

SYSTEMATIZATION OF REHABILITATION INTERVENTIONS FOR NEURO-ONCOLOGICAL PATIENTS USING INTERNATIONAL CLASSIFICATION OF HEALTH INTERVENTIONS: A SCOPING REVIEW

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Background: To ensure equitable and effective rehabilitation for neuro-oncological patients the development of an effective treatment strategy is necessary.

Objective: To identify evidence for interventions used in acute rehabilitation for patients with neuro-oncological conditions and to systematize them according to the International Classification of Health Interventions (ICHI) classification

Methods: A scoping review was conducted, comprising 3 parts: identification of interventions in publications; linking the interventions to ICHI classification; and identifying problems targeted by these interventions and linking them to International Classification of Functioning, Disability and Health (ICF) categories.

Results: The search strategy selected a total of 6,128 articles. Of these, 58 publications were included in the review. A total of 150 interventions were identified, 47 of which were unique interventions. Forty-three of the interventions were linked to the ICHI classification; 4 of these interventions were evidence level I, 18 evidence level II, 23 evidence level III, and 2 evidence level IV. Five interventions were linked to the ICF One-Level Classification, and the remaining 42 interventions were linked to the ICF Two-Level Classification. All interventions regarding the Body Systems and Functions were linked to the ICF Two-Level Classification. Only 5 interventions in the Activities and Participation domain, 3 interventions in the Health-related Behaviors domain, and 1 intervention in the Environment domain were linked to the ICF Two-Level Classification. Two identified problems (inpatient nursing and comprehensive inpatient rehabilitation) were not classified according to the ICF.

Discussion: A total of 47 unique interventions were identified, revealing a significant focus on addressing issues related to bodily functions and structures. The study also highlighted the challenge of linking specific interventions to ICHI codes, particularly when the source documentation lacked adequate detail. While this review offers valuable insights into rehabilitation for neuro-oncological patients and lays the groundwork for standardized coding and data exchange, it also emphasizes the need for further refinement and validation of the ICHI classification to better align with the multifaceted interventions used in rehabilitation.

Conclusion: There is evidence in the literature of 47 interventions used by various rehabilitation professionals in the acute rehabilitation of neuro-oncological patients. However, most of these interventions are evidence level II and III. Four interventions (virtual

LAY ABSTRACT

With the goal of ensuring equitable and effective rehabilitation for patients with neuro-oncological conditions, the aim of this study was to identify and systematize rehabilitation interventions used for these patients in the acute setting. By analysing a substantial body of literature, 47 unique interventions used by rehabilitation specialists were found. However, the majority of these interventions were supported by evidence levels II and III, indicating the need for further high-quality research in this field. Notably, this study encountered challenges in aligning interventions with the International Classification of Health Interventions (ICHI), especially when source documentation lacked necessary detail. In addition, the problems targeted by these interventions were often broadly defined and sometimes did not correspond closely with the intended purpose of the intervention. This study emphasizes the importance of improving the precision and clarity of descriptions of interventions and advocating for closer alignment with the International Classification of Functioning, Disability and Health (ICF) categories, particularly within the domains of Activities and Participation. The study illuminates the heterogeneity in how rehabilitation interventions are reported and categorized, emphasizing the need for refinement and updates in these classification systems. These results provide a basis for a more evidence-based and standardized approach to neuro-oncological rehabilitation, offering valuable insights for healthcare professionals and policymakers striving to enhance care in this patient population.

reality, mirror therapy, robotic upper extremity training to improve function, and cognitive group therapy) are not included in the ICHI. The problems analysed in the literature that are targeted by interventions often do not coincide with the purpose of the specific intervention or are too broadly defined and not specific. These findings emphasize the need for greater precision in describing and documenting interventions, as well as the importance of aligning interventions more closely with ICF categories, particularly in the domains of Activities and Participation. This work highlights the heterogeneity in the reporting of rehabilitation interventions, and the challenges in mapping them to standardized classifications, emphasizing the ongoing need for refining and updating these classification systems.

Key words: neuro-oncology; acute rehabilitation; interventions; International Classification of Health Interventions; classification validation; ICHI mapping.

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METHODS

Research design

This scoping review was conducted in 3 parts: identification of primarily used rehabilitation interventions for neuro-oncology patients and analysis of their evidence levels; systematization of the identified interventions according to the structure of the ICHI; and analysis of the problems addressed by these interventions using the International Classification of Functioning, Disability, and Health (ICF).

Identifying interventions

A scoping review was performed based on the Joanna Briggs Institute-issued guidelines (8–10). Between December 2019 and December 2020, a comprehensive search was performed in PubMed, Science Direct, EBSCO, and Medline databases, and the evidence-based physiotherapy database PEDro, using the keywords “brain cancer”, “brain tumor”, “acute rehabilitation”, and “rehabilitation”, as well as the Boolean operators AND and OR. The search results were imported into the Mendeley platform – a reference manager software by Elsevier, where duplicates were excluded. The following inclusion criteria were used: randomized controlled studies; cross-sectional studies; qualitative studies; systematic reviews; and meta-analyses; case studies presenting rehabilitation medical technologies; studies describing patients with brain tumours; population: over 18 years of age; articles published in English; articles published during the last 22 years (from January 1998 to December 2020). Exclusion criteria were: studies with animals or children; literature reviews; research protocols; articles for which a full-text version is not available; studies not related to rehabilitation interventions.

