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REVIEW ARTICLE

Working draft: Classifications of interventions in mental health care. An expert review

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Abstract
Background and objectives: Specific classifications of mental health interventions have encountered many issues in their integration into a general classification of interventions. Nonetheless, there has not been any previous review on the content and structure of current classifications in relation to mental health care. This expert review aimed to compare the mental health interventions provided in a series of reference classification systems for the incorporation of mental health care into the International Classification of Health Interventions (ICHI).
Methods: Twelve classifications are described with regards to the structure of the classification (unit of analysis, sections, multiaxiality, granularity) and context of utilization (purpose, descriptors, neutrality, interoperability and implementation).
Results: Major problems identified include a granularity unbalance (i.e. differences in the number of codes and its specificity with other areas such as rehabilitation), unclear units of analysis (i.e. differences between procedures, interventions, packages of care and care programs), lack of clearly stated evidence-based interventions in a mental health context; and lack of a well-defined taxonomical tree. An ontology approach to the definition of the different entities involved in the throughput of mental care, including their hierarchical relationships and conceptual map, may have contributed to the failure of previous systems together with the development of systems to classify mental health interventions separate from generic health interventions.

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Conclusions The present review provides additional ground for the development of the ICHI knowledge-base and highlights the importance of taxonomical disambiguation and international comparability in the development and implementation of classifications of mental care interventions.

Introduction

A standard coding of mental health interventions is necessary to support data collection and electronic health records for care monitoring (safety and quality of care), standardization, health logistics, management, planning, financing and research purposes. In the past, specific classifications of mental health interventions have been developed and implemented, but their integration into a general classification of interventions has encountered many problems such as: granularity unbalance (substantially less codes for describing mental health interventions than for interventions in other areas such as rehabilitation); unclear units of analysis (ambiguity in the definition and in the boundaries of the different interventions identified); lack of a well-defined taxonomical tree and lack of clearly stated evidence-based interventions in a mental health context.[1] In addition, a significant proportion of the developments in this area is published in grey literature as working reports, policy documents and tools released by public agencies or other organizations. Unfortunately there has not been any previous review on the content and structure of current classifications in relation to mental health care. A comparative analysis of the classifications of mental health interventions is particularly relevant in the context of the development of the International Classification of Health Care Interventions (ICHI), which will be released in 2019 as a member of the WHO Family of International Classifications (WHO-FIC).[2]

ICHI is divided in three sections (Interventions on body systems and functions, Interventions on activities and participation domains and Interventions to improve the environment and health related behaviours) and mental health cuts across these groupings. 'Intervention' is defined in ICHI as ''an act performed for, with or on behalf of a person or a population whose purpose is to assess, improve, maintain, promote or modify health, functioning or health conditions''. Within this framework ICHI is intended to code only '*what* (action) is done to *whom* (target) and *how* (means)', so it excludes *who* performs the intervention (provider), *why* (goal: a health condition or a function), and *where* (setting).[2] It comprises a categorical structure with three axes: Target, Action and Means. In addition, ICHI incorporates relationships among the axes, value domains for the three axes, a coding scheme and (optional) extension codes which can be added to an intervention as additional information. A better understanding of the content and hierarchy of existing classifications of interventions and their applicability to the mental health field is crucial in order to incorporate useful and extensive interventions to ICHI.

This expert review aims are threefold: (i) to compare the extent to which mental health interventions are included among the main classifications of interventions available to this date; (ii) to describe the challenges found in these classifications in order to identify mental health interventions; and (iii) to provide a background for the incorporation of mental health interventions in ICHI, with a particular focus on the practicality of a cross-cutting approach versus a specific one based on a separate section on mental health interventions.

Methods

A core group at the Mental Health Policy Unit of the Brain and Mind Centre selected a list of the main generic and specific classifications of health interventions relevant to mental health care that have been developed and implemented by international and national organizations and health agencies. This list was checked with experts from the National Centre for Classification in Health (University of Sydney), the WHO's ICHI Development Group and 6 key informants from Australia, Canada, Italy, France, Spain, the UK and the US. An Italian independent team linked to the ICHI Development Group revised the list and the content analysis. In order to provide a systematic description of the classifications, the expert core group developed a checklist with nine main content domains to be assessed in a comparative analysis of the classifications. For a better understanding, the criteria were divided into those (A) related to the structure or internal aspects of the classification and those (B) related to the context or external aspects of it. The definition of these domains identified for the standard description of the classifications of mental care interventions are summarized in Table 1.

Two summary tables detailing each of the classifications according to the criteria mentioned above are included (Tables 2 and 3). A summary table describing specific characteristics of classifications of health interventions with regard to mental health is also provided. The appropriateness of this section was assessed, accounting for the inclusion of inappropriate/controversial interventions or non-evidence-based (EBM) interventions.

Finally the coding and descriptions of two key mental health interventions (Psychotherapy and Counselling) were analyzed in the different classifications. Training Activities of Daily Life and Psycho-pharmacotherapy were also assessed.

Table 1 Definition of the domains identified for the standard description of the classifications of mental health interventions.

Domains	Definition
Structure of the classification	
Unit of analysis	The smallest piece of information on care performance that is coded by the classification system (activity, procedure, action, intervention, care package, etc.) taking into account the existence of a formal, precise and operational definition of every category.
Sections	Number and description of sections in each classification
Multiaxiality	Description of the axes that make up codes
Granularity	Number of codes and their level of detail
Context for utilization of the classification	
Purpose	Whether the classification was designed to be used by clinicians, healthcare managers or both; and to which extend the final purpose is related to the professionals who were substantially involved in the development process.
General descriptors	Standard length of time spent for an intervention (i.e. the time spent for a psychotherapeutic session), content and other information, which may be relevant for Mental Health.
Neutrality	The extent to which the coding in the classification does not depend on the type of service provider (e.g. a physician) or the type of setting (e.g. hospital)
Interoperability	Relationships, interfaces and workability of the classification with other classifications fully described and understood
Implementation	Processes to put the classification into action and indicators of its use in practice

