursing practice, with most of the articles (n=9) showing the specificity of clinical use in the rehabilitation area. This suggests further research should be done to explore other possibilities for ICF use, such as the study by Lakke *et al.* (22) who sought correlations between the ICF components with tests of FC in healthy workers. This differentiated it from many studies.

The number of ICF nursing publications is still low compared to other areas of knowledge and it is necessary for nurses to carry out more research, as the ICF now has a worldwide classification of reference for all disciplines (39). In Taiwan, for example, since 2012, the Law on Protection of the Rights and Interests of Citizens with Disabilities has required health care providers to assess the level of disability according to the ICF; this requires knowledge of the ICF on the part of nurses (41).

Use of the ICF offers opportunities for health professionals to provide standardisation between different disciplines and health-care environments (42), assisting in the exchange of information between health professionals (43).

Most of the selected publications did not describe the physical, social and attitudinal specifications where the ICF was used and this did not, therefore, allow for a deeper analysis. Publications only stated the studies were developed in the following environments: rehabilitation clinics, neurological therapy centres and neurological hospitals, in the home, in psychiatric environments, in the community, in the work environment and at three university medical centres. According to the ICF, environmental factors have an impact on all components of functioning and disability and are organised sequentially, connecting the person's immediate environment to the general environment. Thus, environmental factors constitute the physical, social and attitudinal environment in which

people live and conduct their lives (1), confirming the importance of knowledge about the environments where the ICF is used.

The area of rehabilitation nursing was the subject of the majority of the ICF papers. Therefore, it is evident we need more investment in studies that address disease prevention and health promotion through the ICF. As indicated by WHO, the ICF provides a conceptual framework for information applicable to health care personnel, including prevention, health promotion, improving participation by removing or mitigating social barriers, and encouraging the allocation of social support and facilitators (1).

In addition, further research is needed to address the contents of the ICF in relation to nursing, especially its use in patient care and the ability of nurses to write up records and specify nursing tasks. This requires expanding the ICF to include detailed knowledge of nursing in healthcare (43).

## Conclusions

This review helps nurses to visualise how the ICF is being used, in what care environments and the contribution it is making. It demonstrates the ICF has been used specifically in the field of rehabilitation nursing, but offers some evidence of its use in occupational health.

The ICF also can be a useful tool for nurses' work in a number of other areas. These include education, as a conceptual model in practice, by generating a set of data that allows nurses to compare their contributions to patient care with those of other health professionals in different environments at an international level and also in research to describe the research questions and facilitate interpretation.

The advantages of use of the ICF by nurses include: advancement in utilization of a multi-professional instrument that facilitates inter-professional and world communication and can be used

to compare research results in different countries; developing and making use of Core Sets in clinical practice, according to the patient's needs; helping to plan individual or collective nursing actions, considering environmental characteristics with the broadening of health/illness conceptions; and complementing conceptual models of nursing, by highlighting quantitative scores, which will serve as parameters for choices on health/nursing interventions, as well as for assessing such interventions.

From this perspective, we suggest complementary use of the ICF with the already existing conceptual models of nursing, such as Callista Roy's Adaptation Model (44), Betty Neuman's Model (45), and Dorothea Orem's Self-Care Framework (46). These conceptual models view the person as a holistic system (44, 45) and identify nine needs: oxygenation, nutrition, elimination, activity and rest, skin integrity, senses, fluids and electrolytes, neurological function and endocrine function (44). In addition, Neuman's model considers the person as an open system in constant interaction with the environment (45), and Orem's Self-Care Theory aims to allow the person to be self-reliant (46). All these aspects are connected and described in the ICF.

Most of the selected publications did not describe the physical, social and attitudinal specifications of where the ICF was used, such as the number of patients seen per day, the number of nursing staff, size of the space, if the furniture was adapted to promote self-care and if the family and/or caregivers were present. This would provide a fuller analysis, as the ICF prioritises environmental factors, treating them as barriers and/or facilitators.

We are of the belief that more research needs to be carried out on use of the ICF, in different care settings and in different knowledge areas, to confirm the usefulness of this data in clinical practice. Such research also would help to update the ICF, ensuring the WHO classification is explicitly adapted to the needs of nurses. Moreover, there is still a need to encourage the use and dissemination of ICF studies in developing countries.