All publications included in the study were analysed according to the design of the study, the interventions used in the study, the measurement tools, the results of the study, the research problems, and the level of evidence of the publication (11). Levels of evidence, sometimes referred to as the hierarchy of evidence, are assigned to research based on its design, methodological quality, validity, and applicability to patient care (11).

The identification of interventions was carried out by 2 independent researchers, and their results were combined and compared. The interventions used in each publication were listed in a Microsoft Excel spreadsheet. Interventions were recorded precisely as described in the publication. It was then noted how many times and in which publications these interventions were mentioned. The interventions, which were called different names, but had the same description in the publications, were grouped as a single intervention. For example, studies used occupational therapy as an intervention and reported that occupational therapists worked to improve daily activities; hence the name of the intervention was daily activity training.

Mapping interventions

The linking of interventions was based on the WHO guidelines for working with the ICHI classification: ICHI Beta-3 Reference Guide (12). The online version of the ICHI classification Beta 3 was used in this review.

ICHI is a tool that covers interventions across all health systems and can be used to report and analyse them. The ICHI classification system is structured along 3 fundamental axes: Target, representing the focal entity upon which an Action is executed; Action, signifying the specific deed performed by an actor towards a chosen Target; and Means, encompassing the techniques and procedures employed in executing the Action

According to World Health Organization (WHO) data, the second leading cause of death is cancer. At the same time, survival rates are increasing with successful treatment. The number of people living with limitations of functioning after treatment is also increasing. Tumours in the brain or other structures of the central nervous system make up approximately 1% of all cases of oncological disease. Involvement of neurological structures often means developing complex impairments in body functions, leading to limitations in daily activities and restrictions in participation. This affects the patient, family members, and society; thus increasing the costs of treatment. Rehabilitation in oncology patients with central nervous system disorders is referred to in the literature as neuro-oncological rehabilitation (1).

The goals of rehabilitation medicine are to improve and maintain optimal functioning for people with impairments or those at risk of developing functional impairments. The WHO guidelines state that the goals of medical rehabilitation include self-care training, mobility, functional independence, and social belonging (2). The literature has repeatedly emphasized that rehabilitation in neuro-oncology should start as soon as possible (3). Rehabilitation is provided by multi-professional team members, each with their competencies, skills, and interventions. A health intervention or medical technology is an activity carried out for or on behalf of a person or the population, intending to assess, improve, maintain, promote, or modify health, functioning, or health status (4, 5).

The International Classification of Health Interventions (ICHI) was created by the WHO and is one of the classifications in their Family of Classifications (6). The ICHI defines a health intervention as an action carried out for, with, or on behalf of an individual or population, aimed at assessing, enhancing, maintaining, promoting, or altering health, functioning, or health conditions (7).

To ensure that high-quality rehabilitation is consistently accessible to all those in need, it is necessary to develop a unified and effective treatment strategy. Thus, the primary objectives of this study are to identify the evidence supporting the most frequently utilized rehabilitation interventions in the acute rehabilitation of neuro-oncology patients and to systematically organize this evidence in accordance with the ICHI framework.

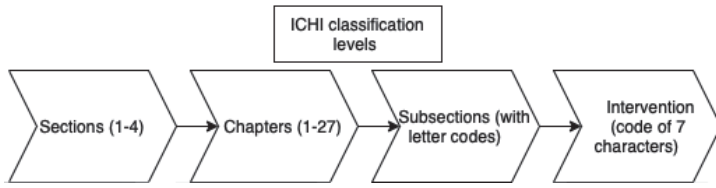


Fig. 1. Graphical representation of International Classification of Health Interventions classification levels.

