The Development and Application of a Rehabilitation Competency Framework

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Il mare diventa più profondo man mano che ci si addentra.

“The sea gets deeper the further you move into it”

— Venetian Proverb

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Candidate's statement

I, Jody-Anne Mills, hereby declare that to the best of my knowledge and belief, the content of this thesis is the product of my own work, and that it does not contain material that has been submitted for any other degree or any other institution. I confirm that all assistance received in preparing this thesis and sources have been acknowledged.

I understand that if I am awarded a higher degree for my thesis entitled "The Development and Application of a Rehabilitation Competency Framework" my thesis will be lodged with the Director of University Libraries and made available for immediate use.

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Supervisor's statement

As supervisor of Jody-Anne Mills' doctoral work, I, James W. Middleton, certify that I consider her thesis, "The Development and Application of a Rehabilitation Competency Framework", to be suitable for examination. I further attest that, as supervisor for the candidature upon which this thesis is based, the authorship attribution statements for all chapters published as papers are correct.

_____ 24 January 2023

Principal supervisor's signature

Professor James W. Middleton, John Walsh Centre for Rehabilitation Research, Kolling Institute, Faculty of Medicine and Health, University of Sydney

Copy Editing

In accordance with the University of Sydney policy on thesis editing, editorial assistance was sought in the final production of this thesis.

Copy editing assistance was provided by Dr Cherry Russell. This assistance took the form of proofreading the thesis for errors in spelling, punctuation, grammar and syntax and making suggestions for minor reorganisation or clarification of some text elements. Dr Russell's former areas of academic specialisation are health sociology and qualitative research methods.

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Abbreviations

FTE	Fulltime equivalent
GRoWE	Guide for Rehabilitation Workforce Evaluation
HLMA	Health labour market analysis
NCDs	Noncommunicable diseases
PIR	Package of Interventions for Rehabilitation
RCF	Rehabilitation Competency Framework
TWG	Technical working group
UHC	Universal health coverage
UK	United Kingdom
WHO	World Health Organization
WISN	Workforce Indicators of Staffing Need

Abstract

The rehabilitation workforce faces immense challenges, including shortages, unemployment, inequitable distribution, issues of quality, and a lack of recognition by policy makers, other health workers and the public. Yet rehabilitation plays an important role in health systems and can have a profound impact on people's lives; its absence can result in unnecessary suffering and hinder participation in work, study and everyday life for individuals with a range of health conditions. The research on which this doctoral thesis is based focuses on how the application of competency frameworks in the context of national workforce evaluation can contribute to rehabilitation workforce development. Currently, rehabilitation-related competency frameworks are absent from many countries that would derive the most benefit from competency-based workforce development. The goal of this study was to develop a competency framework that can be adapted for use with rehabilitation workers from different occupations, specialisations and settings, and which can provide the foundation for the application of competency analysis in national rehabilitation workforce evaluation.

This thesis captures the process of gaining understanding, translating this understanding into tools and procedures and critically examining their feasibility and value. It is presented in five sections: Introduction; Conceptualisation; Operationalisation; Application; and Implications. It adopted a mixed-methods research design involving a systematic scoping review, a Delphi study, a rehabilitation service user consultation, participatory observation, and key informant interviews. To date, this work has contributed to the publication of a glossary of competency-related terminology and the development of two World Health Organization technical products, the *Rehabilitation Competency Framework* and the *Guide for Rehabilitation Workforce Evaluation*.

The project makes several notable contributions to the field. First, it offers a re-conceptualisation of competency-related terminology that acknowledges the origins of competency frameworks and their differential interpretation and use in various parts of the world. It captures this re-conceptualisation in a glossary that allows space for different yet complementary interpretations. Second, it demonstrates the application of this terminology in the first competency framework specifically developed to be relevant to the rehabilitation workforce as a whole—that is, a framework that captures the competencies and activities of all rehabilitation occupations and specialisations and is applicable in all settings. Third, it employs the competency framework to develop competency analysis exercises that can be integrated into national rehabilitation workforce evaluation. To test these exercises in practice, a guide for a comprehensive workforce evaluation

was created. The guide, which nests the competency analysis within market analysis, was piloted in Poland to assess its feasibility and the benefits of integrating competency analysis within national rehabilitation workforce evaluation. The results demonstrated both the feasibility and value of such a process and have practical implications for workforce development.

Although this study was conducted in the context of the rehabilitation workforce, its findings have implications for the wider health sector. They provide a template for and case example of the development of multi-professional competency frameworks that adopt concepts previously considered contradictory. They also demonstrate how competency analysis can be used alongside labour market analysis to enrich the outcome and provide a more effective guide for workforce development initiatives. As such, this thesis both makes an original contribution to knowledge and highlights the potential for rehabilitation—currently an under-valued and under-represented component of health systems—to lead the way in competency-based approaches to workforce development.

Section 1

INTRODUCTION

Section contents: Chapters 1-3

Chapter 1. Background

This chapter describes the conceptual and practical problems addressed by the research on which this thesis is based. It presents the background to the study, establishes the scope of the project, and explains its rationale, aims and objectives.

1.1 Context

Rehabilitation is a core component of health care, along with health promotion, diseases and injury prevention, treatment, and palliation (Bickenbach, Sabariego and Stucki, 2021; Boggs et al., 2021). Rehabilitation services address the needs of people with a wide range of conditions throughout the lifespan, such as developmental conditions, injuries, communicable and noncommunicable diseases (NCDs), musculoskeletal conditions and decrements in health associated with ageing (Bickenbach, Sabariego and Stucki, 2021; Cieza et al., 2020). One of the goals of sustainable development identified by the United Nations is to "ensure healthy lives and promote well-being for all at all ages" (United Nations Department of Economic and Social Affairs, 2015). In order to achieve this, quality rehabilitation needs to be available and accessible to all (Eaton, 2019; World Health Organization, 2017b). Current epidemiological and demographic trends indicate a growing need for rehabilitation to deal with the higher levels of disability associated with the increasing prevalence of NCDs and population ageing (Cieza et al., 2020; Kamenov et al., 2019). Furthermore, long COVID, while still poorly understood, is likely to result in greater demand for rehabilitation services in the months and years beyond the pandemic (Wahlgren et al., 2022; World Health Organization, 2021).

Rehabilitation is characterised by a focus on improving functioning and reducing disability related to a health condition. It aims to facilitate recovery, maximise independence, and optimise an individual's participation in education, work and community life (World Health Organization, 2017b). The consequences of inadequate access to rehabilitation can include prolonged hospitalisation or readmissions, preventable complications, delayed and/or suboptimal recovery, unnecessary suffering and, in some instances, premature death. For some people, particularly children, rehabilitation has life-changing potential, enabling them to leave their homes, attend school, participate in gainful employment, be self-sufficient and enjoy meaningful relationships (World Health Organization, 2017b).

Unlike other health strategies, however, the impact of rehabilitation is poorly captured by conventional indicators of morbidity and mortality, and its development in health systems has

lagged accordingly (Boggs et al., 2021; Stucki et al., 2018). Despite substantial and growing unmet need, many health systems, particularly in low- and middle-income countries, have grossly underequipped rehabilitation services (Bright, Wallace and Kuper, 2018; Kamenov et al., 2019; World Health Organization Regional Office for the Western Pacific, 2017). This is perhaps most starkly reflected in the status of the rehabilitation workforce. Countries around the world face profound shortages in supply, low demand within the labour market due to limited job opportunities, and inadequate levels of education, training and regulation that compromise quality of care (World Health Organization, 2017a; World Health Organization Regional Office for the Western Pacific, 2017).

While addressing the unmet need for rehabilitation globally will require attention to a complex set of factors, including governance, financing and service delivery, workforce is the essential component of rehabilitation and determines, to a large extent, its quality. The rehabilitation workforce comprises diverse occupations, including but not limited to audiologists, occupational therapists, physiotherapists, physical and rehabilitation medical practitioners, prosthetists and orthotists, psychologists, rehabilitation nurses and speech and language therapists. In high-income countries, the rehabilitation workforce also includes chiropractors, osteopaths and exercise physiologists, who mainly work in the private sector. Other mid-level occupations, such as assistants, technicians and community-based personnel, work directly or indirectly with these core rehabilitation professions. The development of the rehabilitation workforce has likely been hampered by this complexity, along with differences among countries in the composition and scope of practice of rehabilitation occupations and lack of understanding of their roles and contributions among policy makers and the public.

1.2 Rationale

This research project was broadly motivated by the desire to support countries seeking to strengthen their rehabilitation workforce, especially those in which such services have been historically underdeveloped. More specifically, it sought to explore the potential of competency-based approaches to facilitate workforce development and address the current underutilisation of rehabilitation in countries of greatest need.

1.3 Competency-based Approaches

Competency-based approaches are orientated around knowledge, skills, attitudes, and behaviours rather than specific occupations. They have particular applicability in settings where: the competencies of the rehabilitation workforce are misunderstood and/or poorly communicated; there is a shortage of rehabilitation workers; and there is a mismatch between the needs of the population and the competencies of the workforce. These three applications of competency-based approaches—communication, workforce scarcity, and misalignment between population needs and workforce competencies—underpin the rationale for this research project. Each is elaborated below.

1.3.1 Communication: establishing a common language for rehabilitation knowledge, skills, attitudes, and behaviours

A diverse vocabulary is used to describe the competencies of a workforce, and the interpretation of the terminology can vary in different countries, occupations, specialisations and settings. The absence of a shared language to describe rehabilitation competencies has compromised efforts to communicate to policy makers, the public and the broader health workforce the contributions made by different rehabilitation occupations and the nature of the interdisciplinary environment in which they work. There is even confusion within the discourse of the rehabilitation workforce itself. Competency frameworks can be used to establish a shared language for the knowledge, skills, attitudes, and behaviours of a workforce, describe the expectations of their proficiency, and capture the scope of their roles and responsibilities. As such, they have potential as key tools for communication within and beyond their respective workforces.

1.3.2 Workforce scarcity: systematic and rational allocation of tasks

The shortage of rehabilitation workers means that their knowledge and skills are often difficult or impossible to access by those who need them. If health systems fail to recognise their contribution, they will likely make little effort to redress this situation. When, however, the consequences of their scarcity are acknowledged, various strategies are available to address the problem. For instance, task sharing can be employed to shift competencies between occupations to address shortfalls in some segments of the workforce. The prerequisite for the success of such a strategy, and others like it, is a clear understanding of the competencies of the occupation and the knowledge, skills, attitudes and behaviours underlying them. This understanding can inform a systematic and rational approach to shifting or expanding scopes of practice and ensuring that this is reflected in education, training and regulation.

1.3.3 Misalignment between population needs and workforce: matching the knowledge, skills, attitudes, and behaviours of the workforce with the need for interventions

The composition of the rehabilitation workforce in a country is shaped by numerous factors, including historical norms and practices as well as currently available models, which have typically been developed in high-income countries. The uncritical adoption of such models in less developed countries can result in a mismatch between the health needs of the population and the structure of the health system and its workforce. Competency-based workforce planning, such as task mapping, can be used to determine what knowledge, skills, attitudes and behaviours are most relevant to the context according to needs, and how these can be best distributed or represented within the workforce. Competency-based education is an important mechanism for ensuring that educational programmes develop workers with knowledge, skills, attitudes and behaviours that align with population needs, while competency standards within regulatory systems can guide and maintain appropriate levels of performance and scopes of practice.

The conceptual framework presented in Figure 1.1 depicts an abridged pathway linking the needs of populations to the development and maintenance of knowledge, skills, attitudes and behaviours in a rehabilitation workforce. It identifies the problems that can disrupt this pathway and the questions they raise. While the characteristics of the problems and the answers to the questions will be country- or context-specific, all can be addressed through the application of competency-based approaches, which are underpinned by competency frameworks that capture and communicate the knowledge, skills, attitudes and behaviours expected of a workforce. While tools and methods for establishing rehabilitation needs within a population are becoming available, many countries have limited means with which to address the questions systematically and comprehensively, particularly as they pertain to a multidisciplinary rehabilitation workforce. Moreover, when competency-based approaches are developed, they typically apply to a specific occupation, specialisation or setting, which is unlikely to be conducive to planning and development of the rehabilitation workforce as a whole. Accordingly, this research project sought to develop a rehabilitation competency framework that could be adopted and adapted to any occupation in any context, and to use the framework to apply a competency-based approach to national rehabilitation workforce evaluation and planning, which can then inform workforce development.

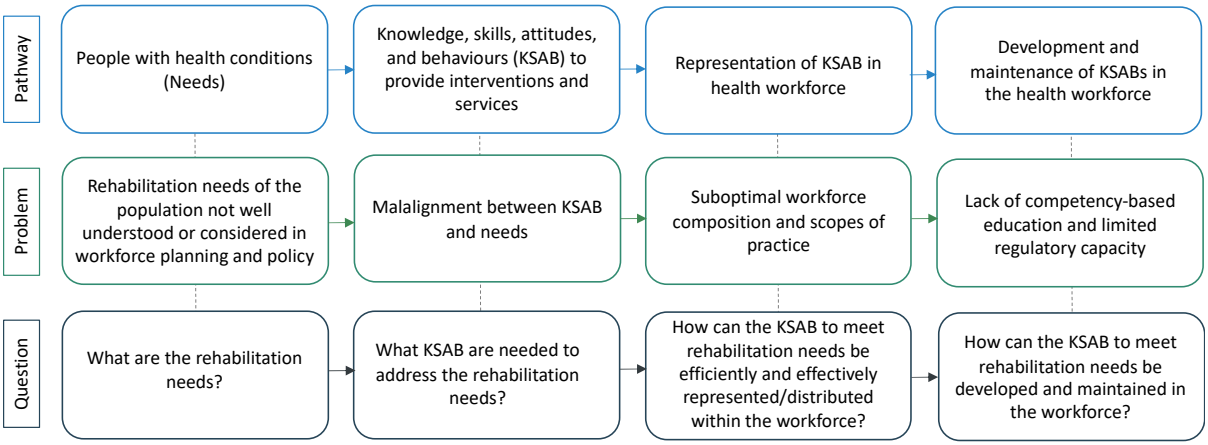

Figure 1.1. Conceptual framework underpinning the development and application of a rehabilitation competency framework.

1.4 Aims and Objectives

This research project had two distinct but related aims, each with specific objectives, as detailed below.

Aim 1. Develop a rehabilitation competency framework relevant across occupational groups, specialisations, and settings.

Objectives

1.1. Establish conceptually sound definitions for competency-based terminology on which to base a rehabilitation competency framework.

1.2. Identify the knowledge, skills, attitudes and behaviours encompassed by the rehabilitation workforce that could collectively address the scope of population rehabilitation needs.

1.3. Communicate rehabilitation knowledge, skills, attitudes and behaviours in a structured competency framework that can be adapted to specific contexts.

Aim 2: Apply a competency-based approach in national rehabilitation workforce evaluation and planning.

Objectives

2.1 Establish tools for integrating competency analysis into national rehabilitation workforce evaluation.

2.2 Assess the feasibility and value of integrating competency analysis into national rehabilitation workforce evaluation.

2.3 Determine how competency analysis can inform rehabilitation workforce planning at the national level.

1.5 Significance

This research project makes two significant and original contributions to the field, namely: (1) developing the first competency framework relevant to the rehabilitation workforce collectively; and (2) integrating competency analysis in national workforce evaluation and planning for rehabilitation. Each of these is elaborated below.

1.5.1 Rehabilitation-related competency frameworks

While a vast number of rehabilitation-related competency frameworks have been published, these are specific to an occupational group, specialisation, health condition or setting, or a combination of these. To the best of my knowledge, no published competency framework captures the knowledge, skills, attitudes and behaviours of the rehabilitation workforce as a whole. Such a framework has a variety of potential applications, including competency analysis across rehabilitation occupations specialisations, health conditions and settings, and can serve as a starting point for the creation of context-specific competency frameworks.

1.5.2 Competency analysis

Competency analysis is not usually a component of national health workforce evaluation, which traditionally focusses on labour market analysis. Its application has been limited to evaluation of specific workforce contexts, such as emergency preparedness or optimising the nursing and midwifery workforce in low-resource countries. The present study is the first to integrate competency analysis into national workforce planning for rehabilitation. It can serve as a guide to the application of such analysis in other areas of health workforce evaluation, where its utility has not yet been explored.

1.6 Conclusion

This chapter has provided an overview of the thesis and explained its intention to make a significant and novel contribution to the knowledge of competency-based approaches to workforce development. The following chapter outlines how the aims and objectives of the project were achieved by describing and justifying the research approach, design and methodologies.

Chapter 2. Research Approach, Design and Methodologies

This chapter presents the theoretical basis for the conceptualisation, operationalisation and application of the study, which are elaborated in Sections 2, 3 and 4, respectively. It explains the rationale for the approach and describes the research design and methodologies.

2.1 Research Approach and Design

While the broad aim of the present study was to expand knowledge in the fields of rehabilitation workforce development and competency-based approaches, it was also solution-driven and action- rather than theory-oriented. As such, it incorporated both basic and applied research, particularly in relation to Aim 2. The study was designed to fill a gap in the tools and methods available for applied competency-based approaches, and to test these in real world settings to determine their feasibility and effectiveness.

A mixed-methods design was adopted, employing both qualitative and quantitative methods. It is widely accepted that these methods can complement each other, with numerical data being supplemented and enriched by in-depth perspectives (Jamshed, 2014). In the present study, mixed methods research enabled an appropriate "intellectual and practical synthesis" (Johnson, Onwuegbuzie and Turner, 2007, p. 129). This synthesis is notably evident in the development of a rehabilitation competency framework and in the critical assessment of the application of competency analysis in national rehabilitation workforce evaluation.

2.2 Methodologies

Research methodology has been defined as "a strategy or architectural design by which the researcher maps out an approach to problem-finding or problem-solving" (Buckley, Buckley and Chiang, 1976, p. 23). The choice of method is based on the nature of the research question being addressed and the context in which the findings will be applied (Noor, 2008). The applied nature of the research project necessitated the use of participatory methodologies that could engage a wide range of stakeholders. The various methodologies employed are elaborated below in relation to the research aim and objective to which they contributed.

2.2.1 Methodologies contributing to the development of a rehabilitation competency framework relevant across rehabilitation occupations, specialisations, and settings

Scoping review. Scoping reviews adopt a systematic process that is similar to that of a systematic review, but they exclude evaluation of quality. They are valuable for clarifying

definitions and concepts, particularly in fields characterised by heterogeneity (Munn et al., 2018; Peters et al., 2015). A scoping review was thus an ideal methodology for this study, in which quality evaluation was neither practical nor necessary. The scoping review was used here to clarify the use and interpretation of competency-based terminology. Further details on how the findings from the scoping review were applied are provided in Chapters 4-6: Chapter 4 describes the scoping review itself, Chapter 5 explains the application of the terminology in the development of the framework, and Chapter 6 presents the resulting framework.

Content analysis. Content analysis has been defined as "a research tool used to determine the presence of certain words, themes, or concepts within some given qualitative data (i.e., text)" (Columbia University Mailman School of Public Health, 2022). As such, it adheres to a naturalistic paradigm. In the present study, it provided a tool for analysing a sample of rehabilitation-related curricula in order to identify the knowledge, skills, behaviours and attitudes contained within them. These were collated and explored for occupation-specific similarities and differences in the context of developing the Rehabilitation Competency Framework. Further details on how the content analysis was applied are given in Chapters 5 and 6: Chapter 5 describes the methodology and Chapter 6 presents the resulting framework.

Modified Delphi method. Delphi studies involve a structured and systematic process of iterative discussion among selected participants/panel members around an epistemic question (Nasa, Jain and Juneja, 2021; Niederberger and Spranger, 2020). The methodology is commonly drawn upon in the development of competency frameworks, which should reflect shared expectations of a workforce within a common field. In the present study, a modified version of the Delphi method was used to build consensus on the competencies, behaviours, activities and tasks of the Rehabilitation Competency Framework. In this version of the methodology, participants were offered content with which they could agree or disagree rather than content from which consensus could be built. The survey instrument allowed for both quantitative and qualitative data to be collected via fixed response ('agree'/'disagree') and open-ended response items, respectively. Further details on how the modified Delphi study was applied are provided in Chapters 5 and 6.

Survey of service users. A survey was used to garner feedback on selected components of the Rehabilitation Competency Framework from rehabilitation service users. Data were collected via an online questionnaire. Participants were recruited using the snowballing technique, whereby rehabilitation service managers and service users invited others who met the eligibility criteria to participate. The survey thus complemented the modified Delphi study by ensuring that the primary

beneficiaries of the services were consulted and engaged in the development of the Rehabilitation Competency Framework. Further details on the implementation of the service-user consultation are given in Chapters 5 and 6.

2.2.2 Methodologies contributing to the application of a competency-based approach in national rehabilitation workforce evaluation and planning

Case study. A case study is used to "generate an in-depth, multi-faceted understanding of a complex issue in its real-life context" (Crowe et al. 2011, p. 1). The naturalistic design of case study methodology lends itself well to addressing questions of 'how', 'what' and 'why' (Yin and Campbell, 2018). In the present study, this methodology was used to explore how competency analysis was integrated into Poland's national rehabilitation workforce evaluation, using analysis tools based on the WHO Rehabilitation Competency Framework. The main focus was on observing how the analysis tools worked in practice, including how various contextual factors influenced their use. The findings helped to refine the tools themselves as well as demonstrating their application in a particular country. Further details on the case study are presented in Chapter 8.

Interviews with key informants. Interviews are commonly used in research to gather information on the target population's knowledge or experience of a topic. Semi-structured interviews are widely used to generate in-depth, qualitative data (DiCicco-Bloom and Crabtree, 2006). This method provides the researcher with the flexibility to pursue an interviewee's responses while maintaining the consistency between interviews that is required to enable meaningful analysis (Patton, 2002). In this study, interviews were conducted with key informants involved in the national rehabilitation workforce evaluation in Poland to obtain their perspectives on the process and use of the competency analysis component. The interviews are discussed in more detail in Chapter 8.

2.3 Conclusion

This chapter has described the research approaches, design and methodologies applied to achieve the aims and objectives of this research project. The following chapter outlines the structure of the thesis, including how each section contributes to the study's aims.

Chapter 3. Thesis Overview

This thesis is presented in the format of a 'thesis including publications', in accordance with the rules and guidelines of The University of Sydney. It is organised into five sections and nine chapters, and comprises three academic publications and two technical resources. As shown in Figure 2.1, following this introductory section, the thesis is structured according to the methodological progression from conceptualisation (Section 2), through to operationalisation (Section 3) and application (Section 4). Sections 2-3 address the first aim of this research project, while Section 4 addresses the second aim. Section 5 discusses the implications of the research for future workforce development within and beyond the field of rehabilitation. Each of these sections is elaborated below.

Section 2 identifies and defines key concepts in the literature on competency frameworks and the use of competency-based approaches and the relationships among them. It examines the varied and often conflicting definitions and interpretations of terms used in the field. From the findings of an in-depth examination of the history, evolution and current use of competency-based terminology, it proposes a clear conceptual framework for the subsequent development of the research project. This section comprises one chapter in the form of a peer-reviewed scoping review of the literature, for which the candidate was lead author, published in the *Human Resources for Health* journal.

Section 3 operationalises the concepts defined in Section 2 in a competency framework for the rehabilitation workforce that allows for their practical application and measurement. The development of the Rehabilitation Competency Framework (RCF) satisfies Aim 1 of the research project and was a precondition to achieving Aim 2. Section 3 contains two chapters: Chapter 5 describes the development of the Rehabilitation Competency Framework in a peer-reviewed research paper published in the *Archives of Physical Medicine and Rehabilitation*. Chapter 6 provides a synopsis of the Rehabilitation Competency Framework itself, which is provided in full in Appendix B. The candidate was first author of the research paper, and project lead and technical writer for the RCF, which was developed and published by WHO in 2020.

Section 4 focuses on the application of competency-based approaches in national rehabilitation workforce evaluation, through the integration of a competency analysis based on the RCF. As such, Section 4 demonstrates the fulfillment of Aim 2 of the research project. Chapter 7 provides a synopsis of the WHO *Guide to Rehabilitation Workforce Analysis* (GRoWE), within which the competency analysis tools and process are nested. The full version of GRoWE is provided in

Appendix C. Chapter 8 details the application of the competency analysis tools in Poland's national rehabilitation workforce evaluation, in the context of piloting GRoWE. Chapter 8 is presented as a manuscript submitted to the journal, *Human Resources for Health*, for which the candidate is first author. The candidate was also project lead and technical writer for GRoWE, which was published by WHO in 2023 (pending).

Section 5 comprises a final chapter which summarises the key findings of the study, discusses their implications for ongoing rehabilitation workforce planning and development, and considers the extent to which the findings may be generalisable to the health workforce more broadly. It acknowledges several limitations of the research project and proposes directions for future research.

The overall structure of the thesis is summarised in Figure 2.1.