Results

General description

Twelve classifications were selected for further analysis according to the ten parameters described in Table 1 to be compared with the International Classification of Health Interventions (ICHI): International Classification for Nursing Practices (ICNP)[3]; Nursing Interventions Classification (NIC)[4]; Common Language for Psychotherapy Procedures (CLP)[5,6]; The International Classification of Diseases Tenth Revision Procedure Coding System (ICD-10-PCS)[7]; Current Procedural Terminology (CPT)[8]; Canadian Classification of Health Interventions (CCI)[9,10]; Office of Population Censuses and Surveys Classification of Surgical Operations and Procedures, 4th Revision (OPCS-4.7)[11]; Classification of General Medical Procedures (CCAM)[12]; Australian Mental Health Intervention Classification (MHIC)[13]; Classification of therapeutic procedures in Medical Rehabilitation (KTL),[14] The Australian Classification of Health Interventions (ACHI)[15]; and The International Classification of Mental Health Care (ICMHC)[16] (Table 2).

These sets include ten general classifications of interventions not specific to mental health (ICHI, ICNP, NIC, ICD-10-PCS, CPT, CCI, OPCS-4.6, CCAM, KTL, and ACHI). Out of them five did not include a section on Mental Health (ICNP, NIC, ICHI, OPCS-4.7, and CCAM), whilst other five general classifications did (ICD-10-PCS, CPT, CCI, ACHI, and KLT). Three of them were specific for mental health (MHIC, CLP, ICMHC). Five classifications were intended for international use (ICHI, ICNP, NIC, CLP and ICMHC), and the rest were developed for coding at national level (ICD-10-PCS, CPT, CCI, ACHI, MHIC, CCAM, OPCS-4.6, and KTL) (Table 2). Three were professional field related: ICNP, NIC for nurses and KTL for rehabilitation professionals.

Structure of the classification

The structure is very different among selected classifications, as shown in Table 2.

Unit of analysis: Only six classifications out of twelve included a formal definition of the unit of analysis (ICHI, NIC, CCI, MHIC, CCAM, and ICMHC). ''Intervention'' is the most common unit, followed by ''procedure''. Definitions were described mostly in terms of activities or services without a clear distinction between these two terms.

Number of sections: The sections vary from three in ICHI and CPT to a maximum of twenty-four in the OPCS-4.

Multiaxiality: Eight classifications use a multi-axial system to determine the type of intervention being classified (ICHI, ICD-10-PCS, CCI, ICNP, NIC, CCAM, KTL, and ACHI). The maximum number of axes is 7 (ICD-10-PCS and ICNP). The axes section, part of the body or system and qualifiers are common to the ICD-10-PCS, CCI, CCAM and KTL classifications. The nursing classifications incorporate novel elements into the axial principle. ICNP includes duration, therapeutic judgement, client and the location of the intervention, while NIC includes the definition and the related activities of each intervention, as well as the background and reading.

Granularity: It is noticeable the unbalance in the number of codes in comparison with other sections or content areas for every classification system. For example the ICD-10-PCS assigns to Mental Health 30 codes out of its 71,924 total codes (0.05%). Although the degree of granularity of the

Table 2 General characteristics of classifications of health interventions: name, development organization, territory of reference, version and year of reference, healthcare target, and structure (definition of the unit of analysis, number of sections, axis, as well as the total number of codes and the number of codes related to mental health, the level of granularity).

Name/organization/territory/ year and version/healthcare target	Acronym	Structure			
		Unit of analysis	N. Sections	Axis	Granularity total codes (MH)
International Classification of Health Interventions World Health Organization International Alpha 2016 General	ICHI	Intervention ''is an act performed for, with or on behalf of a person or a population whose purpose is to assess, improve, maintain, promote or modify health, functioning or health conditions.''	3 Section I: Interventions on body systems and functions Section II: Interventions on activities and participation domains Section III: Interventions to improve the environment and health related behaviours	3 Target A. Body Systems and Functions B. Activities and Participation C. Environment D. Behaviour Action A. Diagnostic B. Therapeutic C. Managing D. Preventing Means A. Approach B. Technique C. Method D. Sample Extension codes can also be added as additional information to an intervention	1490 (N/A)
International Classification for Nursing Practices International Council of Nurses International 2008, updated 2015 General	ICNP	Intervention: ''pre-coordinated concepts representing therapeutic activities of nurses''	None	7 1. Action 2. Client 3. Focus 4. Judgement 5. Location 6. Means 7. Time	872 (N/A)
Nursing Interventions Classification University of Iowa, College of Nursing International 2013/6th Edition General	NIC	Intervention: ''Any treatment, based upon clinical judgment and knowledge, that a nurse perform to enhance patient/client outcomes''.	7 1. Physiological: Basic 2. Physiological: Complex 3. Behavioural 4. Safety 5. Family 6. Health System 7. Community	Level 1 Domains Level 2 Classes Level 3 Interventions Definition Activities Background and Readings	554 (N/A)
Common Language for Psychotherapy Procedures Common Language for psychotherapy procedures Task Force International 2014 Specific for Mental Health	CLP	Procedure – ''Therapists from round the world describe operationally what they do with clients''	Possible domains (16): 1. Attention-Focusing 2. Body Skills Training 3. Contingency Management 4. Distraction 5. Education 6. Empathy Expression 7. Environmental Change 8. Exposure 9. Externalized Feelings and Thoughts 10. Goal Planning and Attainment 11. Homework 12. Interpersonal Skills Training 13. Modelling 14. Reframing 15. Rehearsal and Role Play 16. Therapist's Self-Instruction	None	100 (100)

Table 2 (*Continued*)