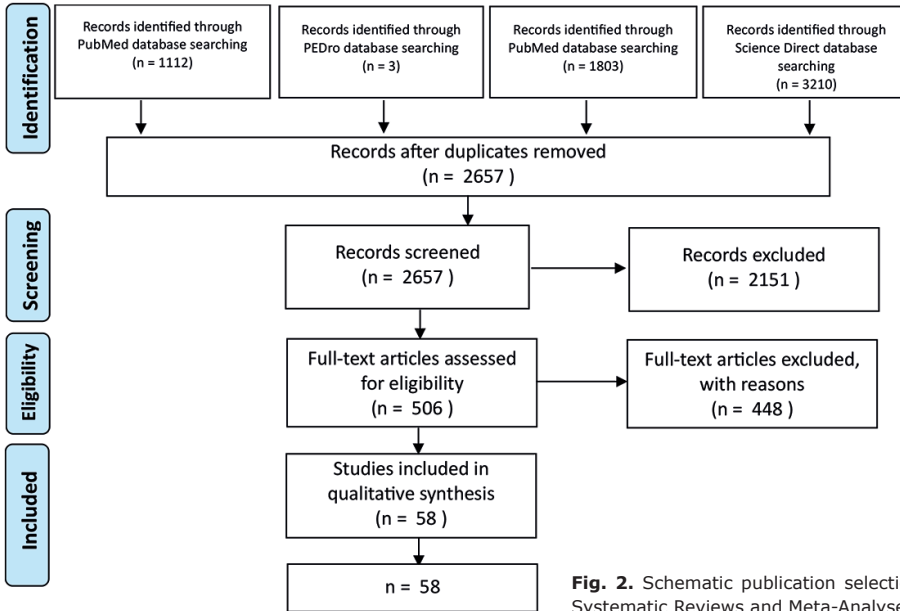


Fig. 2. Schematic publication selection process. Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram.

(6). Furthermore, Extension codes are integrated into this system, facilitating the exchange of information with healthcare classification systems, such as the International Classification of Diseases (ICD) and the ICF. These extensions empower users to furnish comprehensive details regarding interventions in addition to the relevant ICHI code. The overall system is underpinned by a straightforward and coherent syntax, which not only links ICHI stem codes and extension codes, but also accommodates the grouping of related interventions into cohesive packages.

In the linking process, 1 of the 4 most relevant intervention sections was first selected. The most appropriate chapter is chosen, followed by the most appropriate subsection, and finally, the most appropriate intervention is selected (Fig. 1).

When selecting the ICHI intervention, the description of the intervention was considered: the purpose, operation, and means, as well as the comments on the intervention, if any. Often for an intervention in classification, index terms were also added, where it is possible to find information on specific problems that are additionally included in this intervention. In cases where a non-specific method was mentioned in the publication, such as comprehensive inpatient rehabilitation, the most appropriate intervention in the ICHI classification was selected for this intervention. In this case, it was the second major section of the 4: Interventions on Activities and Participation Domains, as the publication did not specifically mention any other therapies.

Identification of the problems targeted by these interventions

Each ICHI intervention in the publications was used to solve a problem. In parallel with the identification of interventions, the problems targeted by these interventions were also identified in the form of a table. In this report, for structuring information, the problems identified were linked to 1 of the ICF categories (13, 14).

RESULTS

Identification of interventions

In total, 6128 articles were selected using the search strategy. Of these, 3470 were duplicates, giving a total of 2658 unique publications. Applying inclusion criteria when reading publication headings, abstract, and, if necessary, the full text, 2,599 studies were excluded, thus a final total of 58 publications were included in the report. The schematic PRISMA publication selection process is shown in Fig. 2.

In total, interventions were mentioned 150 times in 58 publications. Three of the identified studies had level of evidence I (systematic reviews), 17 level II, 31 level III, and 7 level IV.



Fig. 3. Levels of evidence and International Classification of Health Interventions intervention identification scheme.