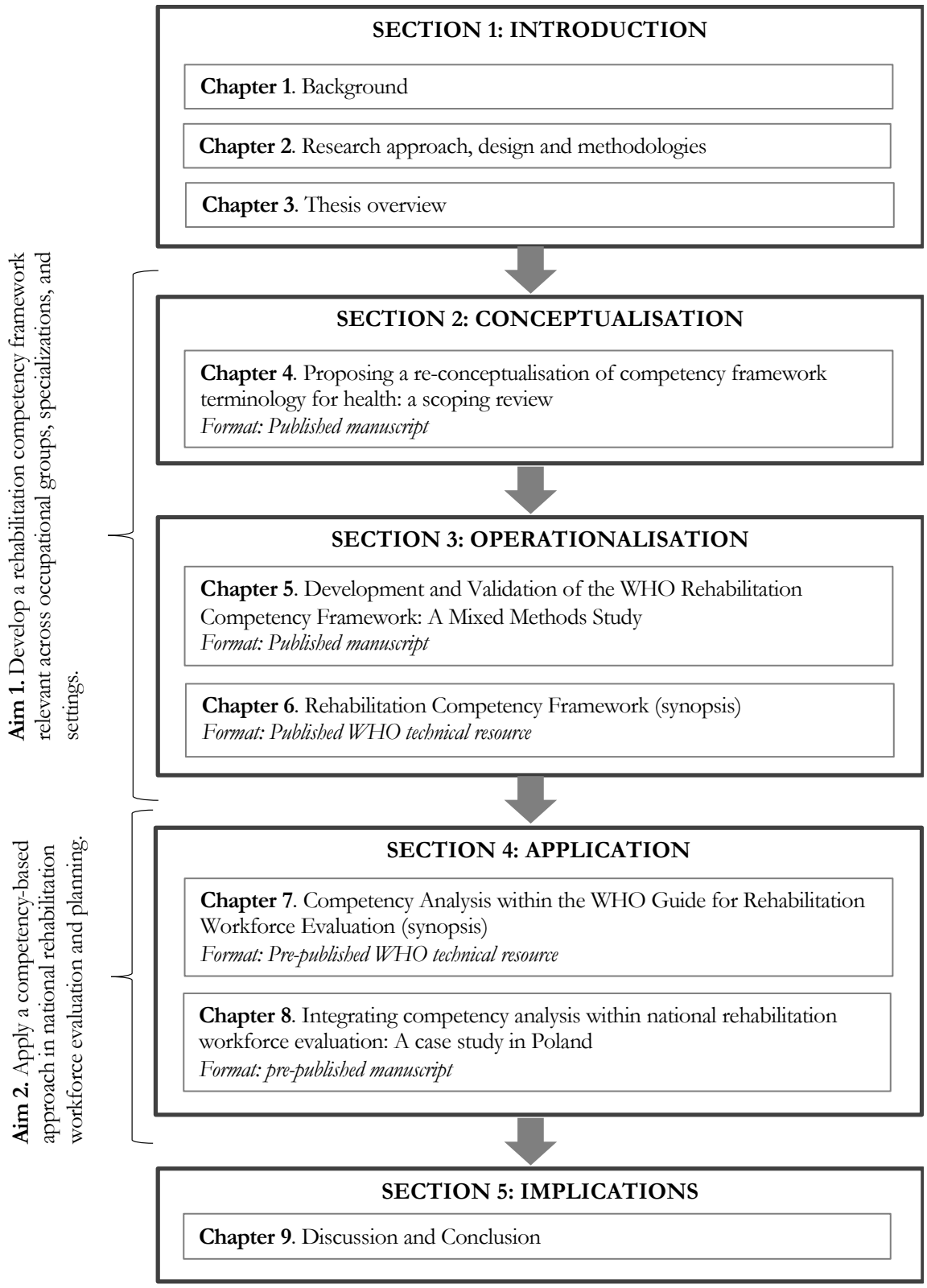

Figure 2.1. Thesis structure.

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Section 2

CONCEPTUALISATION

Section contents: Chapter 4

Chapter 4. Defining Competency-related Concepts and their Relationships

This chapter comprises a scoping review of the literature in the form of a published manuscript and lays the foundation for subsequent chapters. The aim of the review was to achieve conceptual clarity in relation to the use and interpretation of competency-based terminology. Conceptualisation is recognised as an important component in the exploratory phase of research to ensure that "the key concepts are agreed on and defined the same way by all" (*The SAGE Encyclopedia of Social Science Research Methods*, 2004). In the present context, previous work had identified a lack of uniformity in the definition of competency-related concepts, even within the same field, and much debate as to the various strengths, weaknesses, and utility of competency frameworks has resulted.

A scoping review was selected as the methodology for this conceptual study given that the research question did not necessitate any quality evaluation of the literature. Scoping reviews are widely accepted as valuable tools for clarifying definitions and concepts, particularly in fields characterised by heterogeneity (Munn et al., 2018; Peters et al., 2015). While the intention was to apply the terms in the context of a competency framework for the rehabilitation workforce, it was decided that the scoping review should encompass literature from all fields, including those unrelated to health, in order to capture the breadth of definitions and interpretations of competency-based terminology. The resulting definitions, however, would specifically target the health sector, given the need for conceptual clarity to support the wider deployment of competency frameworks within the health workforce as a whole.

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Lead author: The candidate was responsible for the literature search, data synthesis, manuscript writing, submission to the journal and responding to peer reviewer's comments.	85%

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's contributions to this work.

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Proposing a re-conceptualisation of competency framework terminology for health: a scoping review

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Abstract

Background: Competency frameworks are being taken up by a growing number of sectors and for a broad range of applications. However, the topic of competency frameworks is characterised by conceptual ambiguity, misunderstanding and debate. Lack of consistency in the conceptualisation and use of key terminology creates a barrier to research and development, consensus, communication and collaboration, limiting the potential that competency frameworks have to deal with real workforce challenges. This paper aims to advance the field by conducting a detailed review of the literature to understand the underlying causes of conceptual differences and divergent views and proposing a re-conceptualisation of competency framework terminology for use by the health sector.

Methods: A broad scoping review of literature was conducted to identify publications relating to the conceptualisation of competency frameworks and key terms, examine how they are conceptualised and determine how this evolved. In addition, a purposive sample of health-related competency frameworks was chosen to illustrate how the terms and concepts are currently being applied in the health context.

Results: Of the 4 155 records identified, 623 underwent text searches and broad quantitative analysis, and 70 were included for qualitative analysis. Quantitative analysis identified 26 key terms, which were coded under six thematic headings. Qualitative analysis using the thematic areas revealed two distinct conceptualisations of competency frameworks and their terminology emerging concurrently in the education and employment sectors, with different underpinnings and purposes. As competency frameworks have developed, these two conceptualisations intertwined, resulting in the same terms being used to convey different concepts. Examination of health-related frameworks showed that this merging of concepts is prominent, with lack of consistency in definitions and use of key terms even within a single organisation.

Discussion and conclusions: Building on previous efforts to address the lack of conceptual clarity surrounding competency frameworks, this paper proposes a re-conceptualisation of the terminology that encompasses two distinct competency framework interpretations, using a glossary of mutually exclusive terms to differentiate concepts. The re-conceptualisation holds relevance for multiple competency framework applications within health, enabling harmonisation, clear communication, consensus-building and effective implementation of competency frameworks.

Keywords: Competency framework, Competence, Conceptualisation

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Background

Competency frameworks have been widely used for several decades and are being taken up by a growing number of sectors seeking to articulate successful performance and its prerequisites. Educators, regulators, workforce strategists, evaluators and managers are among the many stakeholders establishing competency frameworks to build consensus, foster collaboration and promote standardisation [1–8]. While there appears to be reasonable agreement about what competency frameworks are as an organised collection of related competency statements, significant variation exists in how key terms are interpreted and applied, making useful comparisons among competency-based approaches difficult [9–12].

Critiques about the conceptual ambiguity of competency framework terminology are well documented, with the underlying concepts being described as "fuzzy" [13], "shifting sand" [3] and an uncertain foundation on which to build a framework [10, 11, 14]. The reason for this, while debatable, may result from the adoption of the terms in frameworks developed in different contexts and a lack of clarity around how they relate to different purposes [8, 15–18]. What is consistently acknowledged is the confusion that exists due to inconsistent interpretation and use of terms [14].

While the pitfalls of conceptual uncertainty are evident, there have been few notable attempts to establish a universal set of definitions within or between sectors [19–21]. Harmonisation and standardisation of definitions is clearly required if competency frameworks are to realise their potential as tools that can be applied in a wide range of circumstances. The overarching objective of this study is to fulfil this need by proposing a re-conceptualisation of competency framework terminology, supported by definitions that can be adopted in and beyond the health sector. To achieve this objective, this scoping review aimed to:

1. Identify key terms related to competency frameworks;
2. Determine how the conceptualisation of key terms evolved and how they are used; and
3. Explore how the key terms are defined and used in the context of health-related competency frameworks.

Methods

Scoping review

To capture the breadth of information necessary to meet the aims, a scoping review of literature from all sectors was conducted. The authors applied the methodological steps defined by Arksey and O'Malley to ensure a systematic and rigorous approach in developing the research questions, identifying publications, including and excluding publications, extracting data, and reporting findings [22]. The following exploratory questions were defined:

Exploratory question for aim 1:

a) What are the key terms related to competency frameworks?

Exploratory questions for aim 2:

b) Where did the conceptualisation of key competency framework terminology evolve?
c) How are key competency framework terms applied?

Exploratory question for aim 3:

d) How are key competency framework terms defined and applied in the context of health?

Over the period between 6 and 13 August 2018, the first author (JM) searched Scopus and Web of Science using the broad terms "competenc* framework*" OR "competenc* model*". Databases were selected to capture publications across different sectors so that the historical evolution of the competency framework terminology could be drawn from different fields, including education, industry, business and health. To capture the widest scope of literature, no filters were used for publication date, language or publication type. A modified PRISMA method was used to record the findings (see Fig. 1). Results were exported to Endnote, deduplicated using the Bramer method, and exported into the web application, Rayyan,[1] with further duplicates identified and removed [23]. Titles and abstracts were screened by the first author according to their relevance to the exploratory research questions. Publications for which the term "competence" was used in a different context to that of the research questions, such as in a patient's competence for decision making in a medical or legal context for example, were excluded, as were those focused solely on the technical content of a competency framework, without addressing the exploratory research questions. Publications with no abstract or for which no full text could be identified were also excluded. Where it was not possible to determine if a publication met the inclusion criteria, it was included for full text review.

Data extraction and analysis

Aim 1: Identify key competency frameworks terms

The full texts from all of the records included post title and abstract screening ($n = 623$) were imported to NVivo 12 and a word frequency query run to identify key terms. Terms were thematically grouped and coded for

[1] https://rayyan.qcri.org/welcome

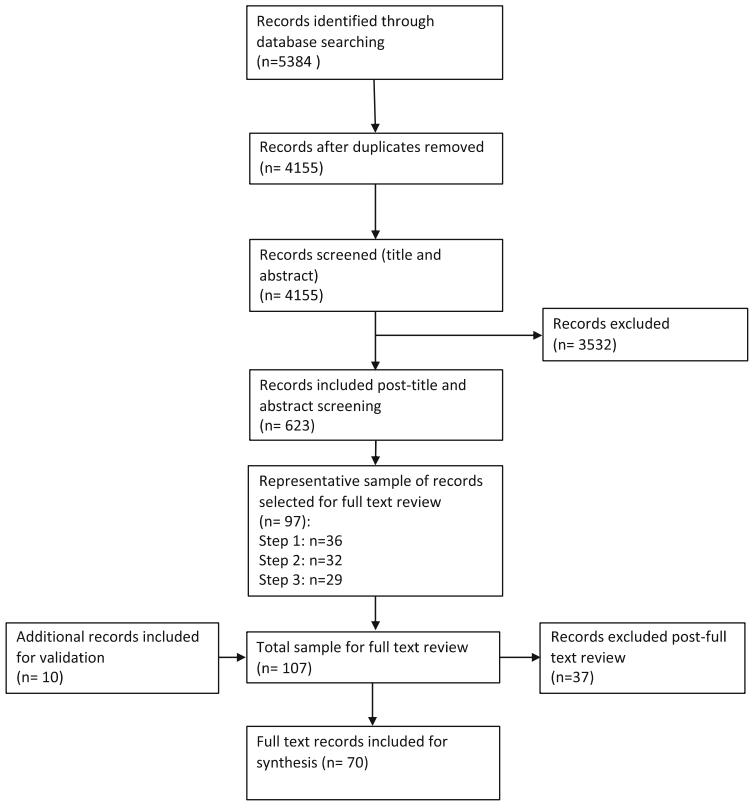

Fig. 1 Scoping review results

further qualitative analysis. As new terms were identified through the full text review ($n = 95$, see details of three-stage process described below), additional text searches were run in NVivo to assess their frequency in the literature.

Aim 2: Capture the origin of dominant interpretations of key competency framework terminology, and how the terms are defined and used

Understanding where the key terminology was derived from and how these terms have been defined and used required full text review and data extraction. In order to make this feasible, a representative sample was selected using a three-stage process as detailed below:

1. Step 1 involved manually selecting all publications directly addressing the conceptualisation of competency frameworks, clarifying the precise meanings, interpretation and application of terms.
2. Step 2 included randomly selecting 5% of the remaining publications (using the randomisation function in Microsoft Excel), reflecting the same distribution of publication dates as the original included publications to ensure the historical evolution was captured. This percentage was considered by the authors to provide a quantity of publications that was feasible for full text review, considering the additional articles available from steps 1 and 3.
3. In step 3, the reference lists of the publications from steps 1 and 2 were screened for additional articles that directly addressed the exploratory research questions.

A REDCap[2] database was created to extract information thoroughly and efficiently from the representative sample for each of the codes identified through NVivo.

[2]https://www.project-redcap.org/

The first author undertook data extraction and synthesis, with findings validated through independent analysis of a smaller sample of publications by two additional authors (JWM and AS). The sample for each author included ten publications from step 1 (previously reviewed by the first author) and five new randomly selected publications from remaining included publications. On reviewing the full texts, the two authors extracted data into an Excel template based on the same codes used by the first author. Once completed, findings from the three authors were compared to identify discrepancies. The validation process did not identify any additional themes and confirmed the findings of the first author. Observations from the review of new publications were integrated into the data synthesis.

Aim 3: Explore how the key competency framework terms are defined and used in the context of health

Since many health-related competency frameworks exist, purposive sampling was used to select a number with which to examine how the key terms are defined and used. Identified competency frameworks published by the World Health Organization (WHO) were selected, as these covered diverse areas of health and enabled the authors to examine how terms were defined and used among different frameworks within a single organisation. Global or internationally recognised competency frameworks that appeared in the included literature were also selected. Definitions of the key terms were extracted, and competencies from the frameworks examined to observe how they had been applied.

Results

Scoping of the electronic databases returned 4 155 results post de-duplication, of which 623 were deemed suitable for full text review (Fig. 1). After applying the three-staged method described above, a representative sample of 97 records were identified, and a further ten publications were included through the validation process (sample $n = 107$). Full text review against the inclusion and exclusion criteria resulted in a total of 70 records undergoing qualitative analysis (Table 1).

Key competency framework terminology

Word frequency and text searches in NVivo and coding of full texts identified five competence/competency "like terms", five "attribute[3] terms", ten "application" terms, three "development" terms, three "occupation" terms and three "related concepts" (see Table 2). This list is not exhaustive (additional attributes were described by authors); however, they represent the most frequently represented terms for each thematic area. Qualitative analysis of the full texts allowed the authors to examine how the "like terms" and "attributes" are conceptualised and how this relates to their use. These relationships are depicted in Fig. 2.

The evolution of the concepts underlying competency framework terminology

From the literature, it is apparent that two dominant conceptualisations of competency framework terminology emerged, almost concurrently, in the United States of America (US) and United Kingdom (UK) responding to different perceived needs and motivations within the education and employment sectors respectively [13, 17, 20, 46, 58]. The emergence of these conceptualisations is addressed in turn.

The emergence of behavioural competency frameworks by educators in the US in the 1970s

Competency frameworks came to prominence in the education sector when David McClelland, a well-known Harvard professor and psychologist, proposed in 1973 that competency was a superior indicator of occupational performance than traditionally used IQ tests [13, 17, 20, 58]. He described competency as: "generic bodies of knowledge, motives, traits, self-image and social roles and skills, that are causally related to superior or effective performance" [13] pp. 679. According to this definition, "competency" is underpinned by the concept of accumulated attributes and is linked to performance in general, rather than to a specific occupation or activity. Within the education sector, which is primary concerned with the students' development, competency is also viewed as continuous and evolving [66]. Indeed, the term "competent", which denotes a definitive state or end point, is to some degree incongruent with this view. This approach shaped the conceptualisation of competency framework terminology in the sector, notably associating competency with the development of attributes, which are applied in work (see Fig. 2). This behavioural conceptualisation and the relationship between terms that it represents are distinct from that which emerged in the UK from the employment sector.

The emergence of the functional competency frameworks in the UK by employers in the 1980s

The rise of competency frameworks in the UK and the conceptualisation of their terminology were driven by the rise of worker rights and the growing demand for standardised selection criteria in recruitment. Employers in industry needed to develop standards for occupational performance based on expected outcomes, which were used to unify work-based qualifications [46]. Unlike the

[2] https://www.project-redcap.org/

[3] In the absence of a consistent label, "attributes" is used in this paper to describe the (non-environmental) factors that underlie competency.

Table 1 Synopsis of included publications

	Number of publications	References
Sector		
Health	24	[1, 2, 9, 19, 24–43]
Other sector	34	[5, 6, 8, 10, 12, 13, 15–18, 44–67]
Cross-sectoral	12	[3, 4, 11, 14, 20, 68–74]
Publication year		
< 1990	1	[69]
1990–1994	6	[8, 34, 45, 52, 64, 68]
1995–1999	15	[9, 19, 20, 33, 38, 39, 46, 49, 57–59, 61, 65, 71, 73]
2000–2004	5	[2, 15, 16, 51, 55]
2005–2009	13	[3, 5, 10, 11, 14, 24, 28, 31, 32, 47, 50, 56, 60]
2010–2014	21	[1, 4, 6, 13, 17, 18, 26, 27, 30, 35–37, 40–42, 48, 54, 62, 63, 74]
2015–2019	9	[12, 25, 29, 43, 44, 53, 66, 67, 70, 72]
Country[a]		
Australia	3	[1, 9, 19
Belgium	1	[42]
Brazil	1	[44]
Canada	5	[10, 15, 27, 32, 43]
China	3	[13, 18, 63]
Croatia	1	[35]
Czech Republic	1	[54]
Denmark	1	[36]
Finland	1	[24]
France	2	[5, 14]
Germany	2	[47, 53]
Greece	2	[56, 62]
Iran	1	[37]
Italy	1	[25]
Lithuania	1	[6]
Malaysia	1	[12]
Morocco	1	[72]
Netherlands	2	[30, 70]
New Zealand	2	[3, 49]
Singapore	1	[55]
Tunisia	1	[74]
United Kingdom	19	[8, 26, 28, 29, 31, 33, 34, 39–41, 45, 51, 52, 59, 61, 64, 66, 68, 71]
United States of America	17	[2, 4, 11, 16, 17, 20, 38, 46, 48, 50, 57, 58, 60, 65, 67, 69, 73]

[a]Country where research was conducted or, if not relevant, country of first author's affiliation

behavioural approach, competency frameworks in the UK were designed to capture the performance expectations for specific occupations [15, 26]. This interpretation was aptly termed the "functional-analysis approach" (hereon referred to as the "functional approach") [15] pp. 9. Competency frameworks developed according to the functional approach were designed to reflect standards—a defined level of performance expected by an employer. The term "competence(s)" was therefore used to portray a dichotomous concept, whereby one either achieved the standard (was competent) or did not [59]. For example, in relation to recruitment and assessment in employment, Christopher Rowe stated that, "competence can only be measured on a pass/fail basis: people are either competent or they are not. This is determined by whether or not a person

Table 2 Key competency framework terms identified in the literature

Code/thematic area	Term	Number of appearances in records ($n = 623$)
Like terms	Competency	24 769
	Competencies	21 167
	Competence	13 966
	Competences	3616
	Competent	1336
Attributes	Skill(s)	12 394
	Knowledge	9874
	Behaviour(ior)	6611
	Values	1963
	Attitudes	1170
Applications	Management	11 925
	Research	8919
	Assessment	6977
	Standard(s)(ize)(ise)	4334
	Communication	2812
	Recruit(ment)	766
	Regulate(ion)(s)	677
Development	Practice	8806
	Training	7840
	Learning	7176
Occupation	Activity(ies)	4045
	Role	3894
	Task(s)	3706
Relating concepts	Performance	8282
	Level	6974
	Proficiency(t)	440

reaches a measurable standard…" [59] pp. 14. Furthermore, competence is defined solely within the context of occupational roles and are defined as activities or tasks. Unlike the behavioural approach, attributes are thus considered distinct from competence (see Fig. 3).

The disparity between the behavioural and functional approaches and the associated conceptual distinction between their terminology, summarised in Table 3, highlight that the two approaches were designed to achieve different ends by different groups. Thus, the terms can be used and interpreted in multiple ways, perpetuating ambiguity. Grzeda (2004), who straddles the two approaches in his role as a professor in the area of management, concluded that "resolving these competing [approaches] does not appear imminent and may in fact not be achievable since both appear to have some merit." [10]

The merging of behavioural and functional approaches

Over time, competency frameworks have been taken up beyond the education and employment sectors, and outside the US and UK, where they came to prominence [11, 13, 14]. This evolution was characterised by a merging of the behavioural and functional approaches, as competency frameworks took on a wider range of applications associated with either or both of the education and labour sectors. The merging meant that competency frameworks used the same terms but often attributed different concepts to them, with variable cohesion observed between which concept was attributed and the motivation/application of the framework [15–18, 20]. Consequently, the proliferation of competency frameworks seen since 2005 (illustrated in Fig. 4) has been accompanied by growing confusion. This is potentially most evident in the degree of variation seen in how terms are used in competency frameworks.

The use of terminology in competency frameworks

As the behavioural and functional approaches became intertwined, key terms were applied differently in competency frameworks. Frameworks apply the terms "competency(ies)" or "competence(s)" to either describe *how* performance is achieved (behavioural approach) or *what* performance looks like in the context of an occupation (functional approach), or a combination of both [31]. There is a tendency for the term "competency(ies)" being used to describe the *how* and "competence(s)" being used to describe the *what*, but this is largely inconsistent [1, 26, 31, 57, 61]. Furthermore, as competency frameworks are taken up beyond English-speaking countries, the

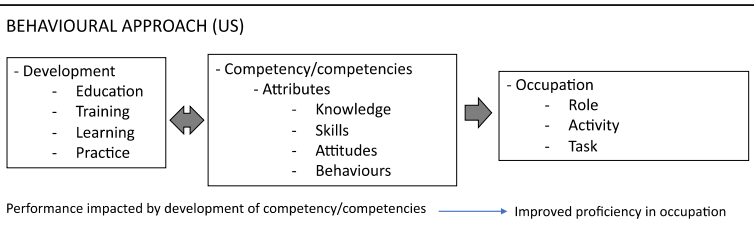

Fig. 2 Relationship between key terms based on educators' behavioural approach

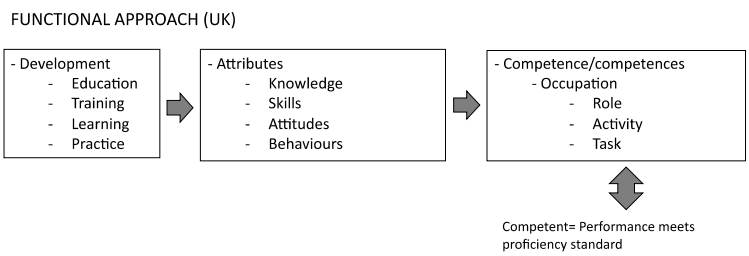

Fig. 3 Relationship between key terms based on the employers' functional approach

nuance between these terms is lost. It is not surprising that criticisms have arisen since these like terms represent distinct concepts that serve different applications in different frameworks. For example, educationalists tend to criticise competency frameworks that use the term "competency" or "competence" to describe activities or tasks and the standards to which they should be conducted as reductionist, claiming that they fail to capture the complexities of practice and the range of attributes that underlie successful performance [1, 6, 9, 10, 32, 33, 43, 71]. They argue that it is not possible to define a profession or role by discrete tasks and that these are meaningless outside of their real-world application. Conversely, those from the industry point to the issues associated with using the term to describe personal attributes, such as empathy, imagination, reflection and resilience. They note the inferences needed for their assessment and claim that they erode the validity of competency frameworks as tools for performance measurement [1, 3, 11, 55].

There does not appear to be consistency in use of umbrella terms for knowledge, skills, attitudes, values and other attributes (attributes being used in this paper), and how they are defined was not a frequent theme in the literature. It was apparent, however, that there is widespread confusion surrounding their use, as this is inevitably tied to the conceptualisation of competency/competence on which a framework is built. When this is unclear, which it frequently is, further debate arises. Some frameworks focus solely on activities and tasks and do not explicitly include underlying knowledge, skill or other attributes (Frameworks 2–4 from Table 4 are examples) [76–78]. This was flagged in one publication as "a prime reason why so many people lapse into a narrow view of competency [frameworks]" [19], pp., 2. Adding to the confusion is the fact that attributes are commonly referred to as "competencies". Early on, Woodruffe (1993) identified this issue and observed that "calling [attributes] 'competences' is likely only to muddle the definition of a competency again, and it seems better to use a separate label" [64]. He did not, however, offer such a label.

