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Research Paper

# The brain injury case management taxonomy (BICM-T); a classification of community-based case management interventions for a common language

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## Abstract

**Background:** Case management is a complex intervention. Complexity arises from the interaction of different components: the model (theoretical basis), implementation context (service), population and health condition, focus for the intervention (client and/or their family), case manager's actions (interventions) and the target of case management (integrated care and support, client's community participation). There is a lack of understanding and a common language. To our knowledge there is no classification (taxonomy) for community-based case management.

**Objective:** To develop a community-based case management in brain injury taxonomy (BICM-T), as a common language and understanding of case management for use in quality analysis, policy, planning and practice.

**Methods:** The mixed qualitative methods used multiple sources of knowledge including scoping, framing and a nominal group technique to iteratively develop the Beta version (draft) of the taxonomy. A two part developmental evaluation involving case studies and mapping to international frameworks assessed the applicability and acceptability (feasibility) before finalization of the BICM-T.

**Results:** The BICM-T includes a definition of community-based case management, taxonomy trees, tables and a glossary. The interventions domain tree has 9 main actions (parent category): engagement, holistic assessment, planning, education, training and skills development, emotional and motivational support, advising, coordination, monitoring; 17 linked actions (children category); 8 related actions; 63 relevant terms defined in the glossary.

**Conclusions:** The BICM-T provides a knowledge map with the definitions and relationships between the core actions (interventions domain). Use of the taxonomy as a common language will benefit practice, quality analysis, evaluation, policy, planning and resource allocation. 

*Keywords:* Case management; Care coordination; Taxonomy; Intervention; Quality analysis

Case management (CM) is a complex intervention which makes a unique contribution toward the long term care, community participation and support of a person with a complicated health condition such as brain injury.[1–3] CM has multiple components, which interact with each other.[4–6] The components concern; the model or approach (theoretical background), implementation context (organization or service), case manager's actions

*Abbreviations:* (BICM-T), Brain injury case management taxonomy; (CM), Case management; (AUD), Australian dollars; (NSW), New South Wales; (LTCSA), Lifetime Care and Support Authority; (WHO), World Health Organization; (ICHI), International Classification of Health Interventions.

The method used for the development of the taxonomy was presented at the International Integrated Care Conference in November 2014, and the abstract of that conference presentation was published in IJIC. There was a poster presentation in 2014 at WHOFIC-Barcelona.

The authors have no conflicts of interest to declare.

There has been one paper presentation on the method at the International Integrated Care Conference in November 2014. There was a poster presentation on the ICHI component of the taxonomy in presentation in 2014 at WHOFIC-Barcelona and a poster presentation in July at the ASSBI conference in Sydney. These are not considered duplicate publication.

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(interventions), focus of the CM interventions (the person with the health condition, or their family/carers), the target of CM (e.g. activities and participation of the person with the health condition or environmental factors) and the time the case manager is engaged with the recipient (stage of recovery). The issues arising from the complexity in CM are similar to the evaluation of other complex interventions, integrated health care and health care programs.[7,8] The variability and lack of consensus on language poses challenges for quality analysis, evidence synthesis, policy development and planning for CM.[5,6,9–11]

### *Brain injury*

In this research, there is a special focus on brain injury, which is an example of a common multi-dimensional and disabling health condition. As such, the taxonomy may be applicable to other multi-dimensional health conditions like dementia, chronic illness or mental health conditions or multi-morbidity.

The differences with definition and reporting of brain injury results in a range of incidence estimates based on hospital data from 91 to 377 per 100,000 population.[12,13] Brain injury potentially impacts on multiple domains of health and participation, the person's cognitive, physical, psychological, behavioral functioning and participation in life roles. In the USA, 2% of the population are reported to experience life-long disability as a result of traumatic brain injury.[14] In an Australian outcome study of various health domains for people with brain injury ($n = 198$) there were significant impairments of mobility (10%), use of the hands (14%), communication (4%), memory (61%), problem solving (52%), social interaction (20%), and at 3 years post injury less than a third of working age people were employed.[13]

Case management for person's with brain injury demands a complex response by services, programs and interventions.[1,15,16] In Australia, children and adults with brain injury were estimated to be 6% of users of Government funded specialist disability service[16] with the total life time cost per incidence case of traumatic brain injury estimated to be $2.5 and $4.8 million (AUD) for moderate and severe brain injury respectively.[15] People with moderate or severe brain injury require CM. In 2012, a local study at the Lifetime Care and Support Authority (LTCSA) in New South Wales (NSW), Australia; 89% of participants in LTCSA with brain injury received CM services.[17]

### *Taxonomy*

In health services and implementation research, complexity has been managed with methods which use broader sources of knowledge, framing and frame analysis. Frame analysis is a method to enumerate and define ideas and themes within a broader topic to support defining new concepts.[18,19] One type of framing tool is classification, a taxonomy. The taxonomy organizes knowledge and articulates the relationship between concepts and components, and provides definitions.[18,20] In health services research taxonomies have been used as a knowledge map to develop consensus and develop a common language in very different areas such as patient safety and reporting of adverse events,[21] rehabilitation interventions[22,23] health-related behaviors[24] or complex psychological behavioral interventions.[25]

In studies on CM, either there is too little information to describe what is done (the interventions or activity) or there is significant variability in the terms and descriptions for the same activity.[11,26–31] For example, the range of terms used in the literature to describe the activity (intervention) of linking or referring the person to health or support services include *managed care*,[32] *brokering*,[33,34] *specialist case management*,[35] *systems coordinator*,[36] *coordinating*,[37] *service broker*[38] or *navigator*.[39]

### *Aim of the research*

The research aims to develop a community-based case management in brain injury taxonomy (BICM-T), for use as a common language in case management quality analysis, policy, planning and practice.

The model and theoretical background for the taxonomy on CM is community-based and person-centered. The person-centered approach holistically considers the clients own context and situation, their strengths, the clients choice and goals for participation in life, their needs and preferences as well as actively supporting them to be involved in planning for supports.[40]

In this paper, we only report on the interventions domain performed by the case manager (throughputs domain). The case management service domain (inputs) is reported elsewhere.

## Methods

The University of Sydney conducted the two phase study (Fig. 1). In December 2013, the University of Sydney granted ethics approval. Phase 1 involves the development of the taxonomy and Phase 2 the dissemination and implementation. The taxonomy on CM in brain injury involves two axis or domains of case management; 1) the service domain (inputs), the description of case management services provided by organizations and 2) the interventions domain (throughputs) which are the 'actions' performed by the case manager. Phase 2 has commenced but the methods and results are not reported here.

Phase 1, the development of the taxonomy involved two groups and four steps (refer to Fig. 1). The focus of this report is on Phase 1 and the case management interventions domain of the taxonomy. Step 1 the scoping study method and results are reported elsewhere. The next steps occurred over 14 months and involved two groups; a core group (SL,