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**Table 1.** Articles researched. Prepared by the authors.

Author, year and countries	Knowledge area	Aims	Methodological approach	Results
Pryor J et al. 2004 Australia	Rehabilitation nursing	Report a secondary analysis of evaluations carried out by graduate students on nursing patients in search of ICF evidence.	Quantitative	There is some evidence the ICF is being used by nursing graduates, supporting the suggestion that there is a resonance between the building blocks of the ICF and nursing.
Kearney & Pryor 2004 Australia	Teaching, practice and research in nursing Rehabilitation nursing	Present a critical overview of the concept of disability and its implications for nursing; propose its use as a conceptual framework for teaching, practice and research in nursing.	Critical review	The ICF is a useful conceptual framework for teaching, practice and nursing research.
Heinen et al. 2005 Netherlands	Nursing process	Investigate the applicability of the ICF in nursing practice, focusing on nursing diagnoses.	Quantitative	Most of the topics covered in nursing diagnoses can be classified by the ICF.
Wang et al. 2005 Taiwan	Rehabilitation nursing	Propose a theoretical model to prevent osteoarthritis (OA) and associated disabilities.	Theoretical model	The model includes the trajectory of the disease, describing the sequence of events and disability associated with OA.
Boldt et al. 2005 Germany/Switzerland	Rehabilitation nursing	Determine whether the ICF covers the goals of nursing interventions and identify areas of functioning, disability and health most relevant to the practice of nursing acute and post-acute neurological patients in need of rehabilitation.	Quantitative	One hundred and eighteen nursing interventions were documented by nursing staff. The objectives of the interventions were linked to 67 different categories at the second level of the ICF.
Van Achterberg et al. 2005 Netherlands	Nursing practice	Report a study that systematically explored the use of the ICF by nurses.	Quantitative	The figures for the three-digit codes in the selected studies were substantial, revealing a predominant focus on body functions (53%), component activities (38%), and participation (19%), and environmental factors (37%).
Ostenjo et al. 2006 Norway	Rehabilitation nursing	Examine the conceptual basis and contents of the Pediatric Evaluation of Disability Inventory (PEDI), using the ICF.	Qualitative	The conceptual basis of the PEDI scales largely coincided with the concepts of the ICF components of activity / participation and environmental factors. Both the PEDI and the ICF use the components of capacity and performance, but differ on how to put them into operation.
Pajalic et al. 2006 Sweden	Rehabilitation nursing	Explore the functionality and subjective health of survivors of cerebrovascular accidents six months after discharge. Investigate the patterns of functions and activities and associations between functionality and subjective health.	Quantitative	The ICF can be used as a framework for nursing care and is made operable for practical use.