The conceptualisation of competency framework terminology in health

The third aim of this study was to examine how key terms are conceptualised and applied in the context of health. An examination of several health-related competency frameworks revealed a haphazard intermingling of

Table 3 The evolution and conceptualisation of terms based on the behavioural and functional approaches

Defining characteristics	Evolution and conceptualisation of terms based on the behavioural approach	Evolution and conceptualisation of terms based on the functional approach
Originating sector	Education	Employment
Originating country	US	UK
Application	Curriculum development, education and training	Employment, standardisation, and workforce regulation
Motivation	Supporting attainment of the highest level of proficiency	Achieve highest production at lowest cost
Focus	Development of competence (continuous)	State of competence (dichotomous)
Primary question	What does a person need to perform effectively? *Or* How does a person perform effectively?	What is effective performance?
Emphasis	Inputs	Outcome
Describes	Attributes of a person, i.e. knowledge, skills, attitudes and behaviours	Roles, activities or tasks
Example	Communicates effectively	Performs a risk assessment

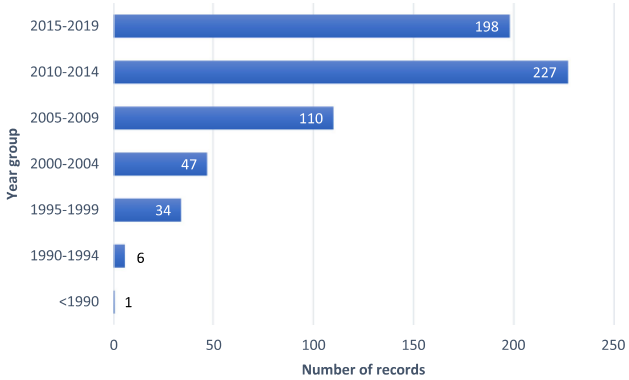

Fig. 4 Distribution of records ($n = 623$) by year of publication over time, < 1990–2019. As no data extraction was required to establish the distribution of publications over time, it was feasible to include all 623 records that were included post title and abstract screening

the behavioural and functional approaches in definitions and use of terms, which is not unexpected given the inherent role that health plays in both education and training, as well as employment and performance management of workers (Table 4) [75–81]. Health-related competency frameworks represented 40% of the 70 records that underwent full text review, representing a considerable interest within the health sector. As seen in Fig. 5, publications of health-related competency framework literature peaked in the years 2010–2014 (46% of health-related records included in the review ($n = 28$) were published in this window), immediately following the 2010 Lancet Commission report into health professions education that called for competency-based education and training [82]. This growth also coincides with the increasing attention workforce received in the health sector over this period, which culminated in a World Health Assembly resolution (WHA67.24) on human resources for health, and the subsequent publication of the Global Strategy on Human Resources for Health: Workforce 2030 [83]. Interestingly, of the 70 included publications, 38% of those derived from countries other than the US or UK (Fig. 6) were from the health sector (as opposed to all other sectors and cross-sectoral studies). The expansion of competency frameworks beyond the countries from which the behavioural and functional conceptualisations derived may further explain the conflation of definitions and uses of terminology observed in health-related competency frameworks.

Table 4 presents the definitions of competency (or like terms, as available) of health-related competency frameworks (presented in chronological order) and extracts examples of their use in competency statements. These are then mapped to the approach that they reflect (behavioural, functional or hybrid of both). It is apparent that definitions are variable, as are their use, and that there is often an incongruence in approaches between and within frameworks. Four frameworks in the sample use definitions aligned with a functional approach (frameworks 1, 2, 5 and 6), articulating a specific level of proficiency and the ability to perform a specific role, action or task. Three definitions aligned with a behavioural approach (frameworks 3, 4 and 7), explicitly highlighting the development of proficiency without making reference to any specific role, activity or task.

The presence of both functional and behavioural approaches in the definitions of competence/competency appears even within a single organisation; four definitions from WHO aligned with the functional approach and one with the behavioural. The conflation is most prominent, however, in the application of the terms; four of the seven frameworks included competencies that aligned with both approaches irrespective of the conceptual definition used. For example, framework 3 includes task-based competencies, such as planning and performing procedures (functional approach), and person-centric competencies, such as demonstrating commitment to high-quality care (behavioural). There is clearly a disparity between how the terms "competence" or "competency" are being conceptualised and how they are being used. There is also a disjointedness between the concept applied to the terms and the intended application of the framework. According to its title, framework 1 is intended to inform curriculum development—an education-related application that would theoretically align with a behavioural approach. However, in its definition of competence, reference is made to a specific level of proficiency, which is a feature associated with a

Table 4 Competency terminology in a sample of existing health-related competency frameworks

	Framework	Definitions and examples	Interpretation reflected
1	Integrating HIV-related content into a competency-based curriculum. 1993 WHO, Regional Office for the Western Pacific [75] *http://www.who.int/iris/handle/10665/206922*	*Definition* "Competence": Competence is the ability to effectively and efficiently deliver a specified professional service. This implies that the nurse is able to practise at a proficiency (mastery of learning) in accordance with local conditions to meet local needs.	Functional
		Examples • Describes universal precautions in infection control. • The student takes a sexual history of the HIV positive person or a person with AIDS.	Functional (and knowledge)
2	Sexual and reproductive health core competencies in primary care: attitudes, knowledge, ethics, human rights, leadership, management, teamwork, community work, education, counselling, clinical settings, service, provision. 2011 WHO [76] *https://apps.who.int/iris/bitstream/handle/10665/44507/9789241501002_eng.pdf?sequence=1&isAllowed=y*	*Definition* "Competence": Sufficient knowledge, psychomotor, communication and decision-making skills and attitudes to enable the performance of actions and specific tasks to a defined level of proficiency.	Functional
		Examples • The primary health-care team member/s provide high-quality health education related to sexual and reproductive health and sexual and reproductive health services. • The primary health-care team member/s provide high-quality family-planning care	Functional
3	CanMEDS Terminology in Medical Education Project: Glossary of Terms. 2012 Royal College of Physicians [77] *http://www.royalcollege.ca/rcsite/canmeds/canmeds-framework-e*	*Definition* "Competence": The array of abilities across multiple domains or aspects of physician performance in a certain context. Statements about competence require descriptive qualifiers to define the relevant abilities, context, and stage of training or practice. Competence is multi-dimensional and dynamic. It changes with time, experience, and setting. "Competency": An observable ability of a health professional related to a specific activity that integrates knowledge, skills, values and attitudes. Since competencies are observable, they can be measured and assessed to ensure their acquisition. Competencies can be assembled like building blocks to facilitate progressive development	Behavioural
		Examples • Plan and perform procedures and therapies for the purpose of assessment and/or management • Demonstrate a commitment to high-quality care of their patients	Functional and behavioural
4	Pharmacy Education Taskforce: A Global Competency Framework. 2012 International Pharmaceutical Federation [78]. *https://www.fip.org/files/fip/PharmacyEducation/GbCF_v1.pdf*	*Definition* "Competence": Knowledge, skills, behaviours and attitudes that an individual accumulates, develops, and acquires through education, training, and work experience.	Behavioural
		Examples • Advise on health promotion, disease prevention and control, and healthy lifestyle • Tailor communications to patient needs	Functional and behavioural

Table 4 Competency terminology in a sample of existing health-related competency frameworks *(Continued)*

Framework		Definitions and examples	Interpretation reflected
5	Four-year, integrated nursing and midwifery competency-based, prototype curriculum for the African Region. 2013 WHO, Regional Office for Africa [79] *https://apps.who.int/iris/bitstream/handle/10665/254742/9789290232612eng.pdf?sequence=1&isAllowed=y*	*Definition* "Competency": Basic knowledge, skills, attitudes and judgement required to safely perform the prescribed role.	Functional
		Examples • Interact effectively with clients fostering mutual respect and shared decision making to enhance client satisfaction and health outcomes. • Conducts a comprehensive assessment of a client in a caring, respectful and culturally sensitive manner.	Functional and behavioural
6	Core competencies in adolescent health and development for primary care providers including a tool to assess the adolescent health and development component in pre-service education of health-care providers. 2015 WHO [80]. *https://apps.who.int/iris/bitstream/handle/10665/148354/9789241508315_eng.pdf?sequence=1*	*Definition* "Competency": Sufficient knowledge, psychomotor, communication and decision-making skills and attitudes to enable the performance of actions and specific tasks to a defined level of proficiency.	Functional
		Examples • Effectively interact with an adolescent client • Assess normal growth and pubertal development and manage disorders of growth and puberty	Functional and behavioural
7	WHO Competency Framework for Health Workers' Education and Training on Antimicrobial Resistance. 2018 WHO [81]. *http://apps.who.int/medicinedocs/documents/s23443en/s23443en.pdf*	*Definition* "Competency": A "combination of knowledge, skills, motives and personal traits", development of which should help individuals to continually improve their performance and to work more effectively.	Behavioural
		Examples • Health worker understands and implements the principles of hygiene, sanitation and IPC to reduce the spread of AMR • Health worker demonstrates that they have the knowledge and understanding… to facilitate optimal and safe use of antimicrobial agents for management of infections.	Behavioural

dichotomous conceptualisation of competence characteristic of a functional approach. Specifications of an expected level of proficiency portray a standard by which one can be measured against and are associated with employment-related applications, such as regulation.

Examination of the definitions further revealed the integration of "personal" attributes within definitions aligned with the functional approach. Framework 4, for example, includes attitudes and judgement in its definition, which are not characteristic of a functional approach as their

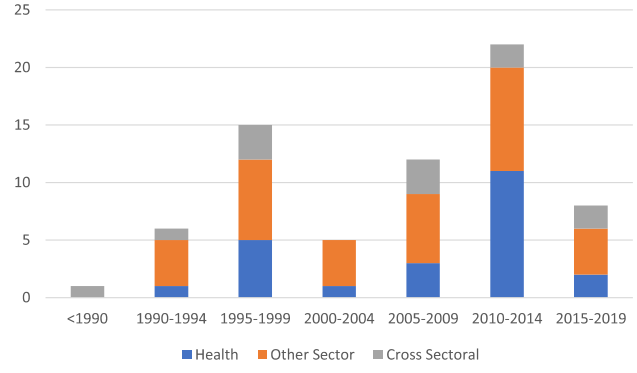

Fig. 5 Distribution of records ($n = 70$) by sector over time, < 1990–2019

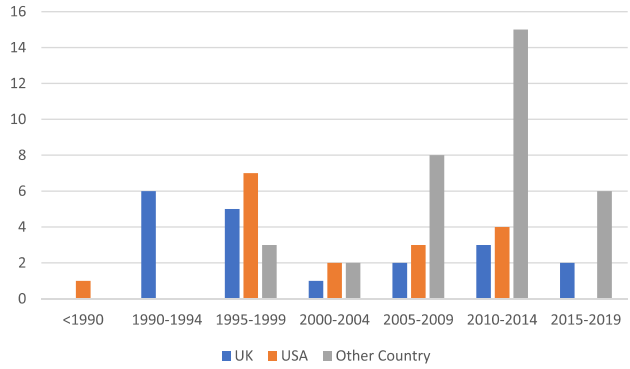

Fig. 6 Distribution of records ($n = 70$) by country of publication over time, < 1990–2019

assessment requires higher levels of inference. Attributes, notably knowledge, also appeared to be conceptualised as competencies. This is seen in framework 1, where description of a specific area of knowledge was included as a competency. This reflects the concept of competency as attributes, rather than as the expression of their aggregation in behaviour.

Discussion

Competency frameworks are becoming more widely used across a variety of sectors and for a broad range of applications. However, conceptual ambiguity and lack of consistency in the use of key terminology still vexes the field. This limits common understanding, cohesiveness and standardisation for research, development and implementation into practice. This scoping review has undertaken a systematic and comprehensive approach to identifying the underlying causes of the conceptual differences and diverging views and seeks to examine how this has influenced competency frameworks in the health sector. Two highly influential conceptualisations have emerged from the education and employment sectors, which have defined this topic area with seemingly incongruent views to competency. They consider competency as either "behavioural" (continuous and evolving, underpinned by the accumulation of attributes and linked to performance in general) or "functional" (related to the performance of a specific occupation or activity and concerned with a definitive end point of being "competent").

The intertwining of the behavioural and functional approaches seen in the health-related competency frameworks presented in Table 4 may reflect the interconnectedness between the education and employment sectors. Indeed, education-related applications of frameworks (e.g. developing curriculum) are influenced by employment-related applications (regulation of proficiency) and vice versa. It appears evident that the developers of competency frameworks see the need for either or both the behavioural and functional approach, depending on the point of view of the developer and the frameworks' intended application. Acknowledging this need and building on the findings of the scoping review, this study proposes a re-conceptualisation of competency frameworks, supported by a glossary of key terms (Table 5). This has been developed through a health lens, although it may be equally applicable to other areas. The glossary encompasses concepts from both the behavioural and functional interpretations but distinguishes between them through assigning discrete terms to each.

Proposed re-conceptualisation of competency framework terminology for health

Four features characterise the proposed re-conceptualisation of key terms:

1. Differentiation between "competency" and "activity" (see Fig. 7)
   The first distinction is necessary because competencies, being embodied by a person, translate across multiple roles, activities and tasks. How these competencies are expressed may differ depending on how they are contextualised. Activities can be differentiated from competencies in that they are time limited (they begin and end), while competencies are durable.[4] For example, "communicates effectively" would be considered a competency, while, "conducts an intervention", would be considered an activity.

[4]"Durable" refers to the ongoing presence of an ability, recognising that performance of the ability may not remain consistent

Table 5 Proposed glossary of terms for health-related competency frameworks

Term	Definition	Conceptual characteristics
Activity	An area of work that encompasses groups of related tasks. Activities are time limited, trainable and, through the performance of tasks, measurable.	Time limited, i.e. begins and ends Describe what is done
Attitude	A person's feelings, values and beliefs, which influence their behaviour and performance of tasks.	An unobservable attribute inferred through performance
Behaviour	Observable conduct towards other people or activities that expresses a competency. Behaviours are durable, trainable and measurable.	Observable attribute, often applied in combination, i.e. several behaviours may contribute towards one competency
Competency	The observable ability of a person, integrating knowledge, skills, and attitudes in their performance of tasks. Competencies are durable, trainable and, through the expression of behaviours, measurable.	Not time limited, i.e. durable through multiple activities Can develop/improve or erode over time
Competent	Performance of required competencies and activities to a defined standard for an occupational role (e.g. "she/he is competent").	Dichotomous, i.e. one is or is not competent
Knowledge	The informational base of competencies and activities.	An unobservable attribute of competence inferred through performance or determined through specific testing A competency and/or activity may draw on multiple areas of knowledge simultaneously
Proficiency	A person's level of performance (e.g. novice or expert).	A degree of ability to perform (continuous)
Occupational role	A category that characterises certain groups of activities (e.g. student, practitioner, educator, manager, researcher).	An aggregate of linked activities that serve a common purpose The macro level to activities (meso) and tasks (micro) Determines scope of practice
Skill	A specific cognitive or motor ability that is typically developed through training and practice.	Observable (physical) and unobservable (cognitive) attribute, often applied in combination, i.e. several skills may contribute towards one competency and/or activity
Standard	The level of proficiency required to perform an occupational role, acquire a professional title, or be deemed safe to perform specific tasks.	A specific level of performance (discrete)
Task	Observable units of work as part of an activity, which draw on knowledge, skills, attitudes and behaviours. Tasks are time limited, trainable and measurable.	Observable attribute of activities, often applied in combination, i.e. several tasks may contribute towards one activity

Both activities and competencies can be broken down into smaller component parts, enabling a more accurate and granular description. In this re-conceptualisation, it is proposed that tasks are the component parts of activities (given that an activity can encompass multiple tasks), and behaviours are the component parts of competency (in that competencies can be expressed through numerous behaviours). Using the examples provided above, a behaviour for effective communication may include using and interpreting body language, and a task associated with conducting an intervention may include prescribing an exercise programme. Notably, both tasks and behaviours are observable, an important factor for applications relating to practical assessment.

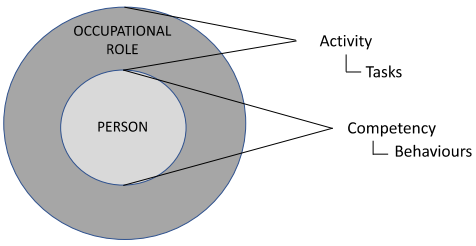

Fig. 7 Differentiating between competency as person-centric and activity as role-centric

2. Distinguishing attributes from competencies and activities (Fig. 8).

Disentangling attributes (knowledge, skills, and attitudes) from competencies and activities enables greater standardisation of how they are expressed and organised in competency frameworks. Much of the current confusion and debate surrounding competency

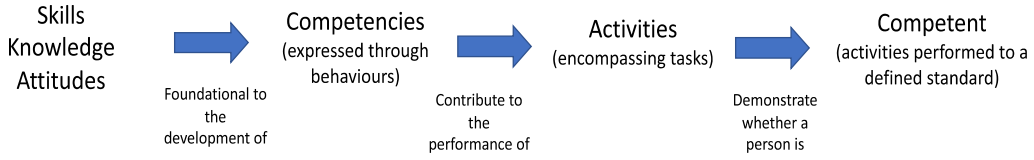

Fig. 8 Relationship between key competency framework terminology according to proposed conceptualisation

frameworks has resulted from a failure to recognise their conceptual distinction and doing so will go far to supporting greater comparability between frameworks.

Building on the previous examples, knowledge of cultural communication practices would underpin effective communication, and knowledge of the indications and contraindications of specific exercises would be required to prescribe an exercise programme. Skills and attitudes would similarly provide the necessary underpinnings for the performance of a competency or activity.

3. Recognising competency as evolving through increasing levels of proficiency

The concept of proficiency is a necessity for many applications of competency frameworks. The glossary articulates the term "standard" as describing the defined point of proficiency at which someone may be deemed "competent" in a specific context. For example, it would require a relatively low level of proficiency to prescribe a protocol-based exercise programme, as opposed to a customised programme that caters for individual factors. A competency framework may describe these different levels, but a standard would articulate at which a person would be considered "competent".

4. Conduciveness to translation

Finally, the terms do not rely on fine nuances of the English language to differentiate them, and use plain-language, succinct definitions. For example, the term "competences", which could not be differentiated from "competencies" in many languages, is not included. This is critical for the development and application of global competency frameworks in particular and for ensuring standardisation and effective communication between countries, cultures and groups.

While the glossary has been developed with the health sector in mind, it has the potential to be adopted by other sectors. At the time of publication, the concepts and terminology proposed here were applied to the WHO Rehabilitation Competency Framework (pending publication), which served as a test case for its application. The differentiation of concepts through distinct terms and the inclusion of both behavioural and functional interpretations has proved invaluable in organising information and providing clarity in this process.

Existing contributions to competency framework terminology conceptualisation

The proposed re-conceptualisation builds on the reflections of several authors who have previously sought to synergise the behavioural and functional approaches. For example, in 1996, Paul Hager and Andrew Gonczi, two educationalists in Australia, presented a definition of competence intended to convey an "integrated approach" and a "richer conception of competence" [19]. The authors suggested that integrating attributes and tasks would enable competency standards to capture "the holistic richness of professional practice in a way that neither [the behavioural and functional] approaches could" (pp.15). More recently, Olle ten Cate proposed the concept of "Entrustable Professional Activities" (EPAs) in an effort to better connect competency frameworks to the workplace (creating a conceptual bridge between the education and employment sectors) [84]. EPAs are defined as a "units of professional practice, defined as tasks or responsibilities to be entrusted to the unsupervised execution by a trainee once he or she has attained sufficient specific competence" (pp. 157). Hager and Gonczi and ten Cate's propositions are similar in so far as they both suggest that competence is underscored by a concept of integrated attributes and tasks. They differ, however, in that Hager and Gonczi posit that tasks should be described in general terms only with the emphasis being on the capabilities that underlie their successful performance, whereas ten Cate focuses attention on discrete tasks that are observable and measurable, leaving the underlying behavioural competencies to inference [85].

Others have also attempted to develop an operational definition that resolves the seemingly conflicting behavioural and functional approaches [3, 10, 11, 13, 38, 46, 54, 57, 59, 60]. For example, Woodruffe (1993), coming from an employment perspective, defined competency as "a set of behavioural patterns that the incumbent needs to bring to a position in order to perform its tasks and functions with competence" [64]. The concept of competency proposed by Woodruffe appears to focus on behaviours that can be linked to tasks, rather than an

integration of these behaviours and the tasks that they are linked to, as proposed by Hager and Gonczi and ten Cate [19, 84]. The nuances between the authors' conceptualisations of terms are subtle but not insignificant. Without consensus on whether the term "competency" encompasses tasks or links to them, confusion is bound to persist and comparability between frameworks will continue to be problematic. For this reason, the distinction between competencies and activities in the proposed re-conceptualisation of terms is considered critical. How a competency framework developer chooses to link competencies and activities may vary; they could be specifically mapped to each other, grouped under thematic domains or kept completely separate, depending on the preferred framework structure. Similarly, competency framework developers may choose to describe the behaviours through which competencies are expressed, and the tasks encompassing activities, or describe only the competencies and activities generally, depending on the level of specificity the intended application requires. The same holds true for the inclusion of attributes (knowledge, skills and attitudes), which may or may not be included according to their perceived value to the user. Regardless of competency framework arrangement or granularity, a common conceptual underpinning will certainly enhance comparability and bring clarity to future discourse [85].

Limitations

The conclusions of this scoping review should be considered in light of its methodological limitations. Firstly, the sampling process applied to achieve feasibility for full text review meant that a large proportion of the literature that was potentially relevant (based on title and abstract screening) was not analysed (although all 623 records included post title and abstract screening were text-searched as per Table 2). While analysis of the 70 publications that did undergo full text review reached a saturation in themes, it is possible that additional themes or historical perspectives were missed. Secondly, data extraction and review for the majority of the publications was undertaken by one author. The validation process, whereby two additional authors conducted data extraction and review of samples of new and duplicate publications, sought to mitigate the risks associated with single-author data extraction and review. Nevertheless, multiple-author data extraction and review would have constituted a more robust methodology.

Conclusions

The literature shows a trend of increasing interest in competency frameworks. Their relevance to numerous and increasing workforce challenges suggests that they will continue to be developed and used in the years to come. The conceptual ambiguity and subsequent debates and confusion that have plagued competency frameworks and eroded their credibility are driven by a conflation of two distinct conceptualisations of shared key terms. The re-conceptualisation presented here, and the glossary through which it is expressed, serves to bring clarity and insight in the future development and use of competency frameworks within health workforce education, recruitment, employment and regulation into the future.

Abbreviations

EPA: Entrustable Professional Activity; UK: United Kingdom; US: United States of America; WHO: World Health Organization

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Authors' contributions

JM conducted the scoping review, analysed the findings and drafted the publication. JWM provided guidance and oversight over the scoping review methodology, participated in the validation process and provided critical feedback and edits to drafts. AS participated in the validation process and provided critical feedback and edits to drafts. SF provided critical feedback and edits on drafts and contributed significantly the establishment of the definitions provided in the glossary. SS provided input to the scoping review methodology and critical feedback and edits to drafts. AC provided input on the scoping review methodology and critical feedback and edits to drafts. All authors read and approved the final manuscript.

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Availability of data and materials

Raw data from the scoping review is available on request. Contact james.middleton@sydney.edu.au.

Ethics approval and consent to participate

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Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Section 3

OPERATIONALISATION

Section contents: Chapters 5-6

Chapter 5. Development of the Rehabilitation Competency Framework

Section 3 focuses on the operationalisation of the competency-based terminology defined in Section 2. Operationalisation refers to the transference of abstract concepts into measurable or observable form. The competency-related concepts on which this research project was based were clearly defined in the glossary developed in Section 1. The purpose of Section 2 is to explicate the process through which these concepts were translated into a format conducive to observation and measurement. This chapter, which is in the form of a published manuscript, describes the research used to develop and validate the Rehabilitation Competency Framework (RCF). Chapter 6 presents a synopsis of the competency framework itself.

This discussion addresses Aim 1 of the thesis, which was to develop a competency framework for the rehabilitation workforce that was relevant across occupations, specialisations and settings. The specific objectives were to: (1) identify the competencies and activities of the rehabilitation workforce and the behaviours and tasks associated with them; and (2) determine whether the statements in which the competencies, behaviours, activities and tasks were communicated were deemed acceptable by rehabilitation workers and beneficiaries. The latter was of utmost importance given the intention of the competency framework to be used as a tool for workforce planning and development by a range of stakeholders globally and, therefore, the need for stakeholder engagement, agreement and buy-in.

Three methodologies were deployed in the course of developing and validating the RCF. These were: a content analysis of existing rehabilitation-related competency frameworks (and associated documents); a modified Delphi study; and a consultative survey of rehabilitation service users. These methodologies are commonly used in the development of competency frameworks, collectively serving to build consensus on statements. They were selected on the basis both of their systematic approach and their practicality as a means of collecting data from very large numbers of participants globally. As explained further in this section, the development of the RCF was supported by a technical working group of 21 experts, who provided advice and assisted with key decision-making throughout the process. The technical working group was led by the candidate.

This chapter is presented as a published manuscript:

Mills, J., Cieza, A., Short, S., & Middleton, J.W. (2021) 'Development and validation of the WHO Rehabilitation Competency Framework: a mixed methods study', *Archives of Physical and Rehabilitation Medicine*. 102(6). https://doi.org/10.1016/j.apmr.2020.10.129.

Authorship attribution statement for Chapter 5

The nature and extent of the candidate's contribution to this publication were as follows:

Candidate contribution	**Extent of contribution**
Lead author: The candidate was responsible for study design, study approvals (Ethics), development of study instruments (Delphi survey and consultation survey) and recruitment strategies, the conduct of the research, manuscript writing, submission to the journal, and responding to reviewers' comments.	90%

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's contributions to this work.

Date: 20 January 2023

Jody-Anne Mills

PhD candidate

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Principal supervisor

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ORIGINAL RESEARCH

Development and Validation of the WHO Rehabilitation Competency Framework: A Mixed Methods Study

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Abstract

Objectives: To identify the competencies, behaviors, activities, and tasks required by the rehabilitation workforce, and their core values and beliefs, and to validate these among rehabilitation professionals and service users.

Design: Mixed methods study, involving a content analysis of rehabilitation-related competency frameworks, a modified Delphi study, and a consultation-based questionnaire of service users.

Setting: Desk-based research.

Participants: Participants who completed the first (N=77; 47%) and second (N=68; 67%) iterations of the modified Delphi study. Thirty-seven individuals participated in the service user consultation. Collectively, the participants of the mixed methods study represented a significant range of rehabilitation professions from a broad range of countries, as well as both high- and low-income settings.

Interventions: Not applicable.

Main Outcome Measures: Not applicable.