Name/organization/ territory/year and version/healthcare target	Acronym	Structure			
		Unit of analysis	N. Sections	Axis	Granularity total codes (MH)
The International Classification of Diseases Tenth Revision Procedure Coding System U.S. Centers for Medicare and Medicaid Services (CMS), and National Centre for Health Statistics US 2012/10th Edition, updated 2016 General with Mental health section	ICD-10-PCS	Procedure: ''the complete specification of the seven characters'' (pg. 125. Glossary)	16 1. Medical and Surgical 2. Obstetrics 3. Placement 4. Administration 5. Measurement and Monitoring 6. Extracorporeal Assistance and Performance 7. Extracorporeal Therapies 8. Osteopathic 9. Other Procedures 10. Chiropractic 11. Imaging 12. Nuclear Medicine 13. Radiation Therapy 14. Physical Rehabilitation and Diagnostic 15. Audiology 16. Mental Health 17. Substance Abuse Treatment	7 1. Section 2 Body system 3 Root operation 4 Body part 5 Approach 6 Device 7 Qualifier	71,924 (30)
Current Procedural Terminology American Medical Association US 2015/8th edition General with Mental Health section	CPT	Procedure (or service) – N/A	3 Category I Evaluation and Management Anaesthesiology Surgery Radiology (including Nuclear Medicine and Diagnostic Ultrasound) Pathology and Laboratory Medicine (except Anaesthesiology) Category II (supplemental tracking codes that can be used for performance measurement) Modifiers (codes to indicate that a service specified in the associated measure (s) was considered but, due to their medical, patient, or system circumstance (s) documented in the medical record, the service was not provided). Composite codes (codes combine several measures grouped within a single code descriptor to facilitate reporting for a clinical condition when all component are met). Patient Management Patient history Physical examination Diagnostic/Screening processes or results Therapeutic, Preventive, or Other Interventions Follow-up or Other outcomes Patient safety Structural Measures Category III (this section contains a set of temporary codes for emerging technology, services, and procedures. The inclusion of a service or procedure in this section neither implies nor endorses clinical efficacy, safety, or the applicability to clinical practice).	None	N/A (66)

Table 2 (*Continued*)

Name/organization/ territory/year and version/healthcare target	Acronym	Structure			
		Unit of analysis	N. Sections	Axis	Granularity total codes (MH)
Canadian Classification of Health Interventions Canadian Institute for Health Information Canada 2012/10th Edition, updated 2015 General with Mental Health section	CCI	Intervention: ''a service performed for or on behalf of a client whose purpose is to improve health, to alter or diagnose the course of a disease (health condition), or to promote wellness''. This definition has its specific variations according whether is therapeutic, diagnostic or other: •Therapeutic: ''while a therapeutic intervention may contain a diagnostic component, the primary intent of the intervention is to alleviate or treat the underlying disease or health condition''. •Diagnostic: ''a service performed for or on behalf of a client whose basic purpose is to assess the presence, absence or status of a disease process or health condition''. •Other intervention: ''any other service that cannot be described as obstetrical (foetal), therapeutic or diagnostic but, nevertheless, contributes directly to improve a client's health, alters the course of a health condition or promotes wellness''.	8 1. Physical/Physiological Therapeutic Interventions 2. Diagnostic Interventions 3. Diagnostic Imaging Interventions 4. Obstetrical and Foetal Interventions 5. Cognitive, Psychosocial and Sensory 6. Diagnostic and Therapeutic Interventions 7. Other Healthcare Interventions 8. Therapeutic Interventions Strengthening the Immune System and/or Genetic Composition	4 (10 digit alphanumeric code). 1 Section 2-3th Group (anatomically driven or section dependent). 4-5th Interventions 6-10th Qualifiers (approach/technique; devices used/implanted; any tissue used)	17,845 (N/A)
Office of Population Censuses and Surveys Classification of Surgical Operations and Procedures National Health Service UK 2016, version 4.7 General	OPCS-4	Interventions are those aspects of clinical care carried out on patients undergoing treatment: •For the prevention, diagnosis, care or relief of disease. •For the correction of deformity or deficit, including those performed for cosmetic reasons. •Associated with pregnancy, childbirth or contraceptive or procreative management.	24 Anatomically based chapters (A-T, V-W). Diagnostic Imaging, Testing and Rehabilitation (U). Miscellaneous Operations (X). Subsidiary Classification of Methods of Operations (Y). Subsidiary Classification of Sites of Operation (Z).	None	N/A (10)
Classification of General Medical Procedures Classification Commune des Actes Médicaux Ministère de la Santé, de la Jeunesse et des Sports France 2015 version 41 General	CCAM	Medical procedure ''any procedure by which the realization by means of verbal, written, physical or instrumental is made by a member of the medical profession in the context of the exercise and the limits of its competence''	18 1–16 (defined by the anatomic-physiological system) 17 (interventions not defined by anatomic-physiological system) 18 (complementary interventions)	4 Anatomical site Action Technique Used method	7200–8000 (4)
Australian Mental Health Intervention Classification Australian Institute of Health and Welfare Australia 2013, version 1.0 Specific for Mental Health	MHIC	Intervention: ''activities carried out during a service contact to improve, maintain or assess the health of a person. If not therapeutic or diagnostic, an intervention will nevertheless contribute materially to improvement of a client's health, alter the course of a health condition or promote wellness. Interventions include invasive and non-invasive procedures, cognitive interventions and other interventions (including psychosocial interventions)''.	4 1. Assessment and review interventions 2. Therapeutic Interventions 3. Emergency interventions 4. Service coordination intervention	N/A	9401 (9401)

Table 2 (*Continued*)