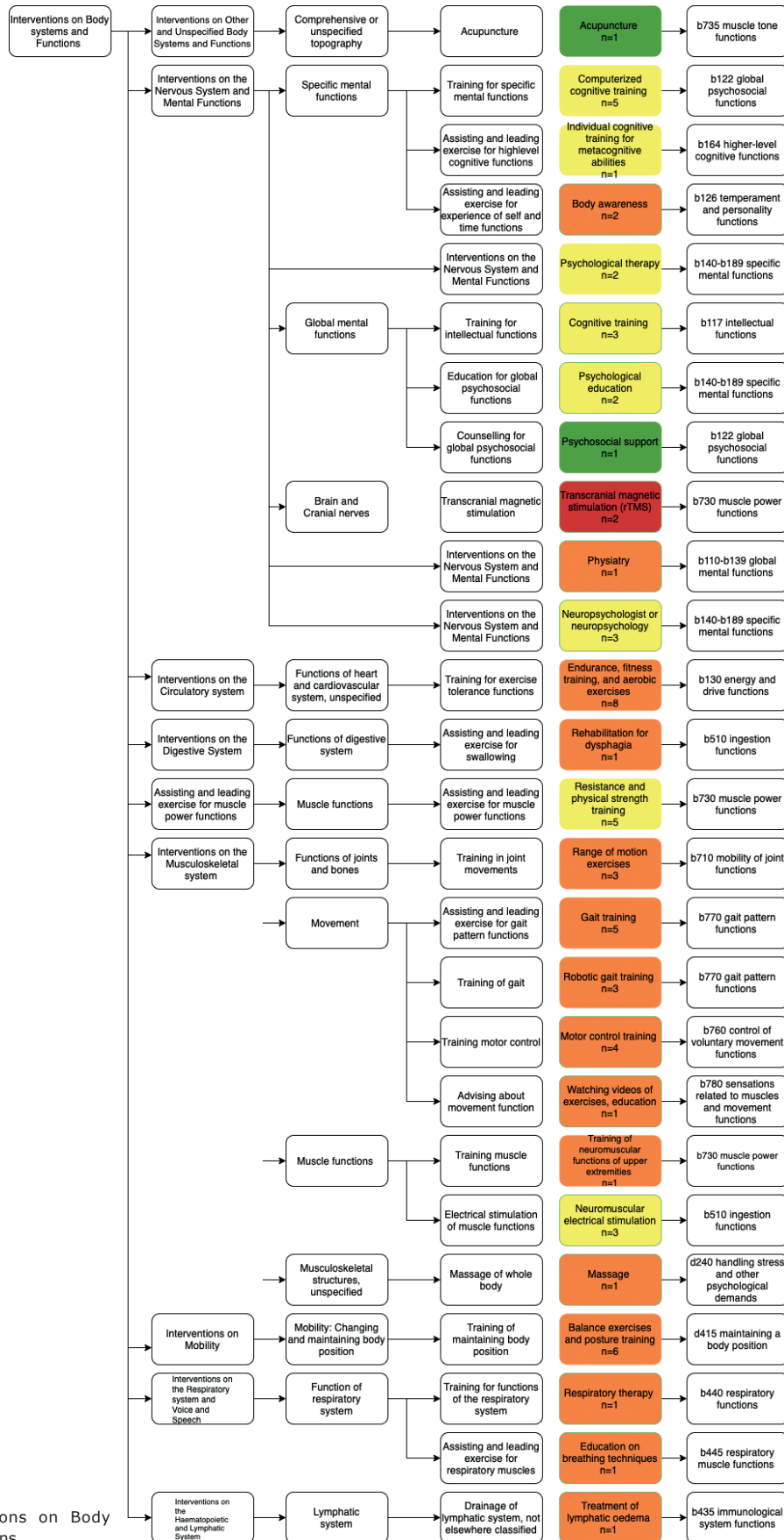


Fig. 4. Interventions on Body systems and Functions.

Analysing all the reported publications, the author selected 47 unique interventions identified in publications and illustrated in Figs 4–8.

All interventions were evaluated by their level of evidence and colour coded accordingly. ICHI intervention identification and the appropriate ICF category schematics are shown in Fig. 3.

Linking Interventions to International Classification of Health Interventions

In total, according to the ICHI, 47 interventions were systematized, while 4 interventions were not identified in this classification (robotic upper limb training to improve function, mirror therapy, virtual reality for cognitive functions, virtual reality for upper limb function, and cognitive group therapy).

There were 9 chapters, 14 subsections, and 26 interventions identified in the component Body Structures and Functions. Seven chapters, 6 subsections, and 12 interventions were identified in the component Activities and Participation. The parts of the ICHI classification for the Environment were 1 chapter, 1 subsection, and 1 intervention. One chapter, 2 subsections, and 4 interventions were identified in interventions on the component Health-related Behaviours. 4 interventions were not identified in ICHI.

Interventions such as comprehensive inpatient rehabilitation, occupational therapy (daily activity training), speech therapy, physiotherapy, psychology, neuropsychology, psychiatry and home care are too broad to link to the ICHI 7-digit code. Comprehensive inpatient rehabilitation was related to section level: Interventions on Activities and Participation Domains. Next on the sec-