Results: The mixed methods study resulted in the inclusion of 4 core values, 4 core beliefs, 17 competencies, 56 behaviors, 20 activities, and 62 tasks in the Rehabilitation Competency Framework. The content analysis of rehabilitation-related competency frameworks produced an alpha list of competencies, behaviors, activities and tasks ("statements"), which were categorized into 5 domains. The final iteration of the modified Delphi study revealed an average of 95% agreement with the statements, whereas the service user consultation indicated an average of 87% agreement with the statements included in the questionnaire.

Conclusions: Despite the diverse composition of the rehabilitation workforce, this mixed methods study demonstrated that a strong consensus on competencies and behaviors that are shared across professions, specializations, and settings, and for activities and tasks that collectively capture the scope of rehabilitation practice. The development of the Rehabilitation Competency Framework is a pivotal step toward the twin goals of building workforce capability to improve quality of care and strengthening a common rehabilitation workforce identity that will bolster its visibility and influence at a systems-level.

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Competency frameworks, which comprise organized statements that communicate the expected or aspired performance of a particular workforce, can be valuable resources in addressing workforce challenges in many settings. These challenges generally relate to a shortfall of workers, deficiencies in quality of care, and a mismatch between workforce capabilities and population needs.[1-3] Competency frameworks can help address these challenges at the individual, institutional, service, and system levels.[4,5] Regulatory or accreditation bodies use competency frameworks to communicate the standards expected of a profession. When applied to pre- and

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postservice education and enforced through audits and other mechanisms, they form an integral component of quality assurance. Education institutions use competency frameworks for articulating the outcomes of their courses. They can be used to shape the learning outcomes of courses and to ensure that the knowledge and skills taught by the institution are aligned with population needs. Services use competency frameworks in workforce planning and human resource management. In the context of planning, they enable services to successfully align their staff competencies and activities with population needs and service objectives and help to identify gaps in knowledge and skills and performance deficiencies. In the context of human resource management, competency frameworks define performance excellence and provide a benchmark against which workers are assessed. They are also integral to establishing individual and service-wide development priorities. Ministries of health can apply competency frameworks in workforce evaluation and planning, such as in conduct competency gap analyses.

Considering their broad utility, competency frameworks have a clear role in the field of rehabilitation, where workforce challenges are acutely felt, especially in low- and middle-income settings.[6,7] Lack of access to a skilled rehabilitation workforce has substantial health, social, and economic implications. In addition, countries are facing increased pressure to take action in light of ageing populations, the growing prevalence of noncommunicable diseases and injuries, health emergencies, and other health trends.[3,6]

Although a considerable number of rehabilitation-related competency frameworks exist, they have typically been developed in the context of a specific profession, specialization, or setting; have largely been developed in high-income countries; and have had widely varied language and interpretation of key concepts. This poses a barrier to their use, particularly in the context of broader workforce evaluation and planning that crosscuts professions, specializations, and settings, and promotes fragmentation in the field. There is an evident need for a competency framework that harmonizes rehabilitation competencies and captures the breadth of rehabilitation activities, provides a common language, and is relevant to both low- and high-resource settings. Such a framework will support rehabilitation workforce evaluation and planning and facilitate the development of context-specific competency frameworks that are aligned with others in the rehabilitation field. Furthermore, it will promote a common rehabilitation identity, which is integral to increasing its visibility and influence.

Moving forward with the development of a Rehabilitation Competency Framework (RCF) that can serve the above aims will require that several questions be addressed. First, what are the core values, beliefs, competencies, behaviors, activities, tasks, knowledge, and skills needed by the rehabilitation workforce? These need to be representative of the scopes of practice of the various rehabilitation professions and specializations to not only provide rehabilitation interventions, but also deliver rehabilitation services in a range of settings. The distinction between competencies, behaviors, activities, and tasks (which, along with core values, beliefs, knowledge, and skills, are hereafter collectively referred to as statements) is summarized in table 1 and is based on the conceptualization of competency framework terminology proposed by Mills et al.[8]

List of abbreviations:

RCF	**Rehabilitation Competency Framework**
TWG	**technical working group**
WHO	**World Health Organization**

Next, are the statements deemed relevant and acceptable to different rehabilitation professionals of varying specializations working across settings? For the RCF to have impact, there must be broad consensus about its content by those to which it applies. This is critical to not only achieving the buy-in required for its uptake and utilization, but also to ensure its function as a unifying framework.

Finally, are the statements deemed relevant and acceptable to different rehabilitation service users? It is the preferences of these stakeholders that shape the behaviors required of the rehabilitation workforce. Building consensus on relevant statements of the RCF among service users helps ensure that it is promoting a rehabilitation professional that can deliver the type of care individuals wish to receive.

To the authors' knowledge, there is no existing literature on the identification or agreement on statements that encompass all rehabilitation professions, specializations, and settings. In addressing these questions, the authors used 3 methodologies, involving a content analysis of existing rehabilitation competency frameworks to address the first question, a modified Delphi study to address the second question, and a questionnaire-based consultation to address the final question.

Methods

The development of the RCF was guided by the expertise of an international, multidisciplinary technical working group (TWG) composed of 20 members. Members of the group were selected via nomination from different rehabilitation professional associations based on the relevance on their experience and to achieve an optimal balance between disciplines and representation of World Health Organization (WHO) regions. The use of a TWG was necessary to ensure that the perspectives of each profession and of different geographic areas and cultures were considered in decision making. It also provided a forum for discussion and problem solving, which the methods used to address the 3 research questions did not allow. The demographic characteristics of the TWG can be found in table 2. Ethical approval for this study was provided by the Northern Sydney Local Health District Human Research Ethics Committee within the New South Wales Department of Health in Australia.

Identifying the competencies of the RCF: content analysis of existing rehabilitation-related competency frameworks

A content analysis of existing rehabilitation-related competency frameworks was used given its precedence and recognition as a sound technique for identifying and compiling competency framework statements, particularly when used alongside participatory approaches.[9-12] In the context of the RCF, it was deemed a practical and strategic methodology to generate an alpha version of the RCF, as it enabled competency statements from all rehabilitation professions and a range of countries to be captured efficiently.

A database of existing rehabilitation-related competency frameworks was created using REDCap,[a] a secure web-based software. Identification of frameworks involved a 3-pronged search strategy (search approaches can be found in table 3). First, a call for frameworks was extended to international rehabilitation professional associations, international condition-

Table 1 The distinction between competencies and activities applied in the RCF

Competencies	Activities
Associated with an individual	Associated with work
Continuous (transcend all activities and tasks)	Discrete (begin and end)
Expressed as behaviors	Encompass tasks
Relevant to all rehabilitation workers	Relevant to some rehabilitation workers and not others, depending on their occupational role
Example:	Example:
Competency: communicates effectively with the individual, his or her family, and the health care team	Activity: conduct a rehabilitation assessment
Behavior: speaks clearly and concisely	Task: analyze barriers and facilitators in the individual's environment

specific organizations, WHO offices, and academic institutions relevant to rehabilitation for dissemination among their respective networks. Next, a search was conducted using electronic databases (ie, PEDro, OTSeeker, PsychINFO, Cochrane Rehabilitation, MEDLINE, and NHS Evidence). Then, a Google[b] search was conducted for competency frameworks related to each of the 8 core rehabilitation professions. For each search, web pages were screened until 2 consecutive pages elicited no more results.

Within the database, key details such as author, field, and year of publication, as well as the thematic structure of the frameworks, were extracted. The thematic structures were reviewed with the TWG, who agreed on 5 domains, each structured to provide the desired level of specificity (fig 1).

The content of the existing RCFs was mapped to the 5 domains in a Microsoft Excel[c] spreadsheet. As content was extracted, it was grouped according to emerging topics such as communication, problem solving, and safety and quality, which shaped the RCF statements. A consultative process between the lead author (J.M.) and the TWG was used to determine how the behaviors and tasks were described across 4 levels of proficiency to capture the scope of performance represented in the rehabilitation workforce (see fig 1). These 4 levels represent an escalation in autonomy and decision making, as well as an increased depth of knowledge and skill mastery, from level 1 to level 4. A profile summarizing the broad expectations of each level was created for each domain. Knowledge and skills, which were poorly described in the identified competency frameworks, were not included in the alpha version of the RCF, and it was determined that a parallel process involving a content analysis of rehabilitation curricula and consultation with condition-specific experts was necessary.

Relevance and acceptability of the RCF statements to rehabilitation professionals: a modified Delphi study

A modified-Delphi study was used based on its effectiveness in obtaining consensus in the context of a paucity of empirical evidence, as well as its ability to efficiently and systematically capture the opinions of the broad target audience of the RCF.[13-17] Delphi studies are among the most commonly used methodologies in the development of competency frameworks, both within and beyond the health sector, and are recognized as a participatory approach that promotes a sense of ownership among the target audience of the framework.[18,19] A 2-iteration modified Delphi study was undertaken between August 20 and November 20, 2019. The classic Delphi methodology, which uses a structured feedback technique to quantify opinion with the intention of building consensus, was modified to suit the context of the study.[20,21] Rather than requesting participants to rank or prioritize statements in the RCF, the modified Delphi study used binary responses (agree/disagree) to determine whether the statements should be included or not, and free text fields to identify what adjustments were needed to achieve optimal consensus. Ranking and prioritization of statements was not considered meaningful as they are complimentary and equally weighted in the RCF, and the binary response options eliminated the generation of superfluous data and increased the speed with which participants could move through the questionnaires, which was important given their length. Participants were also given the option to opt out of responding to a specific statement if they felt unable to comment on the subject area. Furthermore, unlike the traditional Delphi study technique, the study commenced with an existing draft

Table 2 Demographic characteristics of the RCF TWG

Variable	Frequency
Profession, n (%)	
Audiology	2 (10)
Occupational therapy	4 (20)
Physical and rehabilitation medicine	2 (10)
Physiotherapy	3 (15)
Prosthetics and orthotics	1 (5)
Psychology	3 (15)
Rehabilitation nursing	2 (10)
Speech and language therapy	2 (10)
Other (rehabilitation researcher and service user)	1 (5)
Sex, n (%)	
Female	15 (75)
Male	5 (25)
Location based on WHO world regions, n (%)	
Africa region	2 (10)
Americas region	8 (40)
Eastern Mediterranean region	1 (5)
Southeast Asia region	1 (5)
Western Pacific region	3 (15)
Location based on economic classification, n (%)	
High income countries	16 (80)
Upper-middle income countries	3 (15)
Lower-middle income countries	1 (5)
Low income countries	0 (0)

Table 3 Search strategy for the identification of existing rehabilitation-related competency frameworks

Search Approach 1: Call to International Associations and Organizations	
International professional associations were invited to disseminate the call for frameworks	International Society of Physical and Rehabilitation Medicine (ISPRM), International Society of Prosthetics and Orthotics (ISPO), International Association of Logopedics and Phoniatrics (IALP), American Speech-Language-Hearing Association (ASHA), World Confederation for Physical Therapy (WCPT), World Federation of Occupational Therapists (WFOT), World Federation of Chiropractic (WFC), International Network of Physiotherapy Regulatory Authorities (INPTRA), International Council of Nurses (ICN)
International condition-specific organizations were invited to disseminate the call for frameworks	Centre for Global Mental Health, World Stroke Organization, World Federation fore Neurorehabilitation (WFNR), World Federation of Neurology, Neuro-Optometric Rehabilitation Association, International Brain Injury Association, Rehabilitation in MS-European Network, Consortium of MS Centers, International Parkinsons and Movement Disorder Society, World Autism Organization, Global Autism Project, International Association for the Scientific Study of Intellectual and Developmental Disabilities, Global Alliance for Musculoskeletal Health, Children's Burn Foundation, International Society for Burn Injuries
International development organizations	International Committee of the Red Cross, Humanity and Inclusion, The ICRC MoveAbility Foundation, Swiss Paraplegic Research
Research institutions	Hannover Medical School, Guttman Institute, Korean National Rehabilitation Research Institute, Korea National Rehabilitation Centre, Tonji Medical College, University of Sydney, WHO Collaborating Centre in Health Workforce Development in Rehabilitation and Long Term Care, General Hospital of the University of Sao Paulo Brazil, WHO Collaborating Centre for Rehabilitation, University of Toronto, University of Cape Town, University of Zimbabwe
Rehabilitation focal points in WHO offices	Regional Office for Africa, Regional Office for the Americas, Regional Office for the Eastern Mediterranean, Regional Office for Europe, Regional Office for South East Asia, Regional Office for the Western Pacific: Tajikistan Country Office, Pakistan Country Office: Cambodian Country Office

Search Approach 2: Electronic Databases		
Database	Search Terms	Filters
Cochrane Rehabilitation	Competenc* AND (framework OR model OR standard*)	None
MEDLINE	(Rehabilitation or physiotherapy or "physical therapy" or "occupational therapy" or "speech and language pathology" or "speech and language therapy" or "prosthetics and orthotics" or psychology or audiology) and Competenc*) and (framework or model or standard*)	Title only
NHS Evidence	Rehabilitation competency framework Physiotherapy competency framework Occupational therapy competency framework Orthotics and prosthetics competency framework Speech and language therapy competency framework Speech and language pathology competency framework Audiology competency framework Physiatry competency framework Physical medicine and rehabilitation competency framework Community rehabilitation competency framework	Evidence type: Guidance and Policy; practice-based information; Area of interest: Clinical; Excluded: Guidelines

(*continued on next page*)

Table 3 (*continued*)

OTSeeker	Competenc* AND (framework OR model OR standard*)	None
PEDro	Competenc* framework	None
	Competenc* model	
	Competenc* standard*	
PsychINFO	Competenc* AND (framework OR model OR standard*)	None

Search Approach 3: Google Search	
Search Term	No. of Pages Searched
Audiology competency framework, model or standards	7
Community-based rehabilitation or CBR competency framework, model or standards	5
Physical medicine and rehabilitation or physiatry competency framework, model or standards	5
Physiotherapy or physical therapy competency framework, model or standards	9
Prosthetics and orthotics competency framework, model or standards	7
Psychology competency framework, model or standards	5
Rehabilitation nursing competency framework, model or standards	4
Speech and language therapy or speech and language pathology competency framework, model or standards	8

framework (the alpha draft), rather than using an initial round of open-ended questions to generate content. It was decided that, given the scope of the framework, it was more efficient to develop the alpha version through the content analysis, as described above.

Participants were identified via nomination by the TWG. Nominees were screened according to their world region and profession, and a selection was made that attempted to achieve the best possible representation of low- and middle-income countries and a balance between professions. All participants who had commenced the first iteration of the study were invited to participate in the second, regardless of how far they had progressed.

The online questionnaire instruments were created using REDCap and were disseminated via e-mail. Each iteration included 2 versions of the questionnaire that ordered the statements in a different sequence to avoid response fatigue affecting some more than others, although the statements from the Practice and Professionalism domains were always the first to be presented. Participants were given 1 month to complete each iteration of the study, with a 1-month gap between iterations. Weekly reminders were sent to encourage completion. Participants were not offered incentives for completing the questionnaires, with the exception of a certificate and acknowledgment within the published RCF.

Data were analyzed using SPSS.[d] According to the study protocol, statements with less than 90% agreement were to be revised. However, all recommendations were considered regardless of the rate of agreement. Results of each iteration were used to amend the RCF statements, with changes proposed by the lead author (J.M.) in consultation with the TWG, in response to the qualitative and quantitative data produced.

Relevance and acceptability of the competencies to rehabilitation service users: a questionnaire-based consultation

Although content analyses and Delphi studies are widely used in the development of competency frameworks, consumer consultations are less common. This is owing in part to the fact that consumers can generally offer opinion only on certain nontechnical aspects of performance, and thus can speak only to a restricted portion of competency framework content. However, given that rehabilitation practice is highly collaborative and that positive therapeutic relationships greatly affect outcomes, it was decided that consumer opinion should be sought on the core values and beliefs of the RCF, as well as selection of competencies and behaviors that were directly related to interpersonal interaction and decision making. Given the scope of the RCF and its intention for global application, an online questionnaire was selected as the mode by which to gather rehabilitation service user opinions, with a view to conduct interviews if the findings were ambiguous or highly disparate.

The rehabilitation service user consultation used a questionnaire instrument in both English and French, generated using REDCap. Participants were identified using a snowballing method: the TWG nominated 26 rehabilitation services from 13 countries that could disseminate the questionnaire to suitable service users and to other rehabilitation services, which could do the same. The questionnaire was also disseminated to 13 organizations representing rehabilitation services users and was promoted on the website of the WHO Global Cooperation on Assistive Technology community. No rehabilitation service users were directly contacted by the study coordinators.

The questionnaire used Likert scales and free text fields to determine participants' agreement with and opinions regarding the RCF values and beliefs statements, as well as competencies and behaviors concerning client-centeredness, working relationships, client engagement, communication, professional integrity, contextual consideration, and advocacy. The questionnaire remained open for 6 weeks between September and November 2019. Qualitative results were analyzed using NVivo 12[e] (responses in French were translated to English), and quantitative responses were analyzed using Microsoft Excel. Results of the consultation were considered along with those of the final iteration of the modified Delphi study and were used by the lead author and TWG to make final amendments to the RCF statements. Given the broad agreement indicated by the questionnaire results, it was decided not to proceed with additional interviews.

Results

Content analysis of existing rehabilitation-related competency frameworks

The TWG agreed on 5 RCF domains: Practice, Professionalism, Learning and Development, Management and Leadership, and Research. Content extraction from the existing rehabilitation-related competency frameworks resulted in an alpha version of the framework that included 17 competencies and 47 associated behaviors relevant to all rehabilitation professionals, and 22 activities, encompassing 52 tasks and covering a broad scope of rehabilitation practice, across the domains. Four core values and 3 core beliefs were included.

Modified Delphi study

A selection of 165 individuals were invited to participate in the modified Delphi study, including the 20 members of the TWG. Of these, 84 (51%) completed at least 1 section of the first iteration questionnaire, although only 77 (47%) completed all sections. A total of 102 individuals (those who had commenced the previous iteration, regardless of completion) were invited to participate in the second iteration questionnaire, 71 (70%) of whom completed at least 1 section, and 68 (67%) completed all sections. Demographics for the participants for each iteration can be found in table 4.

Results of first iteration of the modified Delphi study

The first iteration of the modified Delphi study revealed an average agreement of 95% with statements across all domains and a total of 983 comments and recommendations (fig 2). Responses highlighted the need for adjustments to how some behaviors and tasks were described across the 4 levels of proficiency, providing greater clarity on the distinction between behaviors or tasks, as well as modifications to how some statements were expressed. It was evident from comments and recommendations that many participants did not recognize that certain activities and tasks are not relevant to all rehabilitation professionals, that proficiency levels do not align to specific cadres, and that individual professionals may align with different levels of proficiency in different domains and over time. This led to the second iteration questionnaire including further explanation of these points and more frequent prompts for their consideration. The results revealed less than 90% agreement on 14% of the statements (see fig 2). Despite the high degree of agreement, all statements underwent some degree of revision following comments owing to their interconnected nature.

Results of second iteration of the modified Delphi study

The average participant agreement increased to 95% across all domains in the second iteration, and the total number of comments and recommendations was reduced by 56% to 428 (see fig 2). One task in the Practice domain received less than 90% agreement (87%). This task related to the use of pharmacologic agents, and

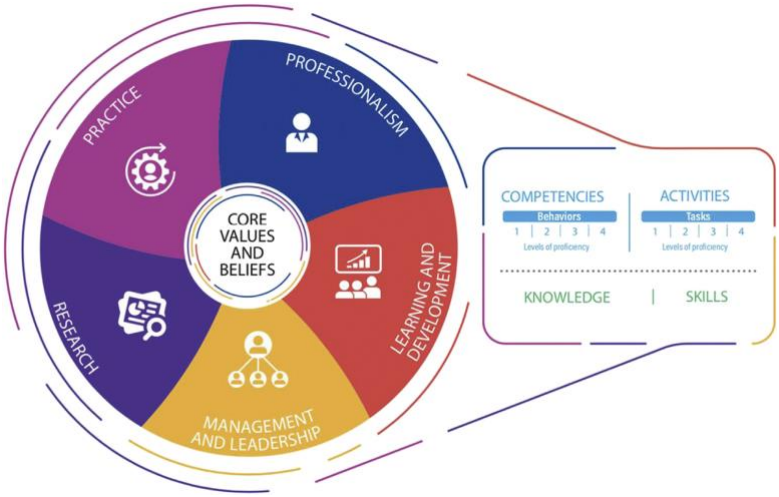

Fig 1 The agreed structure and components of the RCF.

Table 4 Demographics of modified Delphi study participants

Variable	Frequency, n (%)	
	Round 1	Round 2
Profession*		
Audiology	7 (8)	7 (10)
Occupational therapy	19 (23)	16 (23)
Physical and rehabilitation medicine	12 (14)	11 (15)
Physiotherapy	23 (27)	18 (25)
Prosthetics and orthotics	6 (7)	4 (6)
Psychology	10 (12)	7 (10)
Rehabilitation nursing	9 (11)	8 (11)
Speech and language therapy	6 (7)	9 (13)
Other	8 (10)	6 (8)
None	1 (1)	0 (0)
Role*		
Educator	47 (56)	45 (63)
Manager	24 (29)	22 (31)
Practitioner	41 (48)	36 (51)
Policy maker	9 (11)	8 (11)
Researcher	43 (51)	38 (54)
Service developer	24 (29)	21 (30)
Level of education		
High school	0 (0)	0 (0)
Certificate or diploma	2 (2)	2 (3)
Undergraduate degree	10 (12)	7 (10)
Postgraduate degree	72 (86)	62 (87)
Sex		
Female	62 (74)	52 (73)
Male	22 (26)	19 (27)
Age category		
20-30 y	6 (7)	3 (4)
31-40 y	16 (19)	13 (18)
41-50 y	18 (21)	15 (21)
>50 y	44 (52)	40 (56)

* Professions and roles were not mutually exclusive. Most participants had only 1 profession, but many held multiple roles.

the corresponding comments and recommendation suggested that some who disagreed did not realize that the task was not relevant to all rehabilitation professionals. Following comments and suggestions, several changes were made to behaviors and tasks to reduce ambiguity or duplication, but most competencies and activities remained the same.

Rehabilitation service user consultation

A total of 36 individuals participated in the rehabilitation service user consultation, with 30 completing all sections (23 used the English version, 7 used the French version). The largest representation (44%) was from European countries and aged between 35 and 55 years (50%). None of the individuals were younger than 18 years of age. Collectively, the participants had encountered all of the core rehabilitation professions and received rehabilitation in all settings (see table 5 for a full list of demographic characteristics). Among the sample, spinal cord injury, fracture, lower back pain, vision impairment, and hearing impairment were the most commonly reported health conditions for which the participants had sought rehabilitation (fig 3).

Results of quantitative responses from the service user consultation

There was an average 87% agreement with the statements for core values and beliefs of the RCF, as well as with the select competency statements that were included in the consultation (fig 4). Similarly, 80% strongly agreed with the selected behavior statements (fig 5). No justifications were provided for disagreement, nor were specific critiques made in conjunction with the responses of "Somewhat agree."

Results of qualitative responses from the service user consultation

Several themes and subthemes emerged from the free text feedback received in the service user consultation (table 6). It was apparent that the RCF captures what is important to rehabilitation service users. However, the collaborative nature of rehabilitation

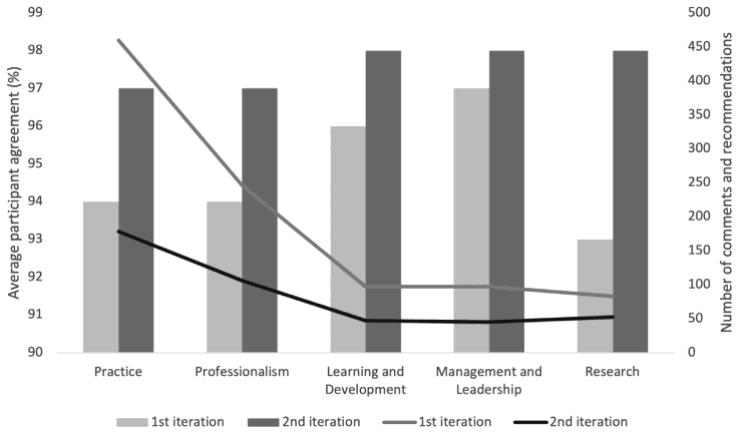

Fig 2 Level of participant agreement and number of comments and recommendations in the first and second iterations of the modified Delphi study.

Table 5 Demographics of rehabilitation service user consultation

Variable	Frequency, n %
Age	
<18 y	0 (0)
18-24 y	6 (17)
25-34 y	3 (8)
35-44 y	8 (22)
45-55 y	10 (28)
55-64 y	6 (17)
>64 y	3 (8)
Sex	
Female	19 (53)
Male	17 (49)
Setting in which rehabilitation occurred*	
Community setting (home, school, workplace)	11 (31)
General hospital	13 (36)
Rehabilitation practice	20 (56)
Professions encountered*	
Audiologist	5 (14)
Community-based rehabilitation worker	5 (14)
Occupational therapist	8 (22)
Physiotherapist	21 (58)
Physical and rehabilitation medicine doctor	5 (14)
Prosthetist and orthotist	2 (6)
Psychologist	5 (14)
Rehabilitation nurse	5 (14)
Speech and language therapist	5 (14)
Other	4 (11)

* Participants may have received rehabilitation in multiple settings and encountered multiple professions.

was deemed not sufficiently clear and an additional core belief was added to the RCF to rectify this. The need for rehabilitation professionals to have the knowledge and skills necessary to provide quality care was the most frequently noted theme in service user feedback, rating 25% higher than the need to engage the individual and his or her family in practice and communication, which were the next most frequently referenced themes.