Name/organization/ territory/year and version/healthcare target	Acronym	Structure			
		Unit of analysis	N. Sections	Axis	Granularity total codes (MH)
Classification of therapeutic procedures in Medical Rehabilitation – Klassifikation Therapeutischer Leistungen German statutory pension insurance scheme Germany 2015 General with Mental Health sections	KTL	Intervention – N/A	11 A. Sport and exercise therapy B. Physiotherapy C. Information, Motivation, Training D. Clinical Social Work, Social Therapy E. Occupational therapy, occupational therapy and other functional therapy F. Clinical Psychology, Neuropsychology G. Psychotherapies H. Rehab-Care and Pedagogy I. Physical Therapy J. Recreation Therapy K. Nutrition medicine procedures	7 digits alphanumeric 1. Section 2. Duration 3. Number of people in the session	503 (260)
Australian Classification of Health Interventions National Centre for Classification in Health (University of Sydney) Australia 2014/9th Edition General with Mental Health Section	ACHI		20 1. Procedures on nervous system 2. Procedures on endocrine system 3. Procedures on eye and adnexa 4. Procedures on ear and mastoid process 5. Procedures on nose, mouth and pharynx 6. Dental services 7. Procedures on respiratory system 8. Procedures on cardiovascular system 9. Procedures on blood and blood-forming organs 10. Procedures on digestive system 11. Procedures on urinary system 12. Procedures on male genital organs 13. Gynaecological procedures 14. Obstetrics procedures 15. Procedures on musculoskeletal system 16. Dermatological and plastic procedures 17. Procedures on breast 18. Radiation oncology procedures 19. Non-invasive, cognitive and other interventions, not elsewhere classified 20. Imaging services	7 digits 1st level – anatomical site axis 2nd level-procedural type axis 3rd level-block axis	N/A ≈40
The International Classification of Mental Health Care World Health Organization International 1996 Specific for Mental Health	ICMHC	Module of Care: ''a type of mental health care, characterised by its objectives and by the interventions necessary to achieve these objectives. As such a Module of Care is made available by a group of people with different professional backgrounds, working within or at least associated with the Module of care, to patients with comparable histories of psychopathological and/or social problems''.	10 1. Establishing and maintaining professional relationships 2. Problem and functional assessment 3. Care co-ordination 4. General health care 5. Taking over daily living activities 6. Psychopharmacological and other somatic interventions 7. Psychological interventions 8. (Re) educating basic, interpersonal and social skills 9. Intervention related to daily activities 10. Intervention aimed at the family, relatives and others	N/A	N/A

MH Mental Health; N/A not applicable.

Table 3 General characteristics of classifications of health interventions: purpose, development process, general descriptors (time, content and other information relevant for mental health), neutrality (setting and professional involved), interoperability and implementation.

Classifications acronym	Purpose	Development process	General descriptors			Neutrality		Interoperability	Implementation
			Time	Content	Other (relevant for MH)	Setting	Professional		
ICHI	Management	Managers/clinicians	No	No		All health care settings	All	WHO-FIC/ISCO	*Under development*: to provide a basis for monitoring implementation of the WHO's Universal Health Coverage, as well as international comparisons, national uses of ICHI; Sustainable Development Goals; Patient safety and quality; Health System Performance
ICNP	Clinical	Nurses	Yes	Yes	Groups of codes for: Community nursing Hospitalized Adult Mental Health Client Catalogue Disaster nursing	All health care settings	Nurses	WHO-FIC IHTSDO ISO SNOMED CT	Development of catalogues on specific areas of care to integrate ICNP into practice
NIC	Clinical/Management	Nurses	Yes	Yes		All health care settings	Nurses	NANDA-International (nursing diagnoses) Omaha System problems Resident Assessment Protocols (RAP) Outcome and Assessment Information Set (OASIS)	Taxonomy used to identify interventions in clinical practice in different healthcare contexts, as MH.
CLP	Clinical	Therapists	No	Yes		Multiple settings	Psychotherapists	None	Therapists submit in the CLP website entries describing a procedure in response to personal or CLP-website invitations. The entry/ies describe operationally what they do with clients. Each entry gives an empirical view of what the therapist does to apply a procedure, including a practical case illustration.

Table 3 (*Continued*)

Classifications acronym	Purpose	Development process	General descriptors			Neutrality		Interoperability	Implementation
			Time	Content	Other (relevant for MH)	Setting	Professional		
ICD-10-PCS	Clinical	Clinicians	No	No		Hospital care	All	WHO/FIC	Implementation Planning Recommendations are provided. Many professional and private sector organizations and businesses have resources available that may help with this process.
CPT	Clinical/Management	Clinicians	Yes	Yes	Mental health specific codes: interactive complexity, psychotherapy, evaluation and management services	Multiple settings	All	ICHI	System of medical nomenclature about health care provided to patients widely accepted and used. Public and private health insurance in US programs require CPT codes for reporting services and procedures.
CCI	Clinical	Clinicians	No	No	Attributes: Status/Location/Mode of delivery/Extent	Multiple settings	All	ICD-10	Research, cooperation and collaboration with clinicians, coders, information analysts, researchers and other stakeholders across Canada had been provided to implement the classification. It is used across the continuum of healthcare settings in the country.
OPCS-4	Management	Clinicians	No	No		Acute care settings	Trained specialist	ICD-10	Implementation is provided by a Requests Portal where all stakeholders can submit their requests for change. Coded clinical data are audited against national clinical coding standards. Clinical coding audit must be objective and provide value to the local organization.
CCAM	Management	N/A	No	No		Hospital and Ambulatory care	Medical doctors	N/A	Reimbursement classification for clinicians in France. The implementation and choice of acts is up to the Evaluation Commission of Acts Professionals of the High Authority of Health.

Table 3 (*Continued*)

Classifications acronym	Purpose	Development process	General descriptors			Neutrality		Interoperability	Implementation
			Time	Content	Other (relevant for MH)	Setting	Professional		
MHIC	Management	Clinicians	No	Yes		All health care settings	All	ICD-10	The list of MH interventions was piloted at a number of trial sites and further refined in 2012. They describe and capture information on selected interventions provided to MH consumers in Australia.
KTL	Clinical/Management	Clinicians	Yes	No	Occupational Group Additional education or training Special field Indication Therapeutic Target Frequency Number of participants in rehabilitation session Other quality features	Rehabilitation care	Trained specialists	None	Widely used as reference classification for rehabilitation interventions throughout Germany in different healthcare fields.
ACHI	Clinical/Management	Expert clinical coders Clinicians	No	No		All health care settings	Health professionals	ICHI ICD-10	Development made by expert clinical coders and clinicians nominated by the Clinical Casemix Committee of Australia. Currently implemented by the Australian Centre for Classification Development.
ICMHC	Management	Clinicians	No	No		Mental health care services	Mental health care professionals		Implementation was made by two consultations from 24 WHO field centres throughout the world. The draft version was put to the test in a number of centre. Comments and experiences ensuing from these trials were used in the final version.