Author, year and countries	Knowledge area	Aims	Methodological approach	Results
Kanervisto et al. 2007 Finland	Rehabilitation nursing	Describe the experiences of people with chronic obstructive pulmonary disease (COPD) in their everyday lives, using the ICF.	Qualitative	The results show impairment of function of the body in people with COPD. Groups provide knowledge of the factors that promote the well-being of people with COPD, highlighting the importance of the spouse.
Boldt et al. 2007 Switzerland	Rehabilitation nursing	Discover if the ICF covers nursing interventions and identify areas of functioning, disability and health most relevant to nursing practice in the treatment of patients with spinal cord injury.	Quantitative	This study represents the first step in identifying a list of intervention categories relevant for nurses in the care of patients with spinal cord injury, according to the common language of the ICF.
Howard et al. 2008 USA/ Canada	Rehabilitation nursing	Discuss how the ICF can be useful in social change through health promotion and health education for all people, especially for those with disabilities and chronic diseases.	Theoretical discussion	Future research should focus on the relationship between the political and social participation of people with disabilities in communities. The development of a new ICF Core Set for accessibility and inclusion in the community improves social support interventions and strengthens the role of professionals in health promotion for people with disabilities or chronic health conditions.
Mueller et al. 2008 Germany/ Switzerland	Rehabilitation nursing	Identify the ICF categories relevant to nursing care in acute and post-acute rehabilitation.	Quantitative	Eighty-seven percent of the categories defined by the ICF targets can be linked to at least one variable nursing intervention: the Leistungserfassung in der Pflege (LEP).
Campbell 2009 Canada	Rehabilitation nursing	Use the ICF as a conceptual framework to discuss pressure ulcers in frail elderly patients.	Theoretical discussion	The ICF bio-psychosocial approach is necessary for all aspects of care. This model provides the rehabilitation nurse with a look at environmental, personal, external and internal factors that can be modified to reduce the risk of pressure ulcers and frailty.
Machado & de Figueiredo 2009 Brazil	Physical medicine and rehabilitation Rehabilitation nursing	Identify strategies to reduce the level of dependency of the person with large TBI sequel, for help in performing daily activities and self-care.	Quantitative	A guided prototype was developed in assistive technology to aid their mobilisation and transfers, with satisfactory results but restricted to the dynamics of protruding from one surface to another with body alignment.
Rauch et al. 2009 Germany/ Switzerland	Rehabilitation nursing	Validate the ICF Core Set for Rheumatoid Arthritis (RA) from the perspective of nurses.	Quantitative	The validity of the ICF Core Set for RA was largely supported by nurses. However, a number of body functions that are related to the side effects of drug therapy are not included in the core of the ICF for RA.
Boldt et al 2010 Germany/ Switzerland	Nursing process	Present a discussion of the conceptual relations and practices of the ICF and NANDA- Nursing Diagnoses from Taxonomy II, and its use in nursing practice.	Theoretical discussion	NANDA enables compliance with requirements that are exclusively nursing in nature. Application of the ICF is useful for nurses to communicate nursing problems with other health professionals in a common language.
Machado & Scramin 2010 Brazil	Rehabilitation nursing	Identify elements of the ICF that are applicable to home care of quadriplegic adult men, with a view to reducing dependence on help from their parents for activities involved in daily living and self-care.	Qualitative	Evident: family support - security for bodily functions of the disabled; assistive technology - inventiveness for promoting quality of care; fears, uncertain future and loss of parents - thresholds and human frailties and functional gain - objective responses in terms of bodily functions.

Author, year and countries	Knowledge area	Aims	Methodological approach	Results
Mueller et al. 2010 Germany/ Switzerland	Rehabilitation nursing	Examine the association between patients' functioning, as encoded by categories of the Acute ICF Core Sets, and nursing workload in patients in an acute care situation; compare the variance in nursing workload explained by the ICF Core Set categories and with the Barthel Index, and validate the Acute ICF Core Sets by their ability to predict nursing workload.	Quantitative	In patients with neurological and cardiopulmonary conditions, selected ICF categories and the Barthel Index Score explained the same variance in nursing workload, whereas the ICF was slightly superior to the Barthel Index Score for musculoskeletal conditions.
Kim & Coenen 2011 USA	Rehabilitation nursing	Examine to what extent the ICF and the International Classification for Nursing Practice (ICNP) can be mapped to facilitate communication between professionals in health contexts.	Quantitative	The major challenges to mapping the two ratings resulted from differences in terminology, representation of the concept, structure and specific content.
Boldt et al. 2012 Germany/ Switzerland	Rehabilitation nursing	Examine whether the ICF can be used as a standard language for expressing goals of intervention by nurses who care for people with spinal cord injury.	Quantitative	The results of this study contribute to implementation of the ICF in nursing care for people with spinal cord injury.
Johansson et al. 2013 Sweden	Psychiatric nursing	Describe the development of an assessment tool based on the ICF adapted to a psychiatric nursing context where both the patient and the nurse assess the patient's ability to participate in various spheres of life.	Quantitative	The results of an unweighted kappa value of 0.38, a linear weighted kappa value of 0.65 and a quadratic weighted kappa value of 0.73 were considered as acceptable when using simulated patient cases.
Lakke et al. 2013 Netherlands	Worker health	Test relationships between Functional Capacity (FC) tests and other ICF factors in a sample of healthy workers, and determine the amount of statistical variance in FC tests that can be explained by these factors.	Quantitative	Moderate correlations were detected between material handling FC tests and muscle strength, gender, body weight, and body height. As for static work FC tests; overhead working correlated fair with aerobic capacity and handgrip strength, and low with the sport-index and perception of work. For the standing forward bend FC test, all hypotheses were rejected.
Machado et al. 2013 Brazil	Health of the elderly	Compare the ability and performance of Basic Activities of Daily Living by dependent elderly individuals cared for in a geriatric healthcare center.	Quantitative	The average age was $81.0 \pm 7.1$ , with a predominance of women. The difference between ability and performance was statistically significant in most daily tasks.
Santos et al. 2013 Brazil	Health of the elderly	The objective was to reflect on the International Classification of Functioning, Disability and Health and its use in nursing care for the elderly.	Reflection	A brief history of the Classification was developed. Functional assessment of the elderly and the importance of planning care actions properly were addressed. Applicability of the ICF by nurses was shown.
Barros et al. 2014 Brazil	Health of elderly ostomy patients	Identify the ecosystem and gerontogeriatric technological actions to be done in complex nursing care for elderly ostomy patients.	Qualitative	The ecosystem actions identified the construction of a therapeutic environment, a guaranty of physical access and environmental adaptation.
Li et al. 2015 China	Rehabilitation nursing	Explore a set of ICF categories that cover spinal cord injury (SCI) nursing practice in China, through a national expert survey.	Quantitative	Twenty-nine Chinese experts in SCI nursing participated. There were 81 ICF categories that received more than 80% agreement among the experts, including 33 Body Functions categories, eight Body Structures, 24 Activities and Participation, six Environmental Factors and 10 Personal Factors items.