After all changes from the modified Delphi study and service user consultation were implemented, the number of RCF core beliefs increased to 4, behaviors to 56, and tasks to 62. The number of activities was reduced to 20, whereas the number of competencies remained at 17 and core values at 4 (see RCF webpage: www.who.int/teams/noncommunicable-diseases/disability-and-rehabilitation/rehabilitation-competency-framework).

Discussion

This study presents the mixed methods used to develop and validate the RCF. The methodologies applied reflected best practice in competency framework development, notably drawing from multiple sources of data and applying a highly participatory, staged approach that gathered and built on the consensus of the target population.[13,15,18,19,22] Focus groups and traditional job analysis, which are also frequently used, were not considered a feasible methodology for this study given the multiple professions and specializations the RCF encompasses and its global scope, and have been criticized as time and resource intensive.[18,22] Using desk-based methods that used online research and questionnaires allowed the authors to achieve greater coverage of the target population of the framework within the time and resource constraints of the project. Indeed, the strength of using the mixed methods was the ability to capture content, opinions, and perspectives from a broad range of frameworks, professional groups, and individuals from around the world. This was fundamental given the intention of the RCF to be a globally relevant tool for the various professions and specializations comprising the rehabilitation community.

Perhaps the most significant finding of the mixed methods study was the confirmation that it is possible to compile the values, beliefs, competencies, behaviors, activities, and tasks of multiple professions and specializations within the rehabilitation field in a shared competency framework. The RCF

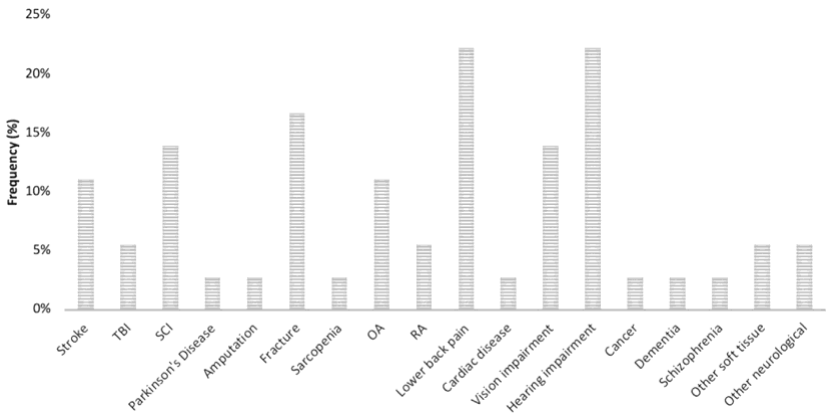

Fig 3 Frequency of health conditions for which the service user sample sought rehabilitation.

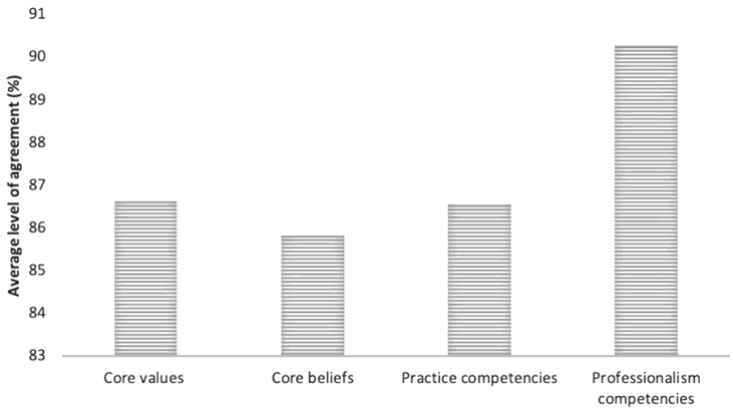

Fig 4 Average level of agreement by the rehabilitation service user sample with core values and belief and select Practice and Professionalism competencies.

demonstrates that the rehabilitation activities and tasks involved in the scope of rehabilitation practice, although not necessarily performed by all rehabilitation professionals, can be captured in a single organizational structure, and that core values, beliefs, competencies, and behaviors are shared across the range of work undertaken.

It is important to recognize that addressing rehabilitation professional performance is necessary but not sufficient to address the challenges faced by the rehabilitation workforce.[23,24] Rehabilitation professionals train and work within systems and environments that are key determinants for their performance and the subsequent outcomes of their interventions. The positive effects of the rehabilitation workforce on population functioning can only be realized when issues of governance, financing, assistive technology, information systems, and service delivery are simultaneously addressed. Indeed, although the effects of rehabilitation workforce challenges manifest as deficiencies in frontline care, they are symptomatic of underlying system failures.[7,25] Nevertheless, in drawing the rehabilitation community into a single framework, the RCF serves to strengthen its unity, which is critical to it gaining the power required to expand at the systems-level. Furthermore, it provides a tool to facilitate competency-based approaches to education and training, regulation, service planning, and human resource management, which help ensure that the rehabilitation workforce is aligned with population needs and the delivery of high quality care.

Study limitations

The development process of the RCF has several limitations of note. Despite best efforts, certain world regions, specifically the Eastern Mediterranean and Southeast Asian regions, as well as

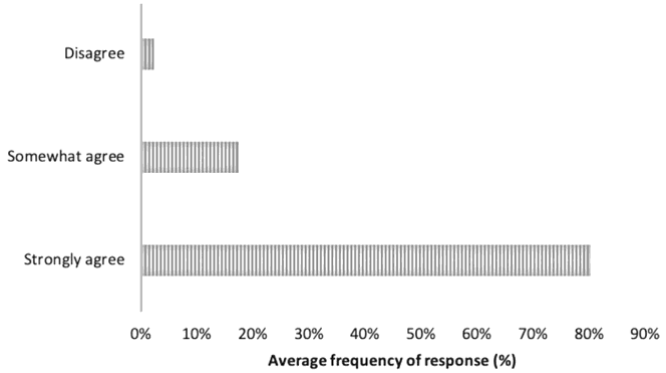

Fig 5 Average level of agreement by the rehabilitation service user sample with select Practice and Professionalism behaviors.

Table 6 Frequent themes in rehabilitation service user consultation responses

Theme (Key Subthemes)	Reference Frequency	Location Where Addressed in the RCF (Topic)
Practice capability (including "experienced," "knowledgeable," and "skilled")	33	Crosscutting
Engaging the person (including "involving the family," "listening to the person," and "being person-centered")	25	Core beliefs Practice competency 1 (person-centered practice) Practice behavior 1.1 (active participation) Practice competency 2 (collaborative relationship) Practice behavior 3.4 (active listening)
Communication	24	Practice competency 3 (communication)
Taking a holistic approach (including "valuing well-being," "considering the context," and "considering the whole person")	15	Core beliefs Practice behavior 4.1 (personal, environmental, and health factors)
Empathy	15	Core values
Professionalism (including "commitment and dedication," "confidence," and "respect")	13	Core values Professionalism competency 2 (professionalism) Professionalism behavior 2.1 (instilling confidence) Professionalism competency 4 (managing responsibilities)
Being approachable (including "kindness")	10	Core values Practice behavior 2.1 (positive rapport)
Being inclusive	9	Core beliefs Practice behavior 1.2 (adapting practice)
Adopting a human rights approach	8	Core beliefs
Nondiscrimination	6	Core values
Cultural awareness	4	Practice behavior 2.4 (attitudes, beliefs, and feelings)
Empowering the person	4	Core values Practice behavior 1.1 (active participation)

low-income countries, were underrepresented among the participants of both the modified Delphi study and rehabilitation service user consultation. There was not an equal balance among other demographic variables for the modified Delphi study, such as sex, age, and profession, which may have affected results. The absence of participants younger than 18 years of age in the rehabilitation service user consultation also meant that the views of children, who are key beneficiaries of rehabilitation, were not captured. The TWG, which is composed of professionals from all disciplines and world regions and with experience across different areas of rehabilitation practice, including pediatrics, helped to mitigate the risks introduced by such imbalances.

As a result of funding restrictions, the questionnaires were only made available in English and, for the rehabilitation service user consultation, in French. This may have prohibited potential participants from engaging in the studies or from fully expressing their views in the free text fields of the questionnaires.

Conclusions

This study conceives of the RCF as a sociotechnical tool that both facilitates communication and rehabilitation workforce capability, while unifying a historically fragmented field under a shared framework. The interdisciplinary collaboration demonstrated in this mixed methods study bodes well for the rehabilitation workforce, indicating its potential to achieve the political maturity and recognition it needs to strengthen rehabilitation capacity in health systems.

Suppliers

a. REDCap; Vanderbilt University.
b. Google Search; Google, LLC.
c. Excel; Microsoft Corp.
d. SPSS; IBM Corp.
e. NVivo 12; QSR International.

Keywords

Clinical competence; Competency-based education; Education; Health workforce; Professional competence; Rehabilitation

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Acknowledgments

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Chapter 6. Synopsis of the Rehabilitation Competency Framework

This chapter presents a synopsis of the following WHO technical product:

> *Rehabilitation Competency Framework*, Geneva, 12 September 2019. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO.

The chapter provides an overview of the Rehabilitation Competency Framework's (RCF) structure and summarises key content. The RCF was launched in February 2021 by the World Health Organization's Rehabilitation Programme through an online webinar. It was accompanied by two additional technical products documents (also available on the above website), namely:

1. *Adapting the Rehabilitation Competency Framework to a specific context*; and
2. *Using a contextualized competency framework to develop rehabilitation programmes and their curricula.*

An information sheet and FAQs were also developed. These documents were developed by the candidate during the period of her candidature but are not included in this thesis. They can be accessed online on the RCF's web page at https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/rehabilitation-competency-framework.

Authorship attribution statement for Chapter 6

The nature and extent of the candidate's contribution to this publication were as follows:

Candidate contribution	Extent of contribution
Project lead: The candidate was responsible for the initiation, planning, research, project management, technical writing, and production/launch of the Rehabilitation Competency Framework. She led the Rehabilitation Competency Framework Technical Working Group, who provided advice and offered feedback on drafts.	80%

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's contributions to this work.

Date: 20 January 2023

Jody-Anne Mills
PhD candidate

Date: 24 January 2023

James Middleton
Principal supervisor

Date: 25 January 2023

Alarcos Cieza
Unit Head
Sensory Functions, Disability and Rehabilitation
Department of Noncommunicable Diseases
World Health Organization

Statement of permission from the World Health Organization

As Unit Head of Sensory Functions, Disability and Rehabilitation, World Health Organization, I granted permission for the candidate's doctoral research to be nested in the development of the RCF. The development of the RCF included a systematic scoping review, content analysis of existing rehabilitation-related competency frameworks, a modified Delphi study, and a service-user consultation, which contribute to this thesis.

Conference presentations delivered by the candidate

1. 'The WHO Rehabilitation Competency Framework as a tool for strengthening community rehabilitation', *Asia Pacific International Rehabilitation Forum*, 8 May 2021(virtual oral presentation).
2. 'The WHO Rehabilitation Competency Framework as a tool for addressing disparities in rehabilitation workforce', 26 May 2021(virtual oral presentation).
3. 'WHO Rehabilitation Competency Framework: shaping education and training for an effective and relevant workforce', *Virtual International Society of Physical and Rehabilitation Medicine 2021 Congress*, 15 June 2021 (virtual oral presentation).
4. 'Using a competency-based approach to build an SCI workforce in low-resource countries', *21st International Spinal Cord Society Network of Networks Day*, 28 September 2021 (virtual oral presentation).

The *Rehabilitation Competency Framework* (RCF) describes the anticipated or expected performance of rehabilitation workers through a series of structured statements that collectively capture what rehabilitation workers do (their activities) and how they behave (their competencies). It further details the core values and beliefs shared by the rehabilitation workforce, and the knowledge and skills that underpin their performance. One of the unique characteristics of the RCF is that it is relevant to the whole rehabilitation workforce, including all occupations, specialisations and settings around the world. This requires that it be capable of reflecting the spectrum of education, specialisation and experience across a diverse workforce. It achieves this by describing behaviours and tasks across four levels of proficiency, with four ascending levels of autonomy, expectations of the role, and depth of knowledge and skills.

The RCF has been designed as a tool to:

1. unify the rehabilitation community around a common framework;
2. facilitate communication within and beyond the rehabilitation workforce by providing a language for describing competencies and activities; and
3. support the development of context-specific competency frameworks and, subsequently, the adoption of competency-based approaches to rehabilitation workforce planning and development.

6.1 Target Audience and Intended Applications

As a highly adaptable and versatile tool, the RCF is relevant to a broad audience. This may include:

- governments (for example, ministries of health, education, or labour) and development planners who wish to evaluate the state of the rehabilitation workforce from a competency perspective;
- regulatory bodies and professional associations who wish to develop or strengthen competency standards for an occupation or specialisation;
- educational institutions who wish to develop curricula for competency-based education;
- employers or service managers who wish to develop competency-based recruitment criteria or checklists for performance management;
- rehabilitation workers or service users who wish to better understand the competencies and activities of the workforce.

Importantly, as shown in Figure 6.1, the RCF was designed to be adapted to the needs of specific workers, settings and applications. This multi-phase process would essentially involve

reviewing, extracting and amending the contents based on the requirements of the framework. In other words, the RCF is not so much a global framework as a template or 'launch pad' for the development of context-specific frameworks.

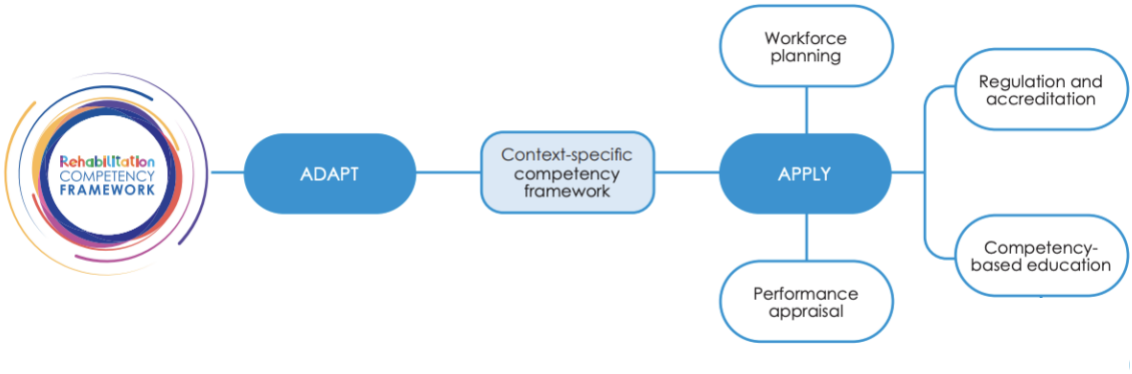

Figure 6.1. Overview of the intended adaption and potential applications of the Rehabilitation Competency Framework (World Health Organization, 2021).

6.2 Components of the Framework

The RCF is structured around five domains of performance centred on core values and beliefs. As shown in Figure 6.2, these domains are Practice, Professionalism, Learning and Development, Leadership and Management, and Research. Following the conceptualisation of competencies, behaviours, activities and tasks described in Chapter 4, the RCF presents competencies and behaviours separately from activities and tasks. The competencies and behaviours are shared by all rehabilitation workers, while the activities and tasks relevant to a worker will depend on their scope of practice. This distinction between competencies and activities enables the RCF to encompass all members of the rehabilitation workforce. Knowledge and skills underpinning the competencies and activities—that is, those that need to be developed to enable a worker to attain the specific competency or perform the relevant activity—are integrated within each domain. They are described in broad terms and may need to be further unpacked depending on the intended application of the framework. For example, should the RCF be adapted to support the development of a curriculum for a specific occupation, the knowledge and skills would need to be specified accordingly.

Figure 6.2. The domains of the Rehabilitation Competency Framework.

A Proficiency Profile at the beginning of each domain characterises the expectations for a worker at levels one to four. The Proficiency Profile for the Practice Domain is shown as an example in Figure 6.3. The RCF emphasises that these levels may not align with levels of education and training, and that a rehabilitation worker may demonstrate a different level of proficiency for each domain, and even within a domain, depending on her or his role, experience and personal strengths and interests.

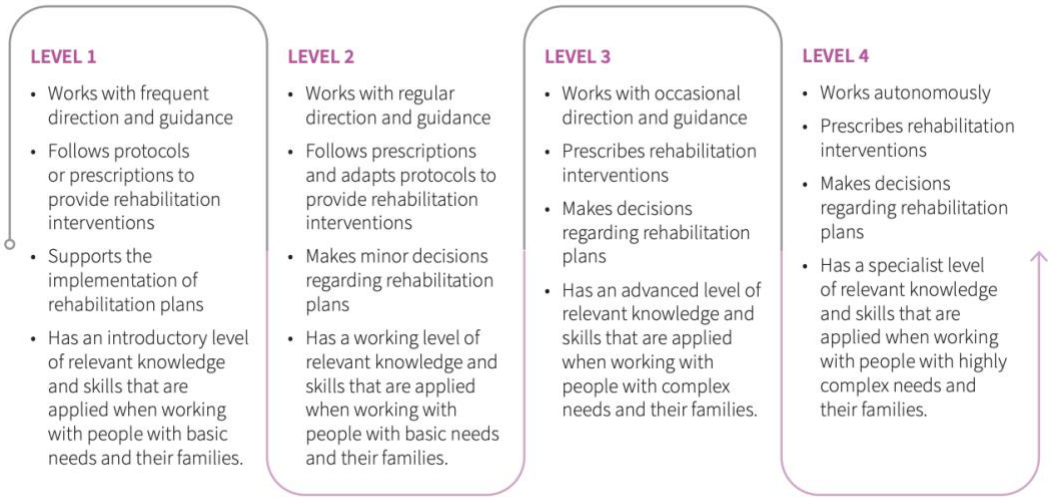

Figure 6.3. Proficiency Profile of the Practice Domain.

6.3 Overview of Key Content

The core values and beliefs, competencies and activities of the RCF are presented below. The behaviours and tasks, knowledge and skills, and Proficiency Profiles, as well as additional explanatory content, can be found in the complete version of the document, available online.

6.3.1 Values and beliefs

VALUES

Compassion and empathy: Rehabilitation workers seek to relate and respond with understanding to the experience of a person and her or his family.

Sensitivity and respect for diversity: Rehabilitation workers treat all people equally and fairly, regardless of race, ethnicity, age, sex, gender identity, sexual orientation, disability, beliefs or economic status; they seek to provide care that is respectful and acceptable.

Dignity and human rights: Rehabilitation workers recognise the inherent value of each person, respect their dignity and promote their human rights**.**

Self-determination: Rehabilitation workers seek to provide choice and promote self-determination for each person.

BELIEFS

Functioning is central to health and well-being: It is integral to how a person is included and participates in meaningful activities and life roles.

Rehabilitation is person/family-centred: It is orientated around the specific needs and goals of the person and her or his family.

Rehabilitation is collaborative: it requires consultation with, and the active involvement of, the person and her or his family.

Rehabilitation should be available to all who need it: It should be integrated throughout the continuum of care for anyone with impairment in functioning who is experiencing activity limitations and participation restrictions.

6.3.2 Competencies and activities

PRACTICE DOMAIN

Competencies

The rehabilitation worker:

C1. Places the person and her or his family at the centre of practice.

C2. Establishes a collaborative relationship with the person and her or his family.

C3. Communicates effectively with the person, her or his family and health-care team.

C4. Adopts a rigorous approach to problem-solving and decision-making.

C5. Works within his or her scope of practice and competence.

Activities

Activities include:

A1. Obtaining informed consent for rehabilitation.

A2. Documenting information.

A3. Conducting rehabilitation assessments.

A4. Developing and adapting rehabilitation plans.

A5. Referring to other providers.

A6. Implementing rehabilitation interventions.

A7. Evaluating progress towards desired outcomes.

A8. Discharging and ensuring appropriate continuity of care.

PROFESSIONALISM DOMAIN

Competencies

The rehabilitation worker:

C1. Demonstrates ethical conduct.

C2. Maintains professionalism.

C3. Works collaboratively.

C4. Manages professional responsibilities.

Activities

Activities include:

A1. Managing risks and hazards.

A2. Undertaking quality improvement initiatives.

A3. Participating in team forums.

A4. Advising on rehabilitation.

LEARNING AND DEVELOPMENT DOMAIN

Competencies

The rehabilitation worker:

C1. Continues to learn and develop.

C2. Supports the learning and development of others.

C3. Works to strengthen rehabilitation education and training.

Activities

Activities include:

A1. Managing own professional development.

A2. Supervising and teaching others.

LEADERSHIP AND MANAGEMENT DOMAIN

Competencies

The rehabilitation worker:

C1. Works to enhance the performance of the rehabilitation team.

C2. Works to enhance the performance of rehabilitation service delivery.

C3. Acts as a rehabilitation advocate.

Activities

Activities include:

A1. Managing a rehabilitation team.

A2. Managing rehabilitation service delivery.

A3. Monitoring and evaluating rehabilitation service delivery.

RESEARCH DOMAIN

Competencies

The rehabilitation worker:

C1. Integrates evidence in practice.

C2. Works to strengthen evidence for rehabilitation.

Activities

Activities include:

A1. Designing and implementing research.

A2. Disseminating evidence.

A3. Strengthening rehabilitation research capacity.

References for Section 3

World Health Organization 2020, *Rehabilitation Competency Framework*, Geneva: WHO Press.

Section 4

APPLICATION

Section contents: Chapters 7-8

Authorship attribution statement for Chapter 7

The nature and extent of the candidate's contribution to this piece of work were as follows:

Candidate contribution	Extent of contribution
Project lead: The candidate was responsible for the initiation, planning, project management, technical writing, organisation of peer review, piloting, and production of the *Guide for Rehabilitation Workforce Evaluation* (GRoWE).	90%

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's contributions to this work.

Date: 20 January 2023

Jody-Anne Mills
PhD candidate

James Middleton
Principal supervisor

Date: 24 January 2023

Date: 25 January 2023

Alarcos Cieza
Unit Head
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World Health Organization

Statement of permission from WHO

As Unit Head of Sensory Functions, Disability and Rehabilitation, World Health Organization (WHO), I granted permission for the candidate's doctoral research to be nested in the development of GRoWE. This included the adaption of the *Rehabilitation Competency Framework* (RCF) into competency analysis tools, which were integrated in the evaluation. The WHO-supported pilot of GRoWE in Poland served as a case study for the integration of competency analysis in national rehabilitation workforce evaluation, which constitutes a component of this thesis.

Date: 25 January 2023

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Chapter 7. Competency Analysis within the WHO Guide for Rehabilitation Workforce Evaluation

Chapter 7 constitutes the first chapter of Section 4, which addresses Aim 2 of this research thesis, namely, to apply a competency-based approach in national rehabilitation workforce evaluation and planning. This chapter deals specifically with Objective 2.1, to establish tools for integrating competency analysis into national rehabilitation workforce evaluation.

While the *Rehabilitation Competency Framework* (RCF) was designed to have numerous applications, as described in Chapters 3 and 4, this project focused on its application in the development and integration of competency analysis for the following reasons:

1) The RCF's occupation-neutral approach lends itself to national rehabilitation workforce competency analysis, which involves a range of occupations. Many other applications of the RCF require that it first be contextualised to a specific occupation or specialisation.
2) The *Guide for Rehabilitation Workforce Evaluation* (GRoWE) was already being developed by WHO and presented an opportunity to integrate competency analysis at a national level, and develop a new use-case for the application of the RCF (World Health Organization 2023a).
3) To the best of the candidate's knowledge, competency analysis has not previously been integrated into national workforce evaluation. Accordingly, the use of the RCF to integrate competency analysis into GRoWE presented an opportunity to contribute new knowledge to the field.

This chapter describes how the RCF was used to integrate competency analysis into GRoWE, and the rationale for doing so. It further outlines the limitations to competency analysis in the context of national workforce evaluation and planning, and how these limitations have been addressed.

7.1 Components of the Competency Analysis

The competency analysis within GRoWE has two components—proficiency profiles and task mapping—both of which are grounded in the RCF and which involve 3-5 representatives of each rehabilitation occupation completing analysis exercises designed in Microsoft Excel ('GRoWE Workbook'). Once completed, the exercises are submitted to a 'GRoWE project officer', who compiles the findings in a separate Microsoft Excel document ('GRoWE Data Analysis Toolbox'). The toolbox generates figures and tables to aid analysis and reporting in a dashboard.

7.1.1. Proficiency profiles

The objective of the proficiency profiling exercise is to develop a profile of the proficiency of each rehabilitation occupation across the five performance domains of the RCF: Practice, Professionalism, Learning and Development, Management and Leadership, and Research. The findings, as detailed in Section 7.2, signal areas of strength and areas requiring attention, thereby triggering and informing dialogue on workforce education, training and mentorship, among other topics. The proficiency profile is developed by indicating what proportion (none, few, most, or all) of the occupation aligns with each level of proficiency (levels 1-4, as described in Section 3) for each performance domain. Those completing the exercise are guided by a brief description of a worker at each level for each domain, drawn from the proficiency profiles of the RCF (Figure 7.1). These descriptions reflect increasing levels of autonomy, decision-making responsibility, and depth of knowledge and skill. The exercise takes approximately 30-45 minutes, including the time needed for explanation and directions for completing it.

There is no predetermined 'ideal' proficiency profile for any occupation. Rather, the findings are presented to guide a discussion among relevant stakeholders in relation to which proficiency profile they would like to attain, and what work is needed to achieve this based on the existing proficiency profile. It is important to acknowledge in these discussions that there will always be some diversity in proficiency levels within an occupation, since the level with which a worker aligns will change over the course of her or his career and will vary depending on the development opportunities that are available and the demands of the particular work role.