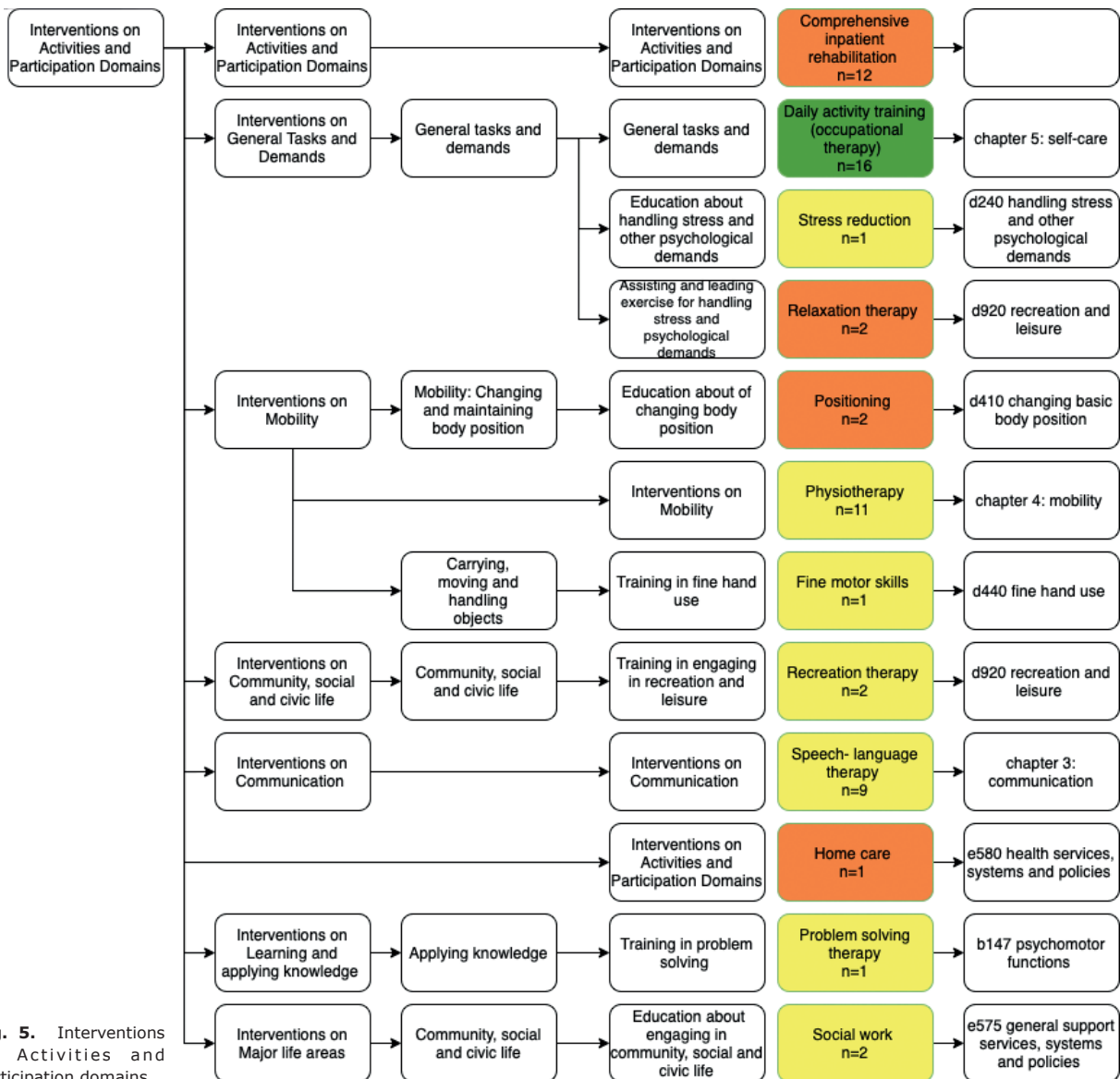


Fig. 5. Interventions on Activities and Participation domains.

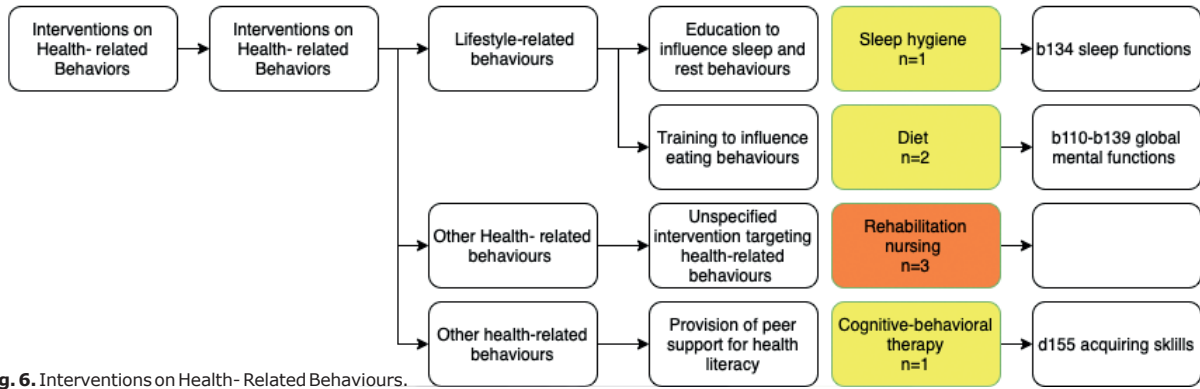


Fig. 6. Interventions on Health- Related Behaviours.



Fig. 7. Interventions on the Environment.

tions, with 2 interventions were linked: Interventions on Communication and Interventions on Mobility, which had appeared in publications as speech therapy and physiotherapy. One intervention was related to the subdivision code: Daily activity training and occupational therapy: General tasks and demands. Up to 7 characters, the ICHI intervention code managed to link 34 interventions.

Problem identification

Each intervention discussed in the articles addresses certain functional impairments of problems. Therefore, these problems identified in articles were linked to the ICF classification to determine if the target of the intervention matches the problem it is used on.

In total 5 interventions were linked to ICF One-Level Classification, the remaining 42 interventions were linked to the ICF Two-Level Classification.