MH, Mental Health; WHO, World Health Organization; N/A, not applicable.

classifications related to Mental Health may be considered medium-low, a lack of information on granularity has been found in eight out of the thirteen classifications considered. This affected both the number of codes related to mental health (ICHI, ICNP, NIC, CCI), as well as the total number of codes (CPT, OPCS 4, ACHI). Since ICMHC has no codes, granularity could not be assessed. Among the general classifications, the Canadian one (CCI) describes the highest number of mental health interventions. As it could be expected, specific classifications on Mental Health have a high level of detail, but it results in the incorporation of non-specific mental health interventions, such as ''skills development for daily living activities'' and ''counselling'', ''active listening'', ''drug prescription'' among others.

Context for utilization

The context for utilization (Table 3) also showed marked differences across the classifications.

Purpose: the purpose and development process (i.e. whether it was designed to be used by clinicians, healthcare managers or both and who of them were involved in the development of the classification): ICHI is intended to fulfil both clinical as well as management purposes, as are four others (NIC, CPT, KTL, ACHI). Four classifications (OPCS-4.7, CCAM, MHIC, and ICMHC) are directed to healthcare managers. The rest are oriented to clinical practice either due to complexity or level of detail. The Australian MHIC illustrates a frequent gap between the professionals involved in the development and testing of the classification and the end-users of the classification. Similar considerations may be applied for several of the classifications, since most of the professionals involved in the classification development process were clinicians.

General descriptors: with regards to general descriptors, four classifications (ICNP, NIC, CPT, KTL) code the average time to provide the intervention. NIC, CPT and KTL have specific codes that identified a standardized time for the intervention. For example KTL provides 20 codes which identify 20 different lengths of time). In ICNP time is an axis that defines the point, instance, interval or duration of an occurrence (e.g. admission). Five classifications (ICNP, NIC, CLP, MHIC, CPT) provide the content of the intervention. CPT, for instance, provides the content of the psychiatric examination (i.e. description of speech, thought processes, mental status, and so on). Four classifications (ICNP, CPT, CCI, KTL) provides other descriptors or groups of codes that are relevant for mental health. CCI, for instance, provides codes describing the status, the location, the mode of delivery and the extent of an intervention.

Neutrality: the ''neutrality'' of the intervention to service-provider and setting-provider was low. Only five classifications (ICHI, MHIC, CCI, CPT, and ACHI) were created to be service-provider and setting-provider neutral. The rest do not allow its translation into a wider context either because they refer only to interventions provided by some professionals (physicians, nurses) e.g. ICNP, NIC, KTL, CLP, and CCAM; or within specific settings (e.g. acute care: ICD-10-PCS, rehabilitation care: KTL).

Interoperability: The interoperability of the classifications was also low. Only five classifications (ICNP, NIC, ICD-10, CCI, AMHIC, and ACHI) state a possible link with other classifications, mainly with ICHI, which has been recognized as a potential gold standard even though it is still in its preliminary version. However the specification of a system of semantic interoperability is not yet available. Most of the scales identified are widely used mainly at national level for statistical, management or financial purposes. Two classifications (CLP, ICNP) are still in the development or dissemination phases. Australian MHIC codes are going to be mapped to the tenth edition of ACHI.[13] Two specific classifications of interventions in mental care are still in the design/pilot phase (CPT) or have been used only for research purposes (ICMHC).

Implementation: Four classifications had been implemented and are currently the reference classification of health interventions in their country (CPT in US, CCI in Canada, CCAM in France and ACHI in Australia). All classifications had been tested in clinical practice.

Specific characteristics of the mental health sections

Among the general classifications, five have a section on mental health (ICD-10-PCS, CPT, CCI, ACHI, and KLT). One classification is mainly based on psychotherapy procedures (CLP) and one was provided for mental health only (ICMHC). Table 4 summarizes the specific characteristics of classifications of health interventions with regard to the mental health section. The appropriateness of mental health interventions was also assessed. Six classifications (CPT, ICD-10-PCS, NIC, CCI, MHIC and ACHI) include procedures that have poor or null evidence support and can lack scientific and ethical background.

Finally we show how two principal domains in Mental Health care have been defined and coded. Psychotherapy was commonly defined as a structured, based on theory, communication, while counselling may lack both structure and theory. However, as we see in Table 5, clear distinctions between the two could not be well delineated, with the exception of ICHI. Table 5 also shows that training activities of daily life are assessed in four classifications (NIC, CCI, KTL, MHIC). Further, whilst psychopharmacology is specifically coded only in MHIC and ACHI, other three classifications provide codes for ''medication management'' (NIC, ICD-10-PCS and CPT). ICMHC provides modules of care concerning both the training activities of daily life and pharmacological treatment. Codes that describe the training in daily life activity and the medication management are both available in ICHI.

Discussion

Strengths and limitations

To our knowledge this is the first review of classifications of mental health interventions. The lack of visibility and relevance of mental health interventions in general classifications is striking. This is particularly relevant in the context of the high direct costs of mental disorders.[17,18]

Table 4 Specific characteristics of classifications of health interventions: mental health section and inclusion non-evidence based interventions.