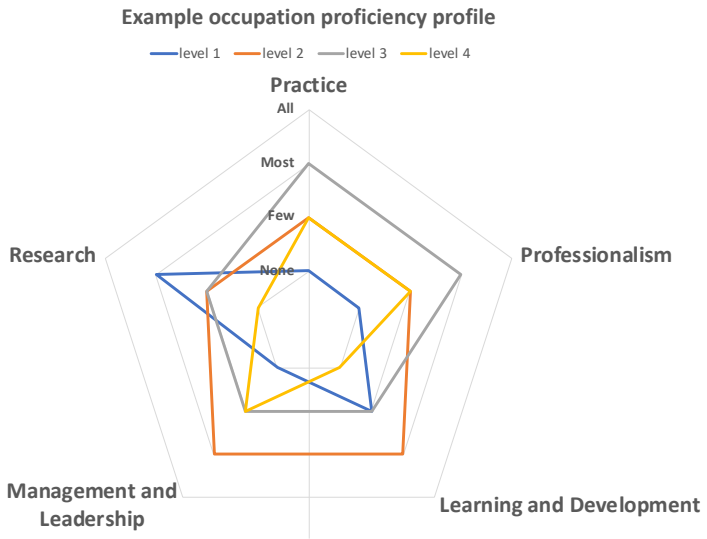

Figure 7.1. Example of a proficiency profile for a rehabilitation occupation.

7.1.2 Task mapping

The objective of task mapping is to describe how rehabilitation tasks (assessments and interventions) are allocated across the occupations, and to identify which tasks are rarely or never delivered based on the availability of the occupation(s) to whom they are allocated. As detailed in Section 7.2, the findings of the task mapping serve to guide dialogue regarding workforce optimisation and to identify links between the state of the workforce and the rehabilitation care people receive. The rehabilitation assessments and interventions included in the task mapping are drawn from the Practice domain of the RCF, specifically Activity 3, "Conducting rehabilitation assessments", and Activity 6, "Implementing rehabilitation interventions" (see Appendix E for the list of assessments and interventions). Due to the large number of assessments and interventions, they are only incorporated in the online version of the RCF, which is due to be launched mid-2023.

The assessments and interventions are derived from the WHO Package of Interventions for Rehabilitation (PIR) (World Health Organization 2023b). The PIR is a list of essential, evidence-based rehabilitation assessments and interventions, relevant to approximately 20 health conditions, which have been compiled primarily to guide countries in the development of publicly funded packages of care. To facilitate completion of the task mapping exercise, only a sample of assessments and interventions was used in the task mapping. This sample was developed in two steps:

1. **Selection of health conditions**: Assessments and interventions for only nine health conditions were used. These were chosen from 20 health conditions included in the PIR and online version of the RCF because they collectively represented the domains of functioning targeted in rehabilitation (cognition, mobility, mental health, cardiorespiratory functioning, and communication, including their impact on activities and participation). As such, the sample of assessments and interventions associated with these health conditions served as a proxy for comprehensive rehabilitation care.
2. **Selection of assessments and interventions**: Only assessments and interventions that involved a clear and discrete set of skills were included. This meant that assessments and interventions drawing on a number of skill sets that are typically represented across several different occupations were excluded. This was essential to ensure that the process of completing the task mapping is simple and the results are meaningful.

The health conditions, assessments and interventions (including assistive products and pharmacological agents) are presented in Appendix E.

During the process of task mapping, the group, typically comprising 5-6 workers from the respective occupation, indicate whether the majority or only a minority of their occupation can confidently perform each assessment or intervention. If the assessment or intervention is not within the occupation's scope of practice, the cell is left blank. Figure 7.2 shows a screenshot of a section of the task mapping exercise for rehabilitation assessments. The task mapping takes approximately 3 hours to complete, including the time needed for explanation and directions for completing the exercise. However, given that the process involves achieving consensus among the workers (who may choose to involve others beyond their group for advice), the completion time can vary significantly.

Assessment Tasks			Delivering this assessment task is within the scope of practice of: the majority of the occupational group (75-100% of workers)	Delivering this assessment task is within the scope of practice of: those with sub-specialisation (<75% of workers)	Comments
Assessment of the environment	Assessment of the home environment				
	Assessment of the educational environment				
	Assessment of the workplace				
	Assessment of mental functions	Assessment of cognitive functions			
		Assessment of fatigue			
		Assessment of sensory perception and processing challenges			
		Assessment of auditory perception			
		Assessment of symptoms of psychosis (positive and negative)			
		Assessment of problems with behavior			
	Screening for vision impairment				
	Screening for hearing impairment				
	Assessment of vestibular functions				
	Assessment of speech, language and communication	Assessment of communication			
		Assessment of cognitive functions of language			
		Assessment of voice functions			
		Assessment of speech functions			
	Assessment of swallowing				

Figure 7.2. Extract from the GRoWE Workbook showing a section of the task mapping template.

Task mapping data for each rehabilitation occupation are migrated to and compiled in the Data analysis toolbox. These raw data can be reviewed to identify specific tasks that are either not being performed by any occupation, or by an occupation with very limited availability. Similarly, tasks that are being performed by multiple occupations are identified and flagged as warranting exploration. It is not uncommon nor necessarily problematic for a task to be performed by more than one occupation; indeed, it can be helpful in contexts where one occupation is minimally represented. In some instances, however, overlaps may result from poor task allocation and planning. Further investigation enables stakeholders to determine whether overlaps are acceptable or should be addressed.

The dashboard in the Data analysis toolbox combines data from the task mapping, needs analysis and supply analysis for display in a number of tables and graphs. The first graph shows the number of fulltime equivalents (FTEs) of each occupation needed against the number that are currently employed. As seen in Figure 7.3, users of the dashboard can select a health condition from a dropdown menu, and the respective data appear. A table in the dashboard also shows which occupations provide assessments and interventions targeting different rehabilitation domains (e.g., communication, mobility, swallowing, pain) and the supply status of the occupation (Table 7.1). Again, the user selects a rehabilitation domain from a dropdown menu to see the data relevant to that domain. The data presented in the dashboard help users to translate the findings of the competency analysis and labour market analysis into meaningful conclusions about the availability of care for those with various rehabilitation needs.

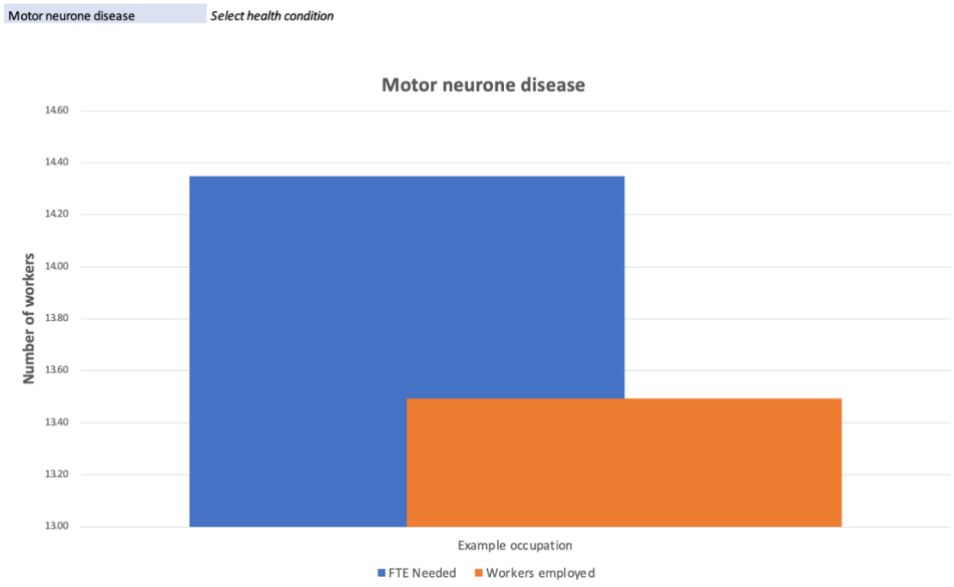

Figure 7.3. Example of a dashboard figure showing the FTE workers needed to meet the rehabilitation needs of people with a specific health condition, relative to the number currently employed.

Table 7.1. Example of a dashboard table demonstrating which occupations address different domains of rehabilitation care, and the respective status of their supply.

Mobility	*Select rehabilitation domain*

Interventions delivered by	**Status of supply of occupation**
Example occupation 1	Moderate shortage
Example occupation 2	Critical shortage
Example occupation 3	Minor shortage

7.2 Rationale

Health workforce evaluation traditionally takes the form of health labour market analysis (HLMA), which focuses on the supply and demand of workers and the factors that underpin these (World Health Organization 2021a). The findings from HLMA guide critical decisions around the production, employment, and distribution of workers, but the analysis is not designed to capture information on workforce performance or scopes of practice. By integrating competency analysis into national workforce evaluation, this research sought to build on the HLMA approach, providing an additional layer of data to inform workforce planning and development. Specifically, the competency analysis gathers data on workforce proficiency across several performance domains, and sheds light on what rehabilitation assessments and interventions are being performed and by which occupation(s). In addition to identifying potential gaps or inefficiencies in the delivery of rehabilitation, this information makes workforce deficiencies in rehabilitation care explicit and quantifiable. While potentially valuable for any health workforce, the data obtained through competency analysis has particular relevance for the rehabilitation workforce, as detailed below.

7.2.1 Added value for understanding the proficiency profile of the rehabilitation workforce

As elaborated in Section 3, the RCF identified five domains as critical to the successful performance of the rehabilitation workforce: Practice, Professionalism, Learning and Development, Management and Leadership, and Research. The framework includes competencies and activities, as well as knowledge and skills, for each of these domains, all of which play a role in ensuring that workers deliver quality and ethical care, work effectively in a team, can build their career and support the development of others, and contribute to service delivery.

The competency analysis enables a proficiency profile to be developed for each occupation within the rehabilitation workforce, shedding light on domains of performance that are well- or under-developed. This is significant because in many countries, especially low- and middle-income countries, the education and training of rehabilitation workers is still in an early stage, with curricula being developed and tested based on models from other countries and where opportunities for post-service education and training are often limited. There is a risk in such situations that certain areas of competency are neglected, such as learning and development, leadership and management, and research, which are arguably more important in the context of a small, developing workforce. For example, where the number of workers is limited, newly graduated workers may be expected to assume leadership roles and make decisions concerning resources and staffing, as well as advocate on behalf of their profession. Furthermore, the performance of the workforce shapes how they are perceived by other health workers and by the recipients of their care. This translates into demand and utilisation of services, as well as workforce motivation and morale. The proficiency profiles produced through the competency analysis can therefore provide valuable insight into areas of need for further investment in education, training and mentorship, which would not be possible through a traditional HLMA approach.

7.2.2 Added value for understanding task allocation within the rehabilitation workforce

The competency analysis includes a task mapping exercise, whereby workers from each rehabilitation occupation indicate which rehabilitation assessments and interventions are relevant to the various health conditions for which they deliver care (see 7.1.2). The findings of this exercise point to gaps or potential inefficiencies in the delivery of rehabilitation care and, importantly, reveal how the rehabilitation of people with specific health conditions is affected by workforce shortages or the unavailability of particular knowledge and skills. For example, if a rehabilitation workforce has few or no speech and language therapists, it is likely that there will be significant gaps in the rehabilitation care for children with cerebral palsy and autism, as well as adults with stroke or neurodegenerative conditions, which can directly affect their functioning outcomes and participation in education, work, and community life. This information can be implied through the findings of an HLMA but is not made explicit to the same extent as is possible through task mapping. The task mapping exercise is critical to communicating the contribution that rehabilitation workers make to patient care, which is often not adequately recognised or valued by other health workers, policy makers or the public and which can therefore translate into low prioritisation for education and employment.

The competency analysis, particularly the task mapping exercise, contributes a unique perspective to national workforce evaluation by focusing not on the occupation (supply, demand and employment) but, rather, on the care that is required by the population, the extent to which it is available, and how this is impacted by the state of the workforce and the allocation of tasks within it. This 'competency lens' is fundamental in the context of universal health coverage, which demands that essential interventions are available to all who need them. Progress towards universal health coverage can be achieved through the development of strategies to compensate for gaps in rehabilitation care stemming from workforce shortages or skill gaps that are informed by the results of the task mapping exercise, which can identify tasks that may be shared by alternative occupations and for which additional education and training are needed.

7.3 Limitations

This section discusses the limitations of integrating competency analysis into GRoWE and explains how these are addressed.

7.3.1 The analysis is completed by only a sample of workers from each occupation

One limitation of the GRoWE competency analysis is that it is completed by only a sample of workers from each occupation on behalf of their specific workforce. While efforts are made to ensure that the sample includes some diversity in specialisation and setting, there is a risk that the workers will not accurately portray the competence of their wider occupation. This limitation is introduced by practical considerations, since it is challenging to identify and recruit workers for the time needed to complete the exercises and because a large number of participants would likely extend the amount of time necessary to reach agreement. This limitation is addressed in several ways. First, as mentioned, efforts are made to capture some diversity in the sample. Second, members of the group are encouraged to reach out to colleagues if the exercises require knowledge beyond their scope. Third, the report containing the results of the analysis is shared for peer review, providing an opportunity for inaccuracies to be identified and addressed. Finally, the limitations are communicated clearly in the report, and readers are advised to interpret the results with some caution.

7.3.2 The task mapping uses only a sample of tasks

The task mapping uses only a selection of tasks across a sample of health conditions as a proxy for the full range of tasks completed by the occupation. It may therefore exclude a number of tasks related to specific health conditions. Reducing the list of tasks was necessary to ensure that

undertaking the exercise would be seen by potential participants as feasible and acceptable. The omission of some tasks from the exercise, however, might fail to reveal that some tasks are not being performed or are being performed unnecessarily by numerous occupations. This information would not be available to guide subsequent planning and actions. This limitation is managed by encouraging those interpreting and discussing the findings to invite the rehabilitation workers involved to engage in a dialogue about other tasks considered to be missing or inefficiently provided. The report presenting the results also indicates that the exercise is not comprehensive and that they should only be viewed as indicative of the situation.

7.3.3 Investment of time required might deter workers from participating

It can take several hours for workers to complete the full competency analysis and, given that they are volunteers and are usually working full time, some may be reluctant to participate. This is managed by following up with each occupation and providing encouragement until the task is complete, or by holding a dedicated workshop in which workers can complete the competency analysis exercises from start to finish.

7.4 Conclusion

The development of GRoWE presents an opportunity to systematically integrate competency analysis into national rehabilitation workforce evaluation. The competency analysis is grounded in the RCF and strives to garner a meaningful picture of the performance of the workforce through a process that is feasible and acceptable to participants. The findings of the competency analysis complement HLMA data by triggering and informing dialogue on the optimisation of the rehabilitation workforce and on the implications of workforce development for the availability of specific rehabilitation care.

Chapter 8. Integrating Competency Analysis into National Rehabilitation Workforce Evaluation: A Case Study

Preamble

This chapter continues to examine Aim 2 of the thesis, which was to apply a competency-based approach in national rehabilitation workforce evaluation and planning. It describes the research undertaken to address objective 2.2, namely, to assess the feasibility and perceived added value of integrating competency analysis into national rehabilitation workforce evaluation. The case study (Yin 2018) was conducted in the context of implementing the *Guide for Rehabilitation Workforce Evaluation* (GRoWE) in Poland and sought to: 1) assess the feasibility and perceived added value of integrating competency analysis into national rehabilitation workforce evaluation; and 2) determine how competency analysis can shape rehabilitation workforce planning.

The research employed several methodologies, including participant observation and key informant interviews. Participant observation is a methodology deriving from anthropological research whereby the researcher gains an insider perspective through engaging directly in the process (Jorgensen 1989). It enables the participant to observe how cultural, social, logistical and other contextual factors come into play. In addition, it allows the researcher to engage with challenges firsthand and contribute towards finding solutions. This is particularly valuable when the research is being conducted within a case study, since lessons learned are more likely to be identified.

Key informant interviews complemented the participant observation by garnering a range of additional perspectives on the process, including from stakeholders who played different roles in the pilot. The combination of participant observation and key informant interviews generated rich data that were used to assess the feasibility and value of competency analysis.

This chapter is presented as a manuscript submitted to the *Human Resources for Health* journal. At time of writing, it is awaiting notification of acceptance.

Mills, J., et al. 'Integrating competency analysis into national rehabilitation workforce evaluation: a case study' *(Publication pending).*

Authorship attribution statement for Chapter 8

The nature and extent of the candidate's contribution to this publication were as follows:

Candidate contribution	**Extent of contribution**
Lead author: The candidate was responsible for study design, study approvals (ethics), conducting and analysing the results of the key informant interviews, manuscript writing, and submission to the journal.	90%

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the candidate's contributions to this work.

Date: 20 January 2023

Jody-Anne Mills
PhD candidate

Date: 24 January 2023

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Integrating Competency Analysis into National Rehabilitation Workforce Evaluation: A Case Study

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8.1 Abstract

8.1.1 Objectives

This case study sought to assess the feasibility and perceived added value of integrating competency analysis into national rehabilitation workforce evaluation, and to determine how competency analysis can shape rehabilitation workforce planning.

8.1.2 Methods

Participant observation was complemented by key informant interviews with experts engaged in the national rehabilitation workforce evaluation in Poland. These experts represented stakeholders in policy, education, research, clinical practice and professional associations.

8.1.3 Findings

The results indicated that competency analysis can be feasibly integrated into national rehabilitation workforce evaluation, particularly when implementation is supported through the use of online platforms. However, the collection of additional data using other tools, such as a survey, could strengthen data reliability. Experts perceived findings of the competency analysis to be valuable for expanding the understanding of rehabilitation, shedding light on task allocation and deployment of the existing rehabilitation workforce, and advocating for the rehabilitation workforce to be strengthened, especially in relation to those occupations which may not be recognised or valued as rehabilitation workers. Although it was not possible to fully explore the impact of competency analysis data on rehabilitation workforce planning and

development in this study, experts suggested that its availability would likely foster greater cooperation among occupations, which has been missing at the policy and planning level to date. It further demonstrates what data should be collected and reported, and provides richer information to guide decisions.

8.1.4 Conclusion

Competency analysis complements traditional labour market analysis, adding depth to the understanding of how members of the workforce perform and perceive themselves, and how deficiencies in the workforce impact on the provision of care to specific population groups

8.2 Introduction

In 2021, the World Health Organization launched the *Rehabilitation Competency Framework* (RCF), which describes the competencies and activities of the rehabilitation workforce (World Health Organization 2021b). As elaborated in Box 1, the framework is relevant to all occupations that deliver care which aims to optimise functioning and reduce disability. It crosscuts specialisations and settings, and is therefore capable of being adapted and adopted for application in any specific context (Mills et al. 2021). In its original form, the RCF provides a unique opportunity to conduct a competency analysis of the rehabilitation workforce. This has not previously been possible due to the absence of: 1) a shared description of proficiency levels that spans the spectrum of qualifications and expertise encompassed within the rehabilitation workforce; and 2) a comprehensive list of tasks that indicate the scope of rehabilitation care delivered by the rehabilitation workforce collectively. The RCF addresses both these barriers, opening the door to a new level of workforce evaluation extending beyond that of traditional health labour market analysis (HLMA).

Box 8.1. The rehabilitation workforce

The rehabilitation workforce comprises a diverse group of occupations which provide interventions that aim to maximise functioning. They address needs associated with impairments in communication, mobility, cognition and mental health to enable people to be as independent as possible in daily activities and maximise their participation in education, work and meaningful life roles (Bickenbach, Sabariego & Stucki 2021). The rehabilitation workforce includes audiologists, occupational therapists, physiotherapists, physical and rehabilitation medicine doctors, prosthetists and orthotists, and speech and language therapists, as well as others whose scope of practice is either solely or partially dedicated to delivering rehabilitation.

Despite their unique and important contribution to health, the rehabilitation workforce lags behind other health occupations in its development and is grossly underfunded and under-prioritised in many health systems (Boggs et al. 2021; Bright, Wallace & Kuper 2018; Kamenov et al. 2019; Stucki et al. 2018).

While HLMA is well recognised as integral to sound policy and planning, it does not generate information about the proficiency of the workforce across key areas of performance, such as clinical practice, research and leadership, the tasks that workers perform or their allocation across occupations. These kinds of data are valuable for identifying opportunities for performance improvement and workforce optimisation among educators, regulators and professional associations, amongst others. The data from competency analysis are also highly relevant in the context of a developing workforce, where educational capacity is emerging and curricula are being refined, and where rational task allocation is critical to ensuring that essential care is available to as many people as possible.

The rehabilitation workforce, and the health workforce more broadly, face numerous barriers, such as critical shortages, high rates of unemployment in some occupations, and issues of quality and access. These challenges pose a major barrier to the achievement of Sustainable Development Goal 3, particularly the provision of universal health coverage, as services cannot be delivered without a skilled workforce. These challenges have been amplified globally by the impact of the COVID-19 pandemic (Coates et al. 2021; Commission on Health Employment and Economic Growth 2016; Jesus & Hoenig 2019; Kamenov et al. 2019). The prevalence of

health (and rehabilitation) workforce challenges reflects the complexity of their underlying causes, and the financial investment needed to address them. For this reason, policy makers, educators, regulators and professional associations need to be equipped with rich and meaningful data to guide policy development, strategic investment and effective action. As seen in Table 8.1, the information available through competency analysis could complement that generated in HLMA to better guide policy, planning and development. Furthermore, the combination of HLMA and competency analysis data enables more explicit links to be drawn between the state of the workforce and the delivery of health care, making a more compelling case for investment.

Table 8.1. Data generated through health labour market analysis and competency analysis

Health labour market analysis	**Competency analysis**
• Population health needs and subsequent workforce requirements • The supply of workers • The demand for workers, i.e., the number of paid job posts • The absorption of workers into health services • Labour market failures, such as a mismatch between supply and demand • The feasibility and impact of potential actions	• Proficiency profile, or level of performance of each occupational group in key areas of performance • Task allocation across occupational groups, i.e., which occupations perform which assessments and interventions, and the proportion of the workforce who are confident in performing the assessment or intervention
Combined data	
• The implications of the workforce situation for patient care, i.e., what a deficiency in the availability of an occupational group means for the care of people with a specific health condition	

Recognising that the rehabilitation workforce lags behind other health-related occupational groups in its development and remains under-funded and poorly prioritised, the World Health Organization developed guidance, tools and a methodology for conducting a national rehabilitation workforce evaluation (Campbell & Mills 2022; World Health Organization 2023). This suite of resources, termed GRoWE, combines a HLMA approach with competency analysis grounded in the RCF with the aim of developing a national rehabilitation workforce report and action plan. Box 2 describes how the RCF was used to integrated competency analysis in

GRoWE. GRoWE was piloted to assess the practicality of the approach, identify any technical issues with the software, and determine the benefit of integrating competency analysis in national rehabilitation workforce evaluation in light of the additional time and data analysis required. This study presents the findings of the GRoWE pilot in Poland, using observation and key informant interviews to address three questions:

1. Is it feasible to integrate competency analysis into national rehabilitation workforce evaluation?
2. What is the perceived added value of integrating competency analysis into national rehabilitation workforce evaluation?
3. How can the findings of competency analysis shape rehabilitation workforce planning?

The findings of the study will be used to inform the final form of GRoWE and guide its implementation in other countries.

Box 8.2. Competency analysis within GRoWE

The competency analysis within GRoWE has two components: a proficiency profile and a task mapping exercise.

Proficiency profiling

Proficiency profiling aims to provide an overview of the proficiency of an occupational group across the five domains of the RCF: Practice, Professionalism, Learning and Development, Management and Leadership, and Research. It does so by requesting a sample of workers from the occupational group to use an Excel-based tool to indicate the proportion of their occupation (none, few, most or all) that aligns with different levels of proficiency. These levels reflect a progression in autonomy, decision-making responsibility, and specialisation from level 1 to level 4. A description of a worker at each level is provided for each of the RCF domains. For example, the physiotherapists completing the exercise may report that, for the Practice domain, none of their occupation is at level 1, a few are at levels 2 and 4, and most are at level 3. Importantly, the assignment of proportions to the four levels can be different for each domain, thereby identifying areas needing to be strengthened in pre- or post-service education and training. The proficiency profiling exercise generates a spider-graph for each occupation, as shown in Figure 8.1.

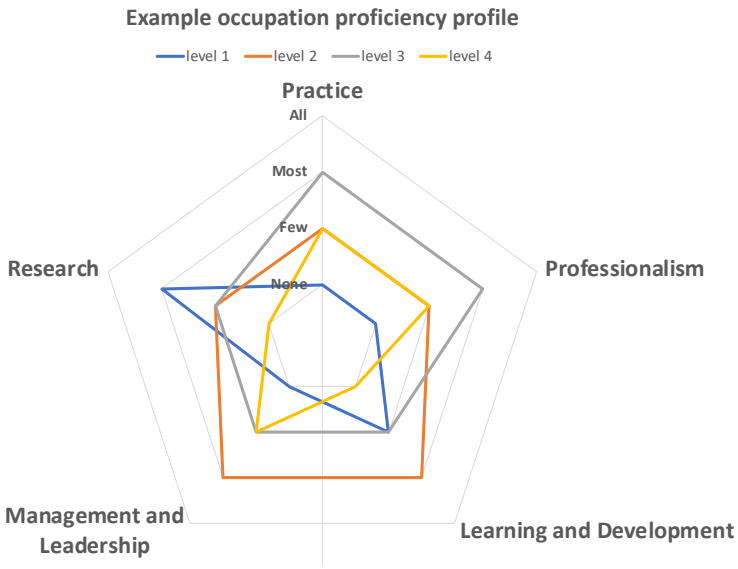

Figure 8.1. Example of proficiency profile for a rehabilitation occupational group

Task mapping

Task mapping aims to describe how essential rehabilitation tasks (assessments and interventions) are allocated across the occupational groups. The task mapping exercise identifies which tasks are never or rarely delivered based on the availability of the occupation to whom they are allocated. It can also show which tasks are being delivered by multiple occupations, exposing potential areas for further optimising the workforce and improving efficiency. Like the proficiency profiling exercise, the task mapping exercise is performed by a sample of workers from each occupation included in the evaluation. The exercise is conducted using an Excel-based tool in which participants indicate the proportion of their occupation that would be confident to deliver each assessment and intervention. The assessments and interventions included in the exercise are those relevant to a number of health conditions, including stroke, spinal cord injury, cerebral palsy, amputation, musculoskeletal conditions (lower back pain, neck pain, arthritis, and fracture), chronic obstructive pulmonary disease, acute myocardial infarction, hearing impairment, and schizophrenia.