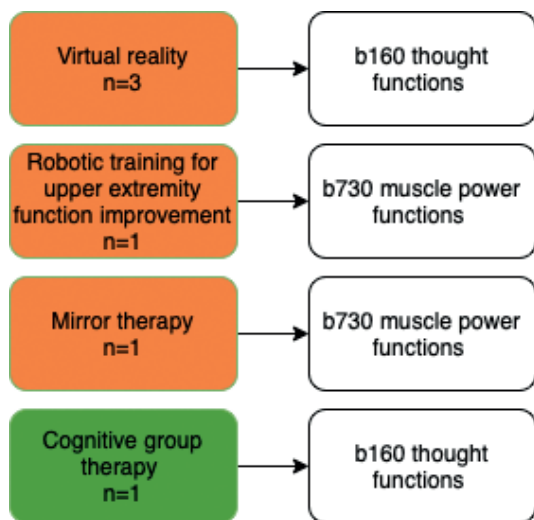


Fig. 8. Non-classified interventions.

All interventions regarding Body Systems and Functions were linked to the ICF Two-Level Classification. Only 5 interventions in the Activities and Participation domain were linked to the ICF Two-Level Classification; in the Health-related Behaviours domain it was 3 interventions and in the Environment domain 1 intervention.

Two of the problems identified (inpatient nursing and comprehensive inpatient rehabilitation) were not classified according to the ICF.

DISCUSSION

This review analysed 58 publications, identifying 47 unique interventions that can be used with neuro-oncological patients during acute rehabilitation. Thus, it provides an idea of the amount of evidence needed for the technologies used in medical rehabilitation to develop a unified, effective, and evidence-based strategy for treating patients.

Clinical guidelines for rehabilitation in neuro-oncology patients include the following interventions: multidisciplinary rehabilitation, physiotherapy, occupational therapy, aerobic and strength exercises, neuropsychological treatment, improved communication and swallowing, and assistive devices (15).

The Australian Cancer Society recommends provision of physiotherapy for patients with impaired strength, coordination, or balance, and occupational therapy for patients with difficulty with daily activities (15). These interventions are also in line with the interventions identified in the current review, where occupational therapy and physiotherapy, along with comprehensive inpatient rehabilitation, were the most commonly analysed interventions.

Analysing the studies included in the scoping review, the most-used interventions for rehabilitation

in patients with brain tumours were identified and summarized in Table I.

Exercise training was one of the most frequently mentioned interventions for patients with brain tumour-induced dysfunction. However, daily activity training can also include a myriad of activities. Speculatively, it can be assumed that the therapists worked by focusing on the activities measured by the instruments used. An example of a popular tool for measuring daily activities was the Karnofsky Performance Scale (KPS), which measures a patient's ability to take care of themselves, attend work, and measures the level of assistance required (16). Thus, when analysing the measurements used in the publication, it is possible to speculate on the interventions used to rehabilitate these patients, but this is not an evidence-based medical practice.

According to the WHO and the ICHI classification, assessment can be seen as a stand-alone intervention, which can be at the level of Bodily Functions and Structures, at the level of Activities and Participation, and at the assessment of Environmental Factors and Health Behaviours. Since assessment has no effect on health outcomes, the assessment does not appear as a separate intervention in the results of this work. However, to be able to judge in detail the expected results of the treatment, it is important for the studies to indicate the specific interventions being used; this is not always done.

Cognitive rehabilitation interventions were the most widely described in the publications, and these studies also accounted for the largest number of tools used. Cognitive rehabilitation often uses a set of neuropsychological tests that measure a wide range of cognitive abilities (17). A large randomized controlled trial (RCT) described in detail the computerized cognitive rehabilitation programme, the number, and frequency of interventions, and the tools and outcomes used (18). It can be assumed that the publications in this review that analyse cognitive rehabilitation interventions describe these interventions better than in other studies. An extensive pilot observational study analysed the cognitive functioning of patients with epilepsy due to a brain tumour and described in detail the computerized

cognitive rehabilitation programme and which rehabilitation specialists performed the intervention(19).

A wide range of studies was included in this report. Interestingly, studies with the highest level of evidence often indicated the worst-rated interventions. For example, a RCT by Ownsworth et al., entitled "Evaluation of the making sense of a brain tumor program: a RCT of a home-based psychosocial intervention" identified only the equipment used in the rehabilitation process "Making sense of the brain tumor" as an intervention, without further description of what this device comprised (20). Similarly, a large retrospective study with 719 participants mentioned only motor skills training, speech therapy, and daily activity training as interventions (19, 20). The only measure used in this publication is the Barthel Index, thus suggesting that only in the domains of daily activity can the improvement really be measured. In contrast, analyses of the situation were very detailed in terms of interventions and doses. For example, a situation analysis from Cofre et al. analysed the functioning of 1 patient using well-described interventions: gait, balance training, relaxation therapy (21). This analysis also described the progression of the exercises over time so that the effectiveness of the interventions can be tracked, coded, and compared globally, which is exactly the goal of WHO (2, 21).

Analysing the included studies, it was often observed that it is not mentioned which specialist performs the specific intervention. Often, when analysing publications, there is a feeling that the authors take it for granted, but different countries have different professions, standards, different interventions and competencies for each profession, so it would be desirable to include specialists who perform a specific intervention.