Classifications acronym	Specific section	N. Codes	Subsections	Inclusion of non-evidence based interventions
			Under development	N/A
ICHI	No	152	Specific to MH in Body Functions section: •Mental: Global functions •Mental: Specific functions	
		≅740	Other codes relevant to MH in: •Activity and Participation •Environmental factor •Health related behaviours	
ICNP	No	N/A	No	None
NIC	No	N/A	Possible domains: •Behavioural •Family •Community	Aromatherapy Bathing Bed rest care Biofeedback Bioterrorism Preparedness Forgiveness Facilitation Humour Journaling Massage Religious Addiction Prevention Religious Ritual Enhancement Spiritual Support Therapeutic Touch Touch
CLP	Yes	99	16 possible domains (see Table 1)	The CLP Task Force welcomes submissions of entries for any psychotherapy procedure by therapists from any background anywhere. The only provisos are: •The procedure should have been published in the professional literature •A CLP entry for that procedure is neither accepted already nor being edited for potential acceptance
ICD-10-PCS	Yes	30	Psychological Crisis intervention Medicine Management Individual Therapy Counselling Electroconvulsive Therapy Biofeedback Narcosynthesis Group Therapy Light Therapy	Biofeedback Narcosynthesis
CPT	Yes	29	Psychiatric diagnostic procedures Psychotherapy Other Psychotherapy Other Psychiatric services or procedures Special codes Interactive complexity (add-on code). It refers to specific communication factors that complicate the delivery of a psychiatric procedure Evaluation and Management services	Narcosynthesis
CCI	Yes	N/A	Section 1(Therapeutic Interventions on the Nervous System) 1AN: Therapeutic Interventions on the Brain 1ZZ: Therapeutic Interventions on the total Body •Immobilization, total body •Pharmacotherapy, total body Section 6 (Cognitive, psychosocial and sensory therapeutic interventions) 6AA: Therapeutic Interventions for Mental health and Addictions 6DA: Therapeutic Interventions for interpersonal relationships 6KA: Therapeutic Interventions for cognition and learning 6LA: Therapeutic Interventions for communication 6VA: Diagnostic and Therapeutic interventions for motor and living skills Section 7 (Other Healthcare Interventions) 7SC: Personal Care Healthcare Interventions	Acupuncture Aromatherapy Injection of sterile water Patterned breathing Counter pressure Hot/cold packs Birthing ball Hydrotherapy (use of tub baths) Therapeutic touch Coaching (presence of a doula) Massage Visualization

Table 4 (*Continued*)

Classifications acronym	Specific section	N. Codes	Subsections	Inclusion of non-evidence based interventions
OPCS-4	No	12	Chapter A (Nervous system) A83: Electroconvulsive therapy Chapter U (Diagnostic imaging, testing and rehabilitation) U52.1 Delivery of rehabilitation for drug addiction	None
CCAM	No	5	01. Central Nervous system, peripheral and autonomy Neurophysiological tests •Evaluation test for cognitive deficit •Evaluation test for intellectual proficiency in infants •Evaluation test for intellectual proficiency in adults •Evaluation test for depression •Evaluation test for personality disorders	None
MHIC	Yes	9401	Diagnostic Interventions Therapeutic Interventions Client Support interventions Physical Safety interventions Pharmacotherapy interventions	Pastoral ritual/worship (Baptism/initiation; Blessing/naming; Eucharist/ministry of word; Prayer NOS; Rites for the dying) Pastoral/cultural ministry (Introducing the service; Pastoral conversation; Spiritual/emotional support; Visit by cultural or spiritual guide) Biofeedback
KTL	Yes	≈	D. Clinical Social Work, Social Therapy E. Occupational therapy, occupational therapy and other functional therapy (E551-E720) F. Clinical Psychology, Neuropsychology G. Psychotherapies H. Rehab-Care and Pedagogy (H550; H560; H740-H830) I. Recreation Therapy	None
ACHI	Yes	≈40	Non-invasive, cognitive and other interventions, not elsewhere classified Counselling, Education Mental, behavioural or psychological therapies skills training	Pastoral ministry Biofeedback
ICMHC	Yes	N/A	≈	None

MH, Mental Health; N/A, not applicable.

A series of limitations should be considered. First, this expert review is limited to the twelve classification systems that have been compared to ICHI. Second, it is interesting to note that most of the information is available on the classification of health interventions is available as grey literature. As an example, only eight papers have been published on ICHI to this date, and only one out of the comparisons made between ICHI (alpha version 2002) and other classification systems (CCAM) has been published.[19] Third, an attempt of mapping of the semantic structure towards ten classifications of interventions to ICHI had been applied for a limited number of interventions for each classification considered.[20] However, the mapping between ICHI and other classifications have not been published in scientific journal yet. The comparison between ICHI and ICD-9_CM volume 3, CPT, and ICNP is available only on the proceedings of WHO-FIC Network annual meetings.[21–23] Fourth, we do not provide an analysis of the metric properties of the different classification systems, their foundation and linearization, as these properties are not relevant for the purpose of our comparison. Finally, we were not able to assess the granularity in most of the classifications, due to the lack of information provided on the total number of codes, as well as on the identification criteria of those codes relevant to mental care.

Findings from the comparative analysis of classifications and implications for ICHI's further development

Major disparities and gaps have been identified in the description of health interventions in mental health care. Some of these gaps are not specific to mental health but refer to the general issues with regards to the ontology of the classifications of health care. There is a lack of operational definitions and accompanying glossary of terms and this may raise problems in the reliability and local variation in the use of these classifications. For example the terms ''intervention'', ''procedure'', ''service'' and activity'' are used interchangeably on many occasions without providing a proper definition and a description of the semantic equivalence. A well-defined unit of analysis is needed to ensure interoperability, consistency and coherence across different classification systems. This is also relevant for avoiding the incommensurability bias[24] and facilitating comparisons like-with-like within every classification. It is important to develop a classification system that provides a meaningful description of a set of comparable categories. As an example a 'prescription' of a medication can be described as a simple *activity* or a procedure within a medical consul-

Table 5 Main domains related to mental health across classifications: psychotherapy, counselling, training activities in daily life, psychopharmacology.