The task mapping data from each occupation is compiled in one large table for ease of review, while a separate table shows how the task allocation, combined with the availability of each occupation, impacts the delivery of rehabilitation care for people with each health condition.

An overview of the findings of the task mapping and key conclusions of the competency analysis of the rehabilitation workforce in Poland are presented in the Annex (note that this does not include the raw data from either the proficiency profiling or task mapping).

8.3 Methods

8.3.1 Study design

This study employed participant observation methodology, whereby two researchers (authors JM and WK) were immersed in the pilot, enabling them to interact with the GRoWE resources and experience each step of implementation. The authors further observed the time taken to complete the different competency analysis exercises, the challenges experienced by the stakeholders completing the exercises, how the findings were reported and how they were interpreted and applied in rehabilitation workforce planning.

Key informant interviews were also conducted with experts engaged in the evaluation, including those working in policy, education, professional associations and clinical practice. Lines of enquiry explored stakeholders' experiences in identifying and reporting data, their perception of the findings and their added value, as well as their recommendations for future evaluations.

8.3.2 Study population

This study draws on the insights of the following stakeholders:

- The WHO personnel overseeing the development and piloting of GRoWE (JM)
- The project officer responsible for implementing GRoWE in Poland (WK)
- Experts engaged in the evaluation (n= 5). The demographic profile of the experts is presented in Table 8.2.

Table 8.2. Demographic characteristics of key informants (experts)

Expert code	**Gender**	**Professional Role**	**Contribution to the evaluation**
KI1	F	Professor, Faculty dean	Provided data, participated in workshops, reviewed draft report.
KI2	M	Professor, hospital management (and parent of a child with a disability)	Participated in workshops, reviewed draft report.

KI3	M	Past president of a professional association, practitioner, researcher	Completed analysis exercises, reviewed report, participated in workshops.
KI4	M	Leader in a professional association, practitioner	Provided data, reviewed report, participated in workshops.
KI5	F	National Institute of Public Health (policy), practitioner, researcher	Provided data, reviewed report, participated in workshops.

8.3.3 Recruitment

The GRoWE project officer (WR) disseminated an invitation to participate in feedback interviews via email to the experts who had engaged in the evaluation. The email included a participant information sheet (translated into Polish) and a link to a brief survey which showed the times available for interviews, and asked if interpretation would be needed. Participants interested in being interviewed were directed to complete the form and contact the WHO focal point (JM), who provided a consent form (also translated into Polish) and confirmed the time of the interview.

The relatively small sample of key informants partly reflects the challenges associated with recruiting individuals who are typically time-poor as well as the size (n=42) of the pool of potential interviewees (i.e., experts who had participated in the evaluation). Nonetheless, the sample represented a wide range of perspectives, including policy makers, researchers, educators, practitioners, and leaders of professional associations. Finally, the themes emerging from analysis of the data achieved saturation, suggesting that additional interviews would not have generated new insights.

8.3.4 Data collection

Key informant interviews were conducted by the WHO focal point and were recorded and transcribed using Microsoft Teams. Transcripts were manually cleaned for analysis. Data from the participant observation were gathered through a systematic debriefing between the WHO focal point (JM) and GRoWE project officer (WK). The debrief involved detailed, goal-focused discussion, framed around the topics of engagement, feasibility, perception, added value and additional lessons learned. The data from the debrief were compared with the findings from the key informant interviews and the results of the competency analysis. These triangulated data were discussed by all authors of this paper.

8.3.5 Data analysis

Thematic analysis of the interview transcripts was performed using NVIVO software. Results of the thematic analysis were reviewed and agreed by all authors and compared with observational findings.

8.3.6 Ethical approval

Ethical approval for this study was obtained from the Human Research Ethics Committee of The University of Sydney, Australia.

8.4 Results

Analysis of the data from the key informant interviews and project officer debrief revealed several themes related to the perceived value of the competency analysis, as well as of the evaluation more broadly. Themes also emerged around challenges experienced with data collection and quality, and several experts offered suggestions for strengthening future implementation of the evaluation. The main themes are elaborated below. Note that key informants and the project officer are referred to as "experts".

8.4.1 Working with the concept of a rehabilitation workforce

GRoWE was designed as a resource for the rehabilitation workforce collectively, rather than for any specific profession. This was reflected in the competency analysis in particular, which presented rehabilitation assessments and interventions targeting a range of areas of functioning (e.g., mobility, communication, respiration, mental health.). Experts reported that participating in an evaluation that adopted the concept of a "rehabilitation workforce" challenged the identity of some occupations and expanded stakeholders' understanding of what rehabilitation is and what its workforce comprises. For example, many speech and language therapists, who in Poland work primarily in the education sector, had not considered themselves as health workers or as rehabilitation workers. Conversely, psychologists in Poland had been working hard to promote themselves as rehabilitation professionals, but had encountered challenges due to the narrow perception of rehabilitation in the country. Experts noted that rehabilitation is largely synonymous with physiotherapy and rehabilitation medicine in Poland, and that other occupations, especially those which do not primarily address 'physical' impairment, are overlooked. The GRoWE project officer noted, "There are two queens or kings – doctors and physiotherapists - and the rest are underestimated". GRoWE challenged this conception, placing equal importance on the competencies and tasks of each occupation included in the evaluation.

8.4.2 Identifying and managing scopes of practice

The competency analysis was reported by experts to be valuable in addressing the issue of informal task sharing. Task sharing was noted to be widespread among the rehabilitation workforce in Poland, especially in relation to physiotherapists absorbing tasks from the scopes of practice of occupational therapy and speech and language therapy. Task sharing was considered to be necessary in Poland given the underdevelopment of many of the rehabilitation occupations but was not always well supported with education and training. Further, it was suggested, physiotherapists tended to assume that they were responsible for all or most rehabilitation tasks—a belief that likely stems from the absence of other occupations in many settings. As one expert reported, "we need to make the space for [other occupations] because sometimes physiotherapists here in Poland are thinking that they are all in one, but we are not" (KI5).

The competency analysis was considered by experts to be useful in showing which occupations were working at what level and what tasks were being performed by whom. This was seen as central to ensuring "proper use of available workforce" (KI2). Despite some limitations in the competency analysis (see data collection and quality below), the results were seen by experts as an important starting point for discussion and as the basis for the development of more comprehensive competency analysis tools.

8.4.3 Multidisciplinary collaboration

A perceived benefit of GRoWE in general and the competency analysis exercises in particular was its ability to foster collaboration between the different rehabilitation occupations. Experts noted that, although some occupations were accustomed to working together in the clinical setting, this rarely translated into cooperation in evaluation and planning. Completion of the exercises necessitated teamwork, while the workshops brought all occupations together around a virtual table, with a common aim. Experts noted that this had previously been lacking. One expert stated, "I was missing this openness and the willingness to cooperate between the different sections of the rehabilitation system. So, it was perfect for me" (KI5).

8.4.4 Data collection and quality

All experts noted challenges with data collection and quality. These related to all aspects of the evaluation, but reliability was specifically flagged as a concern for the competency analysis. This concern was linked to the subjective nature of the competency analysis exercises, which relied on

a small sample of workers reporting on behalf of their wider occupation. The project officer reported that some stakeholders felt uncomfortable with the responsibility of representing their workforce. For example, when completing the competency analysis exercises, participants reported tension between responding based on what is expected of the occupation and the actual performance of workers. While the instruction for the exercises was to report actual performance, it was not always possible for the sample of workers completing the exercise to gauge this. Concerns about reliability were greater for unregulated occupations, such as occupational therapy, for which there is considerable variability in levels of proficiency and scopes of practice. Given these concerns, experts felt that the results of the competency analysis should be interpreted as preliminary and used to facilitate further investigation. It was also suggested that a survey instrument and/or focus groups could be used in addition to the exercises to obtain a wider range of perspectives and opinions, thereby strengthening the reliability of the data.

As the GRoWE pilot in Poland took place in the context of the COVID-19 pandemic, stakeholders had to meet virtually, and data collection occurred via emails, phone calls and online meetings and workshops. This format was considered by the experts to have several benefits, including greater flexibility and the ability to engage stakeholders from different geographic regions of the country. The GRoWE project officer noted, however, that face-to-face discussion among stakeholders, even in a single workshop, had the potential to strengthen stakeholder engagement with the evaluation. Meeting in person was thought to enable better communication and connection among stakeholders (especially those who had not known each other prior to the evaluation) and between stakeholders and the project officer, to whom data were reported. Experts tended to agree that a hybrid approach would be optimal, with online communication complemented by at least one in-person workshop.

8.5 Discussion

This study aimed to assess the feasibility and perceived added value of integrating competency analysis into national rehabilitation workforce evaluation, and to determine how competency analysis can shape rehabilitation workforce planning. These questions were examined in the context of the pilot of GRoWE in Poland, during which participant observation was conducted by the GRoWE project officer and the WHO focal point, and key informant interviews were conducted with experts engaged in the evaluation. Analysis of the triangulated data indicated that

such integration was feasible and that it added considerable value to the rehabilitation workforce evaluation.

8.5.1 Feasibility

The expansion of platforms for online working and the increased familiarity with remote working associated with the COVID-19 pandemic enabled GRoWE to be implemented virtually. This greatly enhanced its feasibility, allowing stakeholders from different parts of the country to engage and minimising the disruption to their regular work. However, a hybrid approach, whereby at least one workshop is held in person, is likely to be optimal as it will provide an opportunity to complete more challenging analysis exercises in the presence of the project officer. In-person workshops will further strengthen GRoWE's role in fostering relationships among stakeholders, especially those from different occupations, and build greater rapport between the stakeholders and project officer, which may help to sustain their participation throughout the evaluation. Such a hybrid approach was adopted with great success in other pilots of GRoWE that were conducted in Rwanda and Nepal after the pilot in Poland had commenced. These additional pilots also demonstrated that the ideal balance between in-person and virtual working is context-dependent and is influenced by what is considered culturally appropriate and the availability and uptake of the required technology.

The method of using a small representative sample of workers from each occupation was initially adopted by GRoWE to address the challenges associated with coordinating large groups of people to complete shared exercises and achieve consensus. Although this approach enhanced the feasibility of the competency analysis, it reduced the reliability of the data for occupations with a large workforce. This may not be of concern when GRoWE is implemented in countries with a much smaller supply of rehabilitation workers, where a sample of 5 workers may represent 25% or more of the occupation. When this is not the case, the use of additional data collection instruments to obtain input from a wider range of perspectives would be valuable. A survey instrument could be developed to complement the existing analysis exercises and serve to verify their findings.

8.5.2 Perceived added value

In this case study, the competency analysis complemented traditional labour market data in several ways. First, from a practical perspective, the competency analysis data provided information on task allocation and worker proficiency that can guide action in education and

inform decisions and practices around task sharing, which are critical in a country without an adequate supply of workers. Second, through participating in the competency analysis exercises, stakeholders became aware of the concept of a rehabilitation workforce and the broader scope of rehabilitation interventions. As such, the competency analysis exercises served as tools for education and advocacy. This was particularly significant for occupations, such as occupational therapy, speech and language therapy and clinical psychology, who are less likely than physiotherapists or physical and rehabilitation medicine doctors to be seen or valued as rehabilitation workers, despite their unique and critical contributions. Third, the competency analysis identified the kinds of data that are important to collect and report, or routinely explore. This may help to improve future data collection practices beyond the evaluation itself.

8.5.3 Impact on rehabilitation workforce planning

It remains to be seen what impact the competency analysis data will have on rehabilitation workforce planning in the months and years ahead. However, experts believed that both the process and results of the analysis will strengthen planning and development by: fostering cooperation between different occupations, which has heretofore rarely occurred at a policy and planning level; identifying the types of data that are important to collect and report; and providing information about the allocation of tasks and proficiency of workers. The latter may also help guide the design and delivery of rehabilitation workforce education in the country by highlighting possible areas of underperformance and areas for interdisciplinary training to facilitate task sharing.

8.5.4 Limitations

This study captured the findings from only one pilot of GRoWE, which was conducted in a high-income country (albeit a high-oncome country with a relatively under-developed rehabilitation workforce). However, the feasibility of the competency analysis, the extent to which it is valued and its impact on planning may differ from country to country. The results of this pilot should therefore be interpreted with caution, and lessons should continue to be drawn from the further implementation of GRoWE in future.

8.6 Conclusion

Competency analysis appears to be a valuable addition to labour market analysis for evaluating the rehabilitation workforce. The approach is of potential interest to other health-related occupational groups, such as the vision or hearing workforce, which comprise a number of

occupations that make unique but interrelated contributions to patient care. Competency analysis in the context of national workforce evaluation is a novel practice and, while it is an exciting innovation, its application should be approached with an openness to learning and adaptation.

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Annex. Overview of Task Mapping Findings and Key Conclusions of the Competency Analysis

Overview of findings from the task mapping

Gaps in the delivery of rehabilitation assessments and interventions

The task mapping identified potential gaps of concern in the assessment of:

- cognitive impairment
- swallowing and salivation impairment
- hearing impairment
- fatigue
- performance of activities and participation in the home, education and work environment.

Gaps were also identified in the ability to deliver the following rehabilitation interventions:

- environmental modifications to home, school and workplace
- educating and supporting teachers, classmates and employers
- airway clearance techniques
- community mobility interventions (e.g., navigating transportation)
- speech and language interventions
- interventions for pain
- interventions for sexual functions and intimate relationships
- interventions for addressing activities and participation, such as self-care interventions and vocational training.

Gaps were further identified in provision and training in the use of assistive products for sensory impairments, such as:

- hearing aids
- Braille displays and writing equipment
- screen readers
- gesture to voice technology
- deaf-blind communicators and communication software.

These assessments and interventions are considered essential in the rehabilitation care of persons with health conditions that are widely prevalent and/or have a profound impact on functioning. As such, their absence is associated with significant unmet needs, resulting in reduced functioning and participation in education, work and community life.

Overlaps in the delivery of rehabilitation assessments and interventions

It is not uncommon, nor necessarily problematic, for there to be a degree of overlap in the provision of certain rehabilitation assessments and interventions. However, overlaps in scopes of practice that develop unintentionally over time can, if not systematically considered, result in inefficiencies. In other instances, it may be beneficial to introduce further overlap in scopes of practice to compensate for a particularly severe shortage of an occupational group.

In this study, the identification of overlaps was complicated for two main reasons. First, prosthetists and orthotists in Poland come from a range of backgrounds, and thus do not have a uniform scope of practice. Second, the profession of occupational therapy is still unregulated, again resulting in variability in scopes of practice. Nevertheless, the task mapping identified several areas of overlap that warrant exploration, as well as interventions that could potentially be expanded into an alternative occupation's scope of practice to ensure they are available to those who need them.

Existing overlaps warranting exploration include, but are not limited to:

- mobility assessments
- assessment of the environment (home, school and workplace)
- the provision of mobility aids (such as wheelchairs, crutches, walking canes and walking frames), grab bars and compression garments.

Key conclusions drawn from the findings of the competency analysis

1. There are competency gaps in the rehabilitation workforce, particularly in the domains of Learning and Development, Management and Leadership, and Research. This indicates scope for strengthening in education and training.
2. There is inconsistency in competency levels both within and between rehabilitation occupational groups, reflecting differences in education and training and inadequate development and verification of competency standards.

3. There is a lack of evidence-based practice in the rehabilitation workforce, driven by a lack of investment in research skills, lack of access to and poor use of clinical guidelines and protocols, and limited mechanisms for knowledge sharing and promotion.
4. Rehabilitation workers lack adequate access to supervision, support and mentorship, including from peers, particularly for those working in more remote contexts. This hinders the development of the emerging workforce and potentially compromises patient safety.
5. There are inadequate opportunities for sub-specialisation, particularly for occupational therapists, which limits the ability of the rehabilitation workforce to meet more complex patient needs.

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Section 5

IMPLICATIONS

Section contents: Chapter 9

Chapter 9. Discussion and Conclusions

The overall purpose of this thesis was to better understand the potential contribution of competency-based approaches to rehabilitation workforce development and to contribute tools to facilitate their application. To this end, studies utilising a range of methodologies have addressed issues of conceptualisation (Section 2), operationalisation (Section 3), and application (Section 4). This final chapter discusses the implications of the study's findings. It summarises the key findings related to the thesis objectives, explores how they may be generalised to the broader health workforce, acknowledges limitations of the research, and considers implications for future research directions.

9.1 The Conceptual Framework Revisited

The conceptual framework underpinning the research project was outlined in Chapter 1. This framework connected the needs of the target population with the knowledge, skills, attitudes and behaviours of the workforce required to meet them (the pathway) and identified the various problems and questions that arise along this pathway. Figure 9.1 shows the contribution of this study to addressing each of these questions.

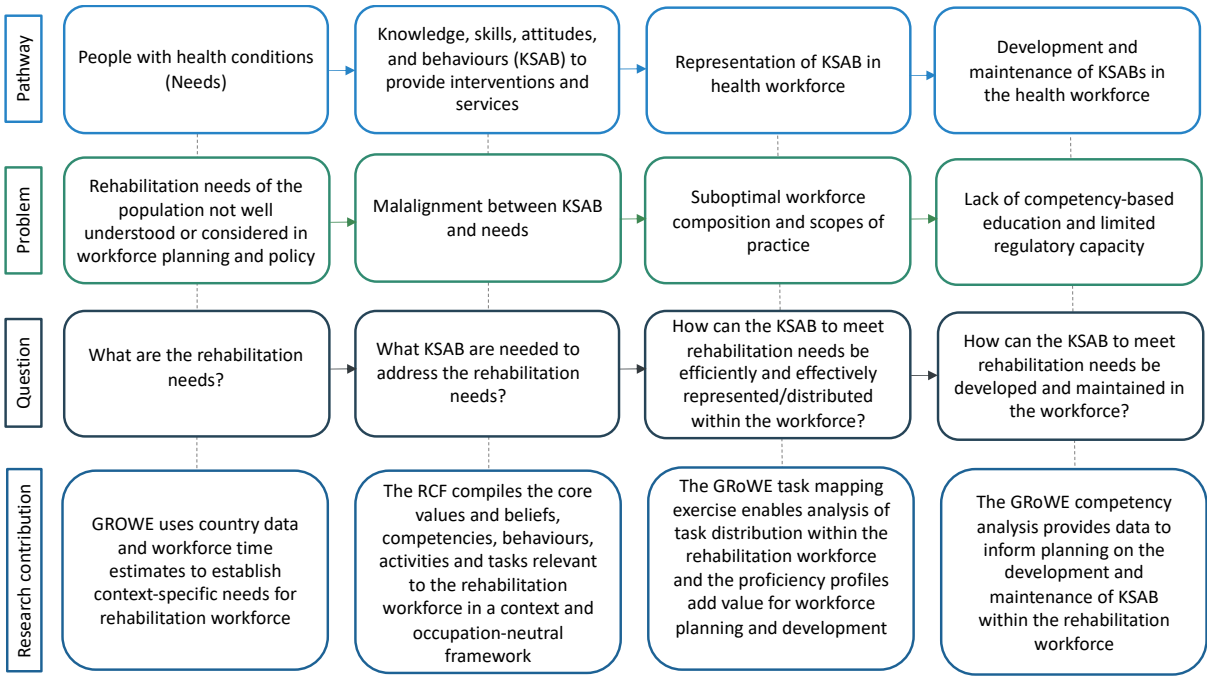

Figure 9.1. The contribution of the thesis in the context of the conceptual framework.

According to the conceptual framework, the starting point for the use of competency-based approaches is to establish the needs of the population in relation to the relevant workforce. Although the importance of grounding health workforce development in population needs and health system functions has long been recognised, its implementation requires systematic approaches that are more data– and time–efficient than simple population-to-provider ratios and health worker density benchmarks (Buchan and Dal Poz, 2002; Kunjumen et al., 2022; Nancarrow, et al., 2017). Indeed, the challenges associated with identifying the rehabilitation needs of a population and incorporating these into processes for workforce planning and policy have often presented a barrier to the adoption of competency-based approaches among the rehabilitation workforce.

In the sense used here, the term "needs" refers to the functional limitations and participation restrictions that individuals experience as the result of a health condition (Cieza et al., 2020). In the context of clinical practice, these are assessed at an individual level. However, in the context of national workforce evaluation, they would be implied from the epidemiologic profile of a country, that is, the country-specific prevalence and incidence of health conditions that are associated with impaired functioning and long-term disability and which are amendable to rehabilitation. This research project used data from the Global Burden of Disease study (Institute of Health Metrics and Evaluation, 2022), adjusted to include only moderate and severe cases (based on clusters of symptoms), to determine the prevalence and incidence of a selected range of health conditions in each country. These data were integrated into GRoWE, along with the rehabilitation assessments and interventions relevant to these health conditions, and were used in a combination of analysis exercises which, collectively, enable a country to identify its rehabilitation needs.

The second step in the conceptual framework's pathway is to identify the knowledge, skills, attitudes and behaviours needed within the workforce to meet the identified population needs, as recommended in the *Global Strategy on Human Resources for Health: Workforce 2030* (World Health Organization, 2016). In other words, the composition of the health workforce should be determined in a way that most effectively and efficiently meets population health needs. As Nancarrow and Borthwick (2005) have argued, achieving alignment between shifting and dynamic population needs, evolving health system structures and a workforce composed of occupations with established professional boundaries, which have been largely shaped by political processes, can be problematic, while unmet population needs, among other factors, place pressure on professional boundaries and demand attention to interdisciplinary relationships (see also

Nancarrow, 2015). The COVID-19 pandemic, for example, highlighted the need for the health workforce to be able to rapidly transform its skill mix and adopt new knowledge and skills in order to effectively respond to population needs (Bourgeault et al., 2020).

Competency-based curricula are an important mechanism for aligning the epidemiologic and demographic trends of a population with the competencies and activities of the workforce. However, issues arise when, rather than being shaped by population needs, curricula apply learning objectives developed in one context or setting onto another (such as those from a high- to low-income country) (World Health Organization. 2022b). Accordingly, alignment between the rehabilitation workforce and population needs is facilitated by assessment of country-specific epidemiologic and demographic trends and health system functions and the use of competency-based approaches to develop and maintain the knowledge, skills, attitudes and behaviours relevant to these. The *Rehabilitation Competency Framework* (RCF) promotes and enables competency-based approaches by identifying the core values and beliefs, competencies, behaviours, activities and tasks along with the underlying knowledge and skills relevant to rehabilitation workers. This content provides a launchpad from which context-specific competency frameworks and other competency-based tools can be created.

The third step in the conceptual model's pathway concerns how the identified knowledge and skills are represented in the skill mix of the health workforce. This will be highly context specific as it depends on the composition of the workforce, the educational capacity of the country, and the availability of resources to support training, task shifting and workforce regulation, among other factors (Nancarrow, 2015; Nancarrow and Borthwick, 2005; Nancarrow et al., 2017). Establishing, reviewing or even adjusting the skill mix of the workforce requires the ability to capture and analyse the proficiency, competencies and activities of the workforce and the unique contributions of each occupation or cadre (Booth and Hewison, 2002).

GRoWE assists countries to improve their understanding of the profile of the rehabilitation workforce, identify any gaps in relation to population needs and utilise this information to develop appropriate enhancement strategies. To this end, both the competency analysis tools and labour market analysis tools can be employed to identify the nature and level of knowledge and skills available in the various occupations. The competency analysis tools provide information on the proficiency profile of the rehabilitation workforce, which sheds light on worker autonomy, decision-making capability, and depth of knowledge and skills of each occupation. The task-

making component of the competency analysis provides an overview of which rehabilitation assessment and intervention tasks are being performed by which occupation/s. This information serves as a proxy for the representation of current knowledge and skills in the rehabilitation workforce and exposes gaps and potential inefficiencies. The labour market analysis exercises contribute to the country's ability to manage these gaps and inefficiencies by providing information on current workforce support and employment as well as institutional capacity. This combination of data can guide policy dialogue and the strategic planning that is needed to shift or amend how knowledge and skills are developed across the various occupations of the rehabilitation workforce. This helps to make rehabilitation care as accessible as possible to those who need it and maximises the most effective, efficient and equitable use of the existing health system, particularly in the context of workforce scarcity and maldistribution.

The problems depicted in the conceptual model require knowledge and solutions beyond the scope of this research project. However, the RCF and Guide for Rehabilitation Workforce Evaluation offer a conceptual approach and practical tools that assist countries in answering key questions about workforce competency, composition, supply, demand, absorption and quality, as well as in recognising the economic and political drivers that enable them to navigate towards context-specific strategies for workforce development. The following section summarises the main findings of the research undertaken in this thesis in relation to its two aims and six objectives, which led to the development of the RCF and Guide for Rehabilitation Workforce Evaluation.

9.2 Summary of Main Findings

Acknowledging the complexity of rehabilitation workforce challenges globally and the largely unexplored potential of competency-based approaches to address these, this research project had two aims:

1. To develop a RCF relevant across occupations, specialisations and settings, and
2. To apply a competency-based approach in national rehabilitation workforce evaluation and planning.

These aims were addressed by three studies which focused, respectively, on conceptualisation, operationalisation and application and which are described in detail in Sections 2, 3 and 4 of this thesis. A summary of the main findings is presented below, followed by a discussion of their implications.