**Table 2.** Articles researched. Prepared by the authors.

Author (year, country)	Number of Subjects per research	ICF use	Instruments	Environments where ICF is used	ICF contributions for nurses' work
Pryor J et al. 2004 Australia	27 undergraduates	Analytical framework	Evaluation Form for Activities of Daily Living (ADL) to sustain life and to participate in life as Dittmer	Rehabilitation clinic	Assists in evaluating and planning for the health needs of persons with disabilities who are under the care of nurses.
Kearney & Pryor 2004 Australia	–	Conceptual framework	–	–	The ICF can become a valuable tool in the search for best practices and positive outcomes for patients.
Heinen et al. 2005 Netherlands	Six nurses	Conceptual framework	Nursing diagnoses from NANDA.	University medical centres	The terminology and codes of the ICF can be used in problem statements, as well as the etiology and signs and symptoms.
Wang et al. 2005 Taiwan	–	Conceptual framework	–	–	The model provides a conceptual framework that is useful for understanding the process of OA disability from a bio-psychosocial perspective and guides rehabilitation nursing interventions in the care of OA.
Boldt et al. 2005 Germany/ Switzerland	290 patients	Relationship between nursing interventions and the categories of the ICF	–	Neurological therapy center and neurological hospital	Nursing interventions for neurological patients in need of acute and post-acute rehabilitation could be linked to the ICF categories, supporting the usefulness of the ICF in nursing.
Van Achterberg et al. 2005 Netherlands	469 nurses 178 other health professionals	Categories of the ICF in nursing practice	–	University medical centres	The ICF can be a useful tool for classifying and reporting aspects of the patient's functionality. Stimulates addition to evaluation of the functions and structures of the body.
Ostensjo et al. 2006 Norway	Two researchers	Relation between the Pediatric Evaluation of Disability Inventory (PEDI) and the ICF	PEDI	–	The ICF can serve as a conceptual framework to clarify the measurement model and the PEDI scales, such as taxonomy, in order to describe and clarify the content of the item, functional scales.
Pajalic et al. 2006 Sweden	89 CVA survivors	Conceptual framework	Katz Index; Evaluation of Instrumental Activities of Daily Living; Scale Berger Short Form Health Survey, SF-12.	Home	Adaptation of the ICF in a practical questionnaire, incorporating dimensions of functions, activities, participation and health. It has the potential to broaden the perspective of nurses in caring for CVA survivors.
Kanervisto et al. 2007 Finland	–	Theoretical framework	–	Home	Theoretical framework for nursing research
2007 Switzerland	–	Relationship between nursing interventions and the categories of the ICF	–	–	Identification of a list of categories of interventions relevant for nurses in the care of patients with spinal cord injury, according to the common language of the ICF.