Classifications acronym	Main Domains			
	Psychotherapy	Counselling	Training activities of daily life	Psychopharmacology
ICHI	Providing therapeutic communication (involving conversation, understanding of information and other knowledge exchange) using highly standardized and theory-based techniques	Providing therapeutic and/or supportive communication (involving conversation, understanding of information and other knowledge exchange) using theory-based methods techniques to encourage a change of functioning, attitude or behaviour in relation to health, or to support problem-solving	Yes	Medication Management
ICNP	N/A	N/A	No	N/A
NIC	N/A	Use of an interactive helping process focusing on the needs, problems, or feelings of the patient and significant others to enhance or support coping, problem solving, and interpersonal relationships	Yes	Medication Management
CLP	Definition: N/A Acceptance and commitment therapy Behavioural Cognitive Cognitive-analytic Couple Family Interpersonal Meditational Morita Psychoanalytic Psychodynamic Rogerian Systemic Approaches	N/A	No	No
ICD-10-PCS	Treatment of (that includes one or more family members of) (two or more) an individual (s) with a mental health disorder by behavioural, cognitive, psychoanalytic, psychodynamic or psychophysiological means to improve functioning or Well-being. Family/Group/Individual: • Behavioural • Cognitive • Interactive • Interpersonal • Psychoanalysis • Psychodynamic • Supportive • Cognitive-behavioural • Psychophysiological	The application of psychological methods to treat an individual with normal developmental issues and psychological problems in order to increase function, improve well-being, alleviate distress, maladjustment or resolve crises	No	Medication Management
CPT	Psychotherapy is the treatment of mental illness and the behavioural disturbances in which the physician or other qualified health care professional, through definitive therapeutic communication, attempts to alleviate the emotional disturbances, reverse or change maladaptive patterns of behaviour, and encourage personality growth and development	Counselling is a discussion with a patient and/or family concerning one or more of the following areas: • Diagnostic results, impressions, and/or recommended diagnostic studies • Prognosis • Risks and benefits of management (treatment) options • Instructions for management (treatment) and/or follow-up • Importance of compliance with chosen management (treatment) options • Risk factor reduction • Patient and family education	No	Medication Management

Table 5 (*Continued*)

Classifications acronym	Main Domains			
	Psychotherapy	Counselling	Training activities of daily life	Psychopharmacology
CCI	Definition – N/A. 6AA30: Therapy, mental health and addictions (Psychoanalysis, Psychotherapy, Therapy, behaviour, Therapy, motivation, Therapy, psychodynamic, Therapy, relaxation (mood, leisure, recreation) 6DA30: Cognitive behavioural therapy, interpersonal relationships 6KA30: Cognitive therapy to improve memory or learning	Definition – N/A 5AD14: Antepartum counselling 5PD14: Postpartum counselling 6AA10: Counselling, mental health and addictions 6DA10: Counselling, interpersonal relationships 6KA10: Counselling, cognition and learning 6LA10: Counselling, communication (skills) 6PA10: Counselling, hearing (loss) 6RA10: Counselling, voice 6TA10: Counselling, sight and other senses NEC 6VA10: Counselling, motor and living skills 7SP10: Counselling, promoting health and preventing disease 7SP60: Education, promoting health and preventing disease (Counselling, healthcare resources (available in community), Counselling, health and wellness)	Yes	No
OPCS-4	N/A	N/A	No	N/A
CCAM)	N/A	N/A	No	No
MHIC	A broad definition of psychotherapy is not provided, but a definition of each psychotherapeutic technique is provided (ex. Cognitive e/o behavioural therapy, Insight-oriented therapy, Interpersonal Psychotherapy, etc.)	Counselling: Alleviating emotional, physiological, psychological, social and/or occupational consequences of a consumer's illness or issue, through the establishment of a supportive or therapeutic relationship. Counselling encompasses the provision of empathic acceptance, clarification, interpretation, problem solving and support	Yes	Yes
KTL	''Psychotherapy involves the treatment of mental (including psychosomatic) disorders by specifically influencing mental processes with psychological, conceptually sound and independent methods''. Chapter G (66 codes)	Definition (Chapter F) This therapy services is usually used in the treatment of mental impairments (e.g., restlessness, anxiety, grief, pain, sleep disorders, emotional and cognitive performance deficits) that affect the rehabilitation. F551:Individual psychological counselling on personal conflicts F552: psychological counselling on work-related problems F553: psychological counselling by testing and talking F554: psychological counselling on mix problems F554: individual-oriented psychological counselling.	Yes	No
ACHI	A broad definition of psychotherapy is not provided, but codes on psychotherapeutic techniques are provided (ex. Cognitive e/o behavioural therapy, Insight-oriented therapy, Interpersonal Psychotherapy, etc.)	N/A	Yes	Yes
ICMHC	Any intervention that is primarily aimed at facilitating changes in the ways in which individuals perceive and understand their thoughts and behaviour	No	Yes Activities necessary in providing for those individuals who are not or not completely capable of managing for themselves	Yes Any operation concerning the use of psychopharmacological drugs and other somatic intervention.

N/A, not applicable.

tation, an *action* that identifies a specific intervention, or as an *intervention* by itself in other contexts and settings (e.g. prescription could be the full intervention provided in a depot clinic or in a lithium clinic). On the other hand, a formal behavioural therapy can refer to a single intervention, to a standard care package, or even to a comprehensive planned clinical programme that includes a series of interventions.

The use of generic terms (services, activities, procedures, acts, etc.) indicates the extent to which these classifications lack semantic interoperability. Furthermore, semantically similar categories overlap and are classified in different sections due to a problem in differencing the category and its content. For instance counselling is classified in different sections in the Canadian Classification of Health Interventions depending on whether it is counselling for primary care, obstetrics, and others.

A taxonomy tree with a clear hierarchy of concepts will help to construct the structure on which the classification should be based. This aim may be more easily accomplished in surgical chapters, but attempts to translate the same model to the mental health component have been unsatisfactory. In some cases an axis system developed for surgical interventions (ICD-10-PCS) have been used to describe mental health interventions without being properly adapted. In the case of ICD-10-PCS just 3 axes out 7 provide meaningful information for coding.

Some classifications show a high degree of detail which may be meaningful for a clinician but not for a health manager or planner. As an example, MHIC provides a detailed coding of different drugs being prescribed. This is not part of the intervention itself but of the content of the intervention, which could be ascertained and coded using other classification systems (i.e. Anatomical Therapeutic Chemical Classification System – ATC).[25] This may lead to the development of classifications that are too detailed and redundant with other coding systems.