In Latvia, all interventions are registered and accounted for by the State Agency of Medicines (SAM) (22). The State Agency of Medicines database contains 27 of the interventions identified in this report. They are categorized in the Rehabilitation Medical Services Department under the interventions of an occupational therapist, physiotherapist, speech-language therapist, and psychologist. Interventions between these specialists often overlapped; for example, counselling on technical aids was provided by both an occupational therapist and a physiotherapist, according to the SAM. Acupuncture is also registered in the SAM database; however, it is not located in the Rehabilitation Medical Services Department, but in the Complementary Medicine Services Department along with manual therapy.

According to the information provided in the database of medical technologies used in medical treatment, physiotherapy is a branch that includes specific interventions divided into examination and treatment interventions (22). Investigative interventions may

Table I. Interventions

Intervention	Studies mentioning intervention, <i>n</i>
Occupational therapy (training of daily activities)	15
Comprehensive inpatient rehabilitation	12
Physiotherapy	12
Motor control learning	10
Speech (language) therapy	9
Endurance, fitness training, and aerobic exercises	9
Balance exercises and posture training	6
Computerized cognitive ability training	5
Resistance and strength exercises	5
Relaxation therapy	5
Gait training	5

include, for example, the examination of physical function in physiotherapy, analysis of the patient's general health and social situation in physiotherapy, or the evaluation and assessment of the patient's activities and participation in physiotherapy. Treatment interventions include patient positioning, verticalization, postural drainage, selection and training of mobility aids, gait training, individual dosing of exercise, and more (22). In this report, physiotherapy and speech-language therapist were identified as separate interventions, but the physiotherapy industry includes several interventions. Therefore, physiotherapy may not be specific enough to describe an intervention that improves patient's functioning.

The situation is similar with speech-language therapy intervention. The studies included in this report, which referred to speech-language therapy as an intervention, explained that it was speech-language therapy, so these categories were considered together in this review. State Agency of Medicines also has a list of speech-language therapy interventions, which also includes diagnostic interventions, as well as treatment methods, such as myofunctional therapy, strengthening of the respiratory apparatus, development, and improvement of fine (finger, hand) motor skills (22). Thus, speech-language therapy without a detailed description of the technology cannot be considered a specific intervention.

Linking interventions to International Classification of Health Interventions

A total of 47 interventions were identified, of which 43 were in the ICHI classification. Of these, 7 interventions were linked only at the level of chapters or sub-chapters, as these interventions were not specified in the publications. The remaining 4 interventions could not be linked to the ICHI because the classification did not include appropriate (or corresponding): robotic upper limb training to improve function; mirror therapy; virtual reality for upper limb function; cognitive group therapy.

An interesting phenomenon was observed in the process of linking interventions. WHO's description of classifications emphasizes that ICHI's objectives are based on the ICF classification and that the codes are arranged hierarchically in the same way as the ICF. Based on this information, it was expected that most rehabilitation interventions would be in the ICHI classification of activities. However, in this review, 26 interventions were linked to categories that fall under the Body Structures and Functions component of the ICF section rather than Activities. The goal of rehabilitation is to enable people with disabilities who experience disability to achieve and maintain optimal functioning in interaction with the environment, thus influencing Activities and Participation (23). Interestingly, most of the interventions identified in this report

represent functions and structures. This demonstrates that although there has been an improvement in activities the interventions used are function-based and not activity-based.

One of the interventions that ICHI failed to identify was virtual reality. Virtual reality has been described as cognitive training in several studies (24, 25); however, it was considered as a separate intervention in this review because the publications compared it to conservative computerized cognitive training, so it did not seem to combine interventions that the authors try to compare. In another study that analysed the effects of virtual reality on upper extremity function, the authors compared virtual reality classes with occupational therapy classes, without explaining in detail what these classes include, and thus linked them to occupational therapy and virtual reality interventions.

Another intervention that could not be identified with ICHI was mirror therapy. Mirror therapy is a well-known method of working with patients experiencing hemiparesis or hemineglect (26). Interestingly, this method is mentioned in only 1 study (27) and cannot be classified in the ICHI classification. Mirror therapy is 1 of 4 interventions that was not associated with any of the ICHI categories.

The ICHI Reference Guide recommends a focus on identifying the most relevant target when mapping interventions. It also mentions that when there is not enough information in the source document to choose a particular stem code, one should use the "unspecified" code (12). On the other hand, if the information in the source document is very detailed but does not match any specific stem code in the ICHI, one should code it as "other". While this guideline was adhered to in this article, it is important to note that, in many cases, interventions described in publications lacked the specificity required to be accurately mapped to a single stem code. This limitation arises from the fact that the interventions are often inadequately detailed in the publications, resulting in a significant number of interventions being categorized as "unspecified" during the mapping process.

Problem identification

This review identified 47 unique interventions and identified a problem with 1 of the ICF categories for each of these interventions. Most of the problems defined in the publications were at the level of Body Functions and Structures.

For most interventions, it was possible to identify the problem in the publication on which the intervention was aimed and to link that problem to a certain ICF category. A few publications named the problem for patients with brain tumours as follows: "Brain tumour"; "Disorders of daily activities"; "Communication",

“Mobility disorders”; “Muscle weakness”; “Cognitive impairment”; “Cardiovascular fitness levels”.