Author (year, country)	Number of Subjects per research	ICF use	Instruments	Environments where ICF is used	ICF contributions for nurses' work
Howard et al. 2008 USA/Canada	–	Use of the ICF for social change through health promotion and health education	–	Community	In health promotion and health education in the community.
Mueller et al. 2008 Germany/ Switzerland	Two nurses	ICF Core Set for nursing interventions	Nursing Intervention (LEP) relevant to acute and post-acute rehabilitation.	Rehabilitation hospital	The ICF Core Set for describing the goals of nursing interventions to facilitate inter-professional communication and respect for the needs of the patient. The ICF may, thus, be a useful tool to set goals for nursing intervention.
Campbell 2009 Canada	–	Conceptual framework	–	–	Enlarged view of the risk factors of pressure ulcers.
Machado & de Figueiredo 2009 Brazil	One patient	Conceptual framework	–	Home	How useful is the use of strategies for care guided by the components of the ICF feature.
Rauch et al. 2009 Germany/ Switzerland	57 nurses	Practical use through the Core Set			The ICF Core Set for Rheumatoid Arthritis facilitates application of the ICF in clinical practice.
Boldt et al 2010 Germany/ Switzerland	–	Relationship between the ICF and NANDA nursing diagnoses	NANDA	–	The ICF and NANDA should be used jointly by nurses and can complement each other to improve the quality of team work and clinical nursing practice.
Machado & Scramin 2010 Brazil	Eight patients	Conceptual framework	–	Home	Conceptual framework
Mueller et al. 2010 Germany/ Switzerland	Patients undergoing rehabilitation	Conceptual framework	Barthel Index Score LEP	Three university-affiliated acute hospitals	Conceptual framework
Kim & Coenen 2011 USA	–	Relationship between the ICF and the International Classification for Nursing Practice (ICNP)	ICNP	–	Supports advancement in the area of harmonization of health terminologies. Applications that combine the concepts of the ICF and the ICNP must be tested in practice.
Boldt et al. 2012 Germany/ Switzerland	35 nurses	Standard language for expressing intervention goals in the care of people with spinal cord injury	–	Different environments	Presents a list of ICF categories and other areas relevant to nursing practice that can be used as a data set to document the problems and goals of nursing intervention and treatment for people with spinal cord injury.
Johansson et al. 2013 Sweden	Expert groups	Conceptual framework for the development of an assessment tool	–	Psychiatric environments and community	The tool potentially can serve as an aid to identify and discuss areas the patient considers as problematic in his or her everyday life.

Author (year, country)	Number of Subjects per research	ICF use	Instruments	Environments where ICF is used	ICF contributions for nurses' work
Lakke et al. 2013 Netherlands	403 healthy workers	Conceptual framework	Five FCE tests; Dynamometer; Bruce Treadmill Test; Baecke Physical Activity; Questionnaire (BPAQ); Questionnaire on Psychosocial Workload and Work-related Stress	Work environment	Conceptual framework
Machado et al. 2013 Brazil	60 elderly	Conceptual framework	Activities of daily living	Geriatric healthcare center	The contribution of this study in terms of using the ICF was achieved by semi-quantitatively interpreting its qualifiers, which allowed for more objective comparisons and inferences, and revealed a clear distance between the performance and ability of these individuals in most of the assessed activities.
Santos et al. 2013 Brazil	-	Conceptual framework	-	-	The classification is able to direct the functional assessment of the elderly, by nurses, taking a holistic view of the human being as having a body, with the need to perform activities and participation, and belonging to a context /environment.
Barros et al. 2014 Brazil	10 elderly ostomy patients	Conceptual framework	-	Estomatherapy service	Conceptual framework
Li et al. 2015 China	Twenty-nine Chinese experts in SCI nursing	Conceptual framework	-	-	A set of ICF categories that cover SCI nursing practice in China was identified. It reflects the main issues that Chinese nurses focus on in caring for SCI patients. These categories can assist Chinese nurses in using the ICF in multidisciplinary teamwork and improve the participation of nurses in the team.