One of the major challenges of the classifications of health intervention is their provider and setting neutrality. According to this, the classification of interventions should be independent of the professional that delivers it or the facility where the intervention takes place. Our review found that four classifications (MHIC, ACHI, CCI, and CPT) are both setting and provider neutral as it happens with ICHI. However the provider and the setting could be implicit in the classification of certain types of interventions in other areas such as surgery or general medicine. As an example surgical interventions are observable and they could only be provided by highly trained and officially qualified staff and performed in operating rooms.

This is not the case of psychotherapy, where the observable activity (a ''conversation'' between a provider and a patient) does not bring in enough information on the specific activity being performed at the clinical encounter. In addition a psychotherapy consultation is by far more ambiguous than a surgical intervention. This leads to an additional difficulty in defining provider neutral interventions in mental health that could differentiate psychotherapy from counselling or from emotional support. It may be argued that these interventions may be related to specific professions and, consequently, are not provided neutral. ICHI, however, try to differentiate psychotherapy as a separate coding from counselling and emotional support actions. A possible step forward may be to provide, as an extension code, an ''intensity'' or high skilled descriptor to grade these therapeutic actions, from a highly standardized and theory-based technique (i.e. psychotherapy) to lower motivational/emphatic actions (i.e. emotional support). ICHI codes may be further used in professional-specific classifications, for instance nursing classifications.

A number of the classifications selected refers to specific service settings or areas such as hospital care (ICD-10 PCS) or rehabilitation care (KTL). On the other hand, ten out of the twelve classifications considered, include a mental health section. CPT, for instance, provides a detailed description of codes and coding rules to be used in psychiatric care.[26] ICMHC describes modalities of care specifically for mental health, rather than being a classification of interventions.[27] Furthermore, classifications not specifically addressed to mental health may be used to describe specific interventions in this area. This is the case of nursing classifications (ICNP, NIC). ICNP provides a catalogue with a subset of codes to be used with Hospitalized Adult Mental Health Client.[28] Most frequent NIC interventions have been identified for different psychiatric disorders, such as schizophrenia or depressive disorders,[29] as well as for other nursing diagnoses, as ''impaired social interaction''.[30]

Classifications for specific professionals (e.g. nurses) and for specific areas (e.g. rehabilitation) may scatter mental health interventions in a plethora of subset codes that are hard to use in management and monitoring. On the other hand ICHI incorporates mental health care interventions in all its sections. It can be used as an ''open tool'' where to identify the mental health interventions, and if necessary, develop a derived classification that lists all the relevant codes for mental health and expands those areas that require further granularity.[31,32]

It is further interesting to note the unbalance found in the classification of mental health interventions, when compared to other health areas. One explanation could be the complexity and ambiguity of mental health interventions in comparison with other observable intervention, which could be highly complicated but not so complex. A similar problem could appear in the description of interventions at primary care.[33] A complex interventions is defined as containing several interacting components, whose different behaviours, groups or organizational levels, number and variability of outcomes determine the degree of complexity.[33,34] Another definition reflects the unpredictable interaction between people and their context in order to produce an outcome ''highly context dependent''.[35] Attempts to assess the feasibility of complex interventions in mental health had been described elsewhere.[36] Major efforts to evaluate complex interventions regard their development, identification, documentation, as well as their reproducibility.[37] The implementation and effectiveness of these interventions may be hindered, thus, by the high variability of interventions in mental health among different classifications. An international classification might allow a better comparison between different standardized interventions across differ-

ent settings. ICHI, hence, may be further applied in order to fulfil this lack of comparability and reproduction. As a consequence, this may enhance the definition and evaluation of complex interventions.

Another unanticipated finding was the inclusion of not evidence-based practices in the classifications implemented in several Western countries (e.g. United States, Canada, Australia). This is the case of ''aromatherapy'' (CCI, NIC)[38] and ''biofeedback'' (NIC, ICD-10-PCS, MHIC, ACHI),[39] or even ''narcosynthesis'' (ICD-10-PCS, CPT), whose available scientific literature dates back to forties'.[40] Moreover, clinical benefits of pastoral care (NIC, MHIC, ACHI) is carrying no scientific background.[41] This may be related to the lack of visibility and awareness of mental health in the current classification systems. However, the inclusion of these interventions should be avoided or clearly differentiated from evidence-based interventions, particularly in relation to the call for the implementation of evidence-based mental health interventions made by WHO.[42] It may be necessary to consider an additional qualifier to describe interventions that are not evidence-base or controversial at the final version of ICHI.

Several classifications include interventions in the mental health section that can be performed in generic health care contacts such as ''counselling'', or ''active listening'' in CCI. This fact may facilitate duplications that contribute to the ambiguity of critical categories such as psychotherapy and counselling.

Conclusions

During the last decade there has been a considerable effort to systematize the process of mental care both at national and international level. A substantial advance has taken place in the classification of the input and outcome domains but the advancement in the classification of the care throughput has been very limited to this date. It could be partly attributed to the traditional depiction of Mental Health process as a 'black-box', to the inherent difficulties of the classification of mental care procedures, its complexity, ambiguity and the blurry boundaries between the throughput and several components of the input domain in mental health. Major problems include a granularity unbalance (i.e. differences in the number of codes and its specificity with other areas such as rehabilitation), unclear units of analysis (i.e. differences between procedures, interventions, packages of care and care programs), lack of clearly stated evidence-based interventions in a mental health context; and lack of a well-defined taxonomical tree. An ontology approach to the definition of the different entities involved in the throughput of mental care, including their hierarchical relationships and its conceptual map, may have contributed to the failure of previous systems together with the development of separate systems from the classification of mental health interventions from generic health interventions.

The classifications reviewed here highlight the significant work already performed in this area and provide ground for the ICHI framework and the future semantic interoperability of other national and professional classifications with this international system.

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Conflict of interest

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