Analysing the ICF and ICHI classifications, a corresponding ICHI intervention can be found for almost every ICF category. However, publications did not always use appropriate ICHI intervention for a specific problem; for example, muscle strength training was not always used for muscle strength functions, etc. This review found that the rehabilitation problem may not be appropriate for a certain intervention.

Each ICHI intervention defines a goal (the entity in which the action takes place), thus it is possible to analyse whether the goal is relevant. The goal of the transcranial magnetic stimulation intervention is the brain. However, paresis of the upper extremities and the functions of the category b730 muscle strength according to the ICF are indicated as problems. It is notable that massage is used to reduce stress, although the ICHI classification targets indicate an effect on soft tissues. Although there were some inconsistencies in the problem identification process with the ICHI objectives, most of the objectives corresponded to the problem. Problem-solving therapy (ICHI) has been used to treat psychomotor disorders (ICF: psychomotor functions) (28), and acupuncture has been used to reduce spasticity and hemiplegia (29).

Disorders of daily activities were not described in detail. These may include self-care problems, mobility impairments, commuting, and more. Thus, the disruption of daily activities was only linked up to Chapter 5 of the ICF in the Activity and Participation component.

Two of the most used interventions, physiotherapy, and speech-language therapy, also did not describe in detail the technologies used by therapists in their work to assist patients with mobility and communication impairments, hence the link to the ICF category could only be made to Chapters 4 and 3, respectively. The publications on endurance training, computerized cognitive training, and resistance exercise interventions noted the precise problems faced by rehabilitation professionals, cardiorespiratory fitness, cognitive impairment, and muscle weakness, respectively. These problems were successfully linked to the ICF categories.

Some categories could not be linked to ICF categories, because the publication did not mention a problem with functioning. For example, the intervention: inpatient nursing is not described in sufficient detail to determine what kind of care patients need from nurses (30). Similarly, publications that used comprehensive inpatient rehabilitation as an intervention did not describe the functioning of these patients.

Giga et al. (31), in their scoping review “Comparison of the content and psychometric properties of functional status assessment tools in patients with brain tumours: a systematic review of the literature”, identified the most

used assessment tools in work with neuro-oncology patients and the elements of these tools are related to ICF categories. Comparing the data obtained by Giga et al. and the data obtained in this review, it is possible to observe discrepancies between the categories “measured” by the instruments and the problems addressed by the interventions in this specific population. Interventions focus mainly on restoring function (attention function, muscle strength function, thinking function), while assessment tools assess concentration, thinking, walking, movement, and other activities that can be affected by muscle strength. Giga et al.’s study identified 40 categories of Body Functions, 46 categories of Activities and Participation, and 10 categories of Environmental Factors. In this report, out of 36 problems, 27 were identified at the function level, only 6 problems were identified at the level of activities and participation, and 3 problems were identified at the level of environmental factors according to the ICF. Two problems were not identified in the publications.

In identifying the problems, the authors of 6 publications did not indicate a specific functional problem due to the need for rehabilitation of the patients or indicated brain tumours as a reason for rehabilitation.

Methodological aspects

To best of our knowledge, this is the first scoping review to attempt to systematize available evidence on rehabilitation interventions for neuro-oncological patients using ICHI classification. The classification was published in 2007 and its aim, along with other reference classifications of the WHO, is to provide healthcare systems with common coding scheme for all levers of users (including healthcare professionals and policymakers). On the one hand, this study demonstrates the possibility to classify information using the “single” language classifications provided by the WHO, thus making it possible to systematize multiple dimensions that are covered in available publications. This provides the basis for comparison and exchange of information across and between different levels of users. The results of this review can help practitioners working with neuro-oncology patients, as well as policymakers to allocate resources. On the other hand, the ICHI classification Beta 3 version was used for linking the information. This means that the classification is yet to be improved and validated.

Conclusion

This review found evidence in the international scientific literature of 47 interventions that can be used by various rehabilitation professionals in the acute rehabilitation of neurological patients. However, most of these interventions have Level II and Level III evi-

dence. This comprehensive scoping review provides an insight into the landscape of rehabilitation interventions for neuro-oncology patients. By systematically classifying these interventions according to the ICHI and linking them to corresponding problems defined by the ICF, this study offers a structured framework for understanding the rehabilitation strategies employed in this specific patient population. The findings accent the need for greater precision in describing and documenting interventions, as well as the importance of aligning interventions more closely with ICF categories, particularly in the domains of activities and participation. This work highlights the heterogeneity in the reporting of rehabilitation interventions, and the challenges in mapping them to standardized classifications, emphasizing the ongoing need for refining and updating these classification systems. Overall, this research serves as a critical step toward developing an evidence-based and standardized approach to rehabilitation for neuro-oncology patients, which will assist healthcare professionals and policymakers in optimizing care for this patient population.

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