9.2.1 Summary of the main findings in relation to Aim 1

Aim 1 concerned conceptualisation (Section 2) and operationalisation (Section 3) and encompassed two studies. The first, a systematic scoping review, examined the conceptualisation of competency frameworks and the interpretation and application of competency-based terminology (Mills et al., 2020). The systematic review served to address Objective 1.1, namely: "to establish conceptually sound definitions for competency-based terminology on which to base a RCF". This study was foundational for this research project, providing conceptual clarity for subsequent work. The literature review revealed a high level of variability in how competency-related terms are understood and used, and showed how differences in the interpretation of terms underpinned many criticisms of competency frameworks. These differences are attributable to the fact that competency frameworks originated in two different countries and for two distinct purposes. In the United States, competency frameworks emerged to describe behaviours associated with successful work performance whereas, in the United Kingdom, they were introduced to describe the tasks that a worker needed to be able to perform. As competency frameworks expanded beyond these countries, the different approaches—one behaviour-oriented and the other task/function-oriented, each designed to serve a specific purpose—became conflated. It is postulated that the merging of these two approaches and the failure to acknowledge the different purpose of each underpins much of the confusion and criticism surrounding newer competency frameworks. For example, behaviour-oriented frameworks have been criticised for their vagueness and the difficulties associated with their measurement and assessment, while task-oriented frameworks have been criticised as reductionist, breaking professions down into lists of tasks that do not reflect the reasoning or behaviours that are required for successful performance.

The findings of the systematic review enabled the authors to develop a glossary of competency-related terminology that reflected both behaviour- and task-based approaches, appreciating that both play important roles in describing what workers do and how they behave (Kamenov et al., 2019). Beyond providing conceptual clarity, this glossary informed the subsequent structure and design of the RCF in this thesis, which brings both approaches together.

The second study adopted a mixed-methods design, involving a content analysis of existing rehabilitation-related competency frameworks, a Delphi study, and a service user consultation (Mills et al., 2021). The findings from this study were combined with those from the systematic scoping review (Mills et al., 2020) to achieve Objective 1.1, "to identify the knowledge, skills, attitudes, and behaviours encompassed by the rehabilitation workforce that could collectively

address the scope of population rehabilitation needs" and Objective 1.3, "to communicate rehabilitation knowledge, skills, attitudes, and behaviours in a structured competency framework that can be adapted and adopted for specific contexts". The findings from content analysis of existing rehabilitation-related frameworks revealed a range of competencies and activities relevant to the rehabilitation workforce. These competencies and activities were structured according to the conceptualisation captured in the glossary of competency-related terminology; that is, they were organised into competencies and behaviours (reflective of the behavioural approach originating in the United States of America), and activities and tasks (reflective of the functional approach derived from the United Kingdom). The content analysis revealed that competencies and behaviours apply to all rehabilitation workers, while activities and tasks differ (to varying degree) by occupation, specialisation and role. The adaptation of the RCF to a specific context therefore involves the selection of only the activities and tasks relevant to the workforce to which the framework is being applied.

In the RCF, competencies and activities were organised into five domains: Practice, Professionalism, Learning and Development, Management and Leadership, and Research. These domains were developed through review of the thematic organisation of existing rehabilitation-related frameworks and subsequent iterative discussions with the RCF Technical Working Group. The domains were developed based on the assumption that all workers will require competencies and activities from each domain in order to perform successfully; that is, the competencies and activities from each domain are complementary.

The competencies (and related behaviours) and activities (and related tasks) extracted from the content analysis and organised into the five domains formed the zero draft of the RCF. This draft then provided the basis for the Delphi study and service-user consultation, which were used to build consensus on the content of the final version of the RCF. The broad reach of these studies—in terms of number of participants, their varying professional roles and their geographical distribution—ensured that the RCF was acceptable to rehabilitation workers, academics and service managers from a wide range of countries, professional backgrounds and service contexts. This was imperative given its intended role as a global reference framework.

9.2.2 Summary of the main findings in relation to Aim 2

As described in Section 4, Aim 2 concerned the application of a competency-based approach in national rehabilitation workforce evaluation and planning, and was addressed through one study.

This study necessitated the development of tools to enable competency analysis to be performed in national rehabilitation workforce evaluation and planning. This was accomplished through the establishment of the Guide for Rehabilitation Workforce Evaluation (GRoWE) and served to meet Objective 2.1, "to establish tools for integrating competency analysis into national rehabilitation workforce evaluation". Objective 2.2, the final objective of this thesis, was "to assess the feasibility and perceived added value of integrating competency analysis into national rehabilitation workforce evaluation". This was achieved by piloting GRoWE and its competency analysis exercises in Poland. The study was embedded within the framework of this pilot project and involved participant observation and key informant interviews with stakeholders engaged in the evaluation.

The participant observation study involved the candidate and the GRoWE project officer, a Polish physiotherapist and consultant to the WHO Country Office for Poland, who supported the implementation of the Guide through each of its phases and steps over the course of a year. The role of the candidate was to provide oversight of the project and guidance to the project officer on the evaluation process, and to write the evaluation report and action plan. This was performed through a combination of virtual meetings and email correspondence. The role of the project officer was to establish and manage a national rehabilitation workforce task team and collect the data required to complete each analysis exercise within the Guide. The project officer was further tasked with overseeing translation of the report and the action plan into Polish and their dissemination among stakeholders for review. The findings of the participant observation study were extracted through a semi-structured debrief between the candidate and the project officer. The debrief was organised around the key topics of engagement, feasibility, perception, and perceived added value. The findings of the debrief were triangulated with the findings of the key informant interviews.

The key informant interviews were conducted virtually using Microsoft Teams after a draft report had been circulated for feedback and evaluation and during the process of developing the action plan through which the report's recommendations would be implemented. The interviews were conducted by the candidate with an interpreter present when required. Thematic analysis of the interview transcripts revealed several important themes relating to the perceived value, challenges and key considerations of the competency analysis component of the evaluation. Notably, key informants reported that the competency analysis provided important information about the practice of informal task sharing, which required further exploration. They further commented

that the task mapping exercise in particular highlighted the full scope of rehabilitation tasks, which covered a broader range than was traditionally considered in Poland, where the term "rehabilitation" was generally viewed as synonymous with physiotherapy or manual therapy.

Despite these and other benefits of the competency analysis and evaluation more widely (see Chapter 8), key informants flagged concerns about the validity of the competency analysis data given the relatively small samples used to complete the exercises. This was of particular significance for occupations, such as occupational therapy, which are not yet well regulated in Poland and for which there is substantial variability in the level of proficiency and tasks performed. Key informants recognised the potential value of using other data collection instruments, such as a questionnaire, to gather information from a wider pool of workers from each occupation included in the evaluation. While not definitive, the competency analysis data from GRoWE were perceived as a valuable starting point for discussion and a foundation for further, more comprehensive analysis.

9.3 Implications of the Research

The outcomes of the research conducted for this thesis have important scholarly and practical implications. This section examines these implications, bearing in mind that others may emerge, given that the conceptual tools developed through the course of the project are still in their infancy and changes in workforce-related understanding and behaviours are typically slow to manifest.

9.3.1 Implications for rehabilitation workforce identity

This thesis has introduced the RCF and Guide for Rehabilitation Workforce Evaluation, which embrace the concept of a collective rehabilitation workforce. This concept ties together a diverse group of occupations with a shared focus on functioning. These occupations are accustomed to interacting with each other, given their proximity during both education and training and patient care, yet their proximity often fails to translate into workforce development initiatives. The result has been a fragmentation of efforts across occupational lines (and sometimes even across lines of sub-specialisation) that can inadvertently weaken their power and influence. For example, policy makers are likely to be quickly overwhelmed by the advocacy efforts of multiple rehabilitation occupations, and the size of individual occupations in many countries is such that they lack the visibility and capacity to effect meaningful change, particularly in policy (Nancarrow et al. 2017). The multiplicity of occupations and their often-modest size require rehabilitation occupations to band together in the pursuit of national workforce development. The concept of a rehabilitation

workforce is useful in this context because it offers a collective identity under which rehabilitation occupations can connect, advocate and advance a shared agenda. By providing, respectively, a clear definition and application pathway for the concept, the RCF and GRoWE developed in this thesis make a significant contribution to such an endeavour.

9.3.2 Implications for communication and comparability

The scoping review (Chapter 4) and content analysis of existing rehabilitation-related competency frameworks (Chapter 5) revealed significant variability in how competencies and activities of the rehabilitation workforce (and other workforce groups) are described. The glossary proposed in Chapter 4 and the application of its terms in the RCF provide a language that reconciles the different approaches to competency frameworks that result from their separate origins. As such, the glossary and RCF have the potential to strengthen communication between and even within rehabilitation occupations. This might take the form of enabling occupations to clearly describe what they do and how they behave to achieve successful performance, defining scopes of practice, or expressing levels of proficiency. Beyond more effective communication, a common language for competency lends itself to improved comparability, such as across curricula, regulatory standards and performance management tools. This has potential importance in relation to worker migration, since the education and performance of incoming workers could be compared with national standards to determine entry to practice. A common terminology would also facilitate the sharing or study of competency-related materials for workforce development or research. Finally, the description of tasks, particularly those associated with assessment and intervention, enables more efficient task allocation, as occupations can more readily see where overlaps and gaps exist.

9.3.3 Implications for the orientation of rehabilitation workforce evaluation and development

Both the RCF and Guide for Rehabilitation Workforce Evaluation are innovative conceptual approaches and tools that facilitate the uptake of competency-based approaches to workforce development. This enables a reorientation of workforce development efforts, whereby the starting point is the outcome (the care that needs to be delivered) rather that the inputs (the workers who deliver the care). Competency-based approaches to workforce development are highly patient-centred, yet they appear to be underutilised. Typically, workforce evaluation and development are uni-disciplinary (Nancarrow and Borthwick, 2005) and are orientated towards the end goal of strengthening the status of an occupation through various metrics of workforce development such as supply, employment or performance.

While strengthening an occupation will usually lead to improvements in care, and an occupation-based approach has a clear role in workforce evaluation and development, this approach is limited in several ways. First, occupation-based approaches to workforce evaluation and development operate within the expected scope of practice of the occupation(s) concerned. When not considered against the scope of needs of the relevant patient group, there is a risk that gaps or deficiencies in care are not identified or responded to appropriately. Second, a solely occupation-based approach inherently serves the agenda of the occupation(s) concerned, such as its own expansion, which may run counter to the objective of optimising access to care. This can occur when strategies to expand access to care involve task sharing, whether in the form of absorbing additional tasks or offloading selected tasks to other cadres of worker. In some instances, pursuit of an occupation's agenda may also require investment of funds that would otherwise be spent on initiatives that have a greater impact on patient care. For instance, investment may be sought to increase the supply or number of positions for physiotherapists, while the speech and language therapy profession requires far greater attention. Finally, an approach that is orientated around patient needs rather than the advancement of an occupation is likely to have better resonance with and be more compelling to policy makers. Political agendas are generally linked to health priorities, such as noncommunicable disease or emergencies, rather than the development of specific occupational groups. Thus, presenting workforce needs through the lens of its impact on access, equity and/or quality of patient care, which is facilitated by competency analysis, is likely to garner greater political traction.

Multidisciplinary workforce planning approaches that integrate task analysis are not unique. They are used, perhaps most notably, in the World Health Organization's Workforce Indicators of Staffing Need (WISN) approach to workforce planning, which is used in numerous countries around the world (Kunjumen et al., 2022). Like GRoWE, the WISN approach seeks to orientate workforce planning around needs and the occupations that deliver the tasks addressing these needs. However, unlike GRoWE, WISN uses health facilities as the basis for establishing needs. This is problematic for the rehabilitation workforce for a number of reasons. First. a significant amount of rehabilitation care is delivered outside health facilities—for example, in people's homes, schools, workplaces, or long-term care facilities. Second, the estimation of workforce needs in WISN is limited to facilities that already exist, yet many contexts lack adequate rehabilitation facilities. As a consequence, workforce evaluation and planning using WISN, while somewhat competency-based, is unlikely to adequately support rehabilitation workforce development in a

particular country. In contrast, by combining population epidemiological data and task mapping, GRoWE can more accurately estimate the rehabilitation workforce needs of a country.

9.4 Contribution of Findings to the Broader Health Workforce

The findings of the studies undertaken in this research can contribute to the adoption or expansion of competency-based approaches in other sectors of the health workforce, such as health promotion, diseases and injury prevention, treatment and palliation. They have both scholarly and practical implications in relation, for instance, to: re-conceptualising competency-based terminology in the broader health workforce; providing a framework and example of the application of the re-conceptualised terminology that is relevant to a range of related occupations; and demonstrating the feasibility and value of integrating competency analysis within national workforce evaluation. These three contributions are further elaborated below.

9.4.1 Re-conceptualising competency-based terminology

The glossary presented in Chapter 4 was developed based on the findings of a systematic scoping review of literature related to the emergence of competency-based terms and their application across a range of sectors and occupational groups. The glossary enables the general health workforce to understand the differences in the interpretation of competency-based terms in the United States and United Kingdom, which have become entangled over time. This is significant because the convergence of terminology appears to underlie much of the confusion and criticism surrounding competency frameworks. By acknowledging the history and value of both interpretations and making space for both, the glossary has the potential to reconcile differences in competency frameworks and improve their effectiveness by promoting the distinction between 'competencies and behaviours' and 'activities and tasks'.

9.4.2 Exemplifying the application of the re-conceptualised terminology in a competency framework

The RCF provides an innovative demonstration of how the terms and their respective concepts, as presented in the glossary, can be applied in a competency framework, and of how the terms can be used in a framework that is relevant to a range of related occupations and specialisations. It does so by demonstrating the cross-cutting nature of competencies and behaviours, alongside the more occupation- or specialisation-specific activities and tasks, which can be described through an increasing level of specificity. That the approach can be generalised to other occupational groups

is demonstrated by the fact that the structure and terms of the RCF have already been used to shape the WHO Eye Care Competency Framework (World Health Organization 2022a).

The ability to create competency frameworks relevant to a number of related occupations and specialisations and across different contexts has scholarly value for several reasons. First, such frameworks provide a starting point for the development of more context-specific competency frameworks, such as those for a particular occupation, specialisation or setting. This not only makes the process of development easier, since it is simply a matter of adaption and adoption, but also strengthens the end result—namely, a framework built on sound conceptualisation. This is likely to benefit many stakeholders who would gain considerably from the availability of competency frameworks but are unfamiliar with or daunted by the process of developing them. The greatest potential beneficiaries are those in lower-resource countries, where few competency frameworks are published but where many of the greatest workforce challenges exist.

Second, competency frameworks provide a tool to facilitate workforce optimisation, whereby knowledge and skills are developed and tasks are allocated to make the most efficient use of a workforce, typically in the context of severe shortages. A competency framework that encompasses multiple occupations or specialisations can aid this process by defining what competencies are required, what activities need to be delivered, and what the requisite underlying knowledge and skills are, so that these can be systematically organised and developed within a workforce. When workforce optimisation does not carefully consider the activities and tasks of each occupation nor the knowledge and skills needed to deliver them safely and effectively, quality of care is compromised, workers can feel overwhelmed or unmotivated, and certain tasks can fall through the cracks, resulting in unmet needs.

Finally, competency frameworks that encompass related occupations and specialisations can help to build a sense of a collective occupational identity by highlighting shared competencies and behaviours as well as attitudes (or core values and beliefs). For example, just as the RCF has encouraged physiotherapists, occupational therapists, prosthetists, orthotists and other occupations to consider themselves part of the "rehabilitation workforce", other health-related occupations may be encouraged to see themselves as part of the hearing and ear care workforce, the social care workforce, and so on. This is particularly meaningful in the context of advocacy, where the multiple efforts of individual occupations can cause confusion, overwhelm policy makers, and fail to carry the weight needed to effect change. It can also be useful for workforce

planning and development initiatives, such as knowledge sharing, and in building professional capacities and prestige.

9.4.3 Demonstration of the feasibility and value of integrating competency analysis within national health workforce evaluation

Competency analysis has not been routinely integrated into national health workforce evaluation to date. Yet the findings reported in this thesis, specifically the study detailed in Chapter 8, demonstrate the feasibility of doing so and the value that can be added in terms of scholarly advancement and practical applications. The competency framework introduced in this thesis is both feasible and meaningful because it was developed in the context of a specific workforce which shares a common aim—to optimise functioning—and whose scopes of practice are linked. These are prerequisites to the generalisation of the findings of this research project. While it would not be practical to conduct a competency analysis across the whole health workforce, this could be accomplished for a group of related occupations, such as the maternal and child health workforce, the sexual and reproductive health workforce, or the vision and eye care workforce. The results from this study have shown that integrating competency analysis into national workforce evaluation reveals gaps in patient care, opportunities to strengthen efficiency, effectiveness and equity (through more rational task allocation), and areas for bolstering education and training, as well as highlighting discrepancies in proficiency levels between occupations.

9.5 Limitations of the Research

Limitations of the individual studies within this project and how they have been managed are detailed in Chapters 4, 5 and 8. Limitations of the study more broadly include:

- *The inability to closely follow the application of the RCF in different countries.* This limitation results from the fact that the RCF was published as an open access tool with the intention of it being utilised as widely as possible. As a consequence, however, it has not been possible to capture or share lessons learned through the use of the Framework in various competency-based workforce development initiatives. To help offset this, WHO has begun requesting its regional offices to record instances of the use of the RCF (and other WHO rehabilitation resources) in countries within their region when they become aware of them and to routinely share this information with headquarters. Although this will not capture every instance of the use of the Framework, it is likely to identify a substantial number of cases for follow-up and further analysis.

- *The inclusion of only one country (Poland) in the GRoWE case study.* The Guide was simultaneously piloted in Rwanda and Nepal as well as Poland. However, it was not possible to follow the same timeline for data collection in each of these countries. When data from Rwanda and Nepal become available in future, the results can be documented and published separately to guide future research and practice.
- *The limited ability to track the use of the findings of the competency analysis in workforce development.* The process of translating findings into action and policy change can be lengthy, occurring over years or even decades. It was thus not possible to examine how Poland's rehabilitation workforce action plan has been used in practice, nor to identify barriers to or facilitators of action. The necessary longitudinal research is beyond the scope of the current project, but would nevertheless be a valuable addition to knowledge in the field.

9.6 Recommendations for Future Research

The results of this study highlight several areas for future research While not exhaustive of such opportunities, the following avenues of enquiry build directly on the present findings and have clear implications for the conceptualisation and effective adoption of competency-based approaches to workforce development.

First, research is needed to explore the use of the RCF in different rehabilitation workforce development applications across various contexts. For example, future research could focus on how the RCF has been used to develop competency-based curricula for different rehabilitation occupations, how it has been applied in the context of competency standards and regulation, how it has assisted with the development of performance management tools, and how the language it uses to describe the behaviours and tasks of the workforce has been accepted and adopted. The results of such analyses will help to shape future iterations of the RCF, indicate what supportive materials may be beneficial, and provide additional evidence to guide the development and application of competency frameworks in the broader health workforce.

Opportunities also exist for longitudinal research examining how the findings from competency analyses conducted as part of national workforce evaluation are applied over time, including whether or how they guide task sharing within the rehabilitation workforce. Although the GRoWE competency analysis is considered feasible, the additional time and effort required to implement the process can potentially direct workers away from their clinical roles for periods of time. It is thus important to understand the longer-term benefits of the analysis (or lack thereof). Such

longitudinal studies may also shed light on what factors impact implementation of findings and how barriers can be addressed.

It is not only the findings of an evaluation that are of benefit to a workforce; the process itself may influence workers' understanding and perception of workforce challenges, the labour market and competency. This understanding has the potential to strengthen technical capacity and create more agents for change in driving a workforce agenda. Further research on how changes in workforce literacy that may occur during the implementation of GRoWE and other workforce evaluations, particularly when a participatory approach is used, may reveal how such literacy can be maximised and used to best effect.

Finally, research is needed to explore how competency analysis within national workforce evaluation can be made more efficient and accurate. The present study has indicated that integrating competency analysis into national rehabilitation workforce evaluation is feasible and valuable, but it represents only the starting point. Future studies could focus on whether sufficient level of detail to guide action can be obtained in less time or with fewer human resources, and whether the same or similar findings are elicited from different-sized groups of workers/participants. Future work could also explore whether and how national workforce surveys can be used to strengthen competency analysis and engage a wider representation of workers.

9.7 Conclusion

The research reported in this thesis focused on the development and application of competency frameworks in the context of rehabilitation workforce development. It has generated two technical products that represent important conceptual innovations: the RCF and GRoWE. Both have been published by WHO and made available to the public. Along with the findings of the various studies included in this research project, these technical products represent a unique contribution to the rehabilitation workforce. The RCF is the first competency framework that is relevant to the rehabilitation workforce as a whole and the first to apply re-conceptualised competency framework terminology, while GRoWE is the first product to combine labour market and competency analysis within national workforce evaluation. The thesis also provides examples of how competency-based approaches can be applied in the broader health workforce.

Around the world, the rehabilitation workforce faces numerous and significant challenges that contribute to substantial unmet need. It is the greatest wish of the candidate that this research empowers rehabilitation stakeholders with the knowledge and tools to not only advance the field but lead the way in the use of competency-based approaches in workforce development.

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Appendices

Section contents: Appendix A-F

Appendix A. Ethics Approval Letter: Modified Delphi Study

From: no_reply@d39cnuplf88huy.cloudfront.net
Subject: 2019/ETH12113: Application HREA - Approved
Date: 13 August 2019 at 8:54 pm
To: millsj@who.int

Date of Decision Notification: **13 Aug 2019**

Dear Jody-Anne Mills,

Thank you for submitting the following Human Research Ethics Application (HREA) for HREC review;

2019/ETH12113: Rehabilitation Competency Framework: Modified Delphi study

Thank you for your letter, dated 22 July 2019, responding to the Northern Sydney Local Health District HREC's request for additional information/modification for the above project, which was first considered by the HREC at its meeting held on 10 July 2019.

I am pleased to advise that the Committee has granted ethical and scientific approval of the above single centre project at a meeting held on the 31 July 2019. The HREC were satisfied that this project meets the requirements of the National Statement.

This project has been Approved to be conducted at the following sites:
John Walsh Centre for Rehabilitation Research (A centre of the University of Sydney located at Royal North Shore Hospital).

The following documentation was reviewed and is included in this approval:

- Protocol, version 2, 22 July 2019
- Participant Information Statement, Version 2, 22 July 2019
- Rehabilitation Competency Framework (RCF) reference document, Draft 2
- Survey Instruments
  - Professionalism-1-01-JULY-2019
  - Practitioner-1-01-JULY-2019
  - Leaderhip-1-01-JULY-2019
  - Ed. and development -1-01-JULY-2019
  - Research-1-01-JULY-2019

Application Documents - (**Please note : Due to security reasons, this link will only be active for 14 days**.)

The Human Research Ethics Application reviewed by the HREC was:
Version: 3
Date: 22 Jul 2019

Please note the following conditions of approval:
• **The approval is for a period of 5 years from the date of this e-mail (13 August 2024)** , on condition of the submission of Annual Reports. The Co-ordinating Investigator is required to notify the HREC 6 months prior to this date if the project is expected to extend beyond the original approval date at which time the HREC will advise of the requirements for ongoing approval of the study.
•The Co-ordinating Investigator will provide an annual progress report at the anniversary date of the project as well as a final study report at the completion of the project within the Research Ethics and Governance Information System (REGIS).
•The Co-ordinating Investigator will immediately report anything which might warrant review of ethical approval of the project in the specified format, including unforeseen events that might affect continued ethical acceptability of the project and any complaints made by study participants regarding the conduct of the study.
•Proposed changes to the research protocol, conduct of the research, or length of HREC approval will be provided to the HREC for review, in the specified format.
•The HREC will be notified, giving reasons, if the project is discontinued before the expected date of completion.
•Investigators holding an academic appointment (including conjoint appointments) and students undertaking a project as part of a university course are advised to contact the relevant university HREC regarding any additional requirements for the project.

This email constitutes ethical and scientific approval only. This project cannot proceed at any site until separate research governance authorisation has been obtained from the Institution under whose auspices the research will be conducted at that site.This HREC is constituted and operates in accordance with the National Statement on Ethical Conduct in Human Research (2007).

The processes used by this HREC to review multi-centre research proposals have been certified by the National Health and Medical Research Council. No members with a conflict of interest were present during review of this project.

Please contact us if you would like to discuss any aspects of this process further, as per the contact details below. We look forward to managing this application with you throughout the project lifecycle.

Monique Macara

Research Ethics Manager
The Kolling Research Office - Northern Sydney Local Health District
Ph 9926 4590 | Fax 9926 6179 | monique.macara@health.nsw.gov.au
http://www.nslhd.health.nsw.gov.au/AboutUs/Research/Office

Appendix B. Participant Information Sheet: Modified Delphi Study

Rehabilitation Competency Framework

Delphi Study – Building consensus on framework items

PARTICIPANT INFORMATION STATEMENT

(1) What is this survey about?

This survey is the first round of a modified Delphi study being conducted in collaboration with the World Health Organization and forms part of a doctoral research study on the development and application of the Rehabilitation Competency Framework. You have been nominated to participate by a member of the Technical Working Group supporting the development of the Framework based on your knowledge and experience as a rehabilitation provider, manager, researcher, educator or service developer.

The aim of the survey is to build consensus around the various items of the Rehabilitation Competency Framework by systematically gathering feedback from a range of stakeholders from different geographical regions and professional backgrounds. The Delphi approach involves rounds of feedback that are collated to inform changes to the framework, which are subsequently shared for further feedback until maximum consensus is achieved. This study will ideally involve no more than two rounds.

This survey is the first round of questions and is based on items of the Rehabilitation Competency Framework that have been developed through review of relevant literature, existing rehabilitation frameworks and with the expert input of the Technical Working Group.

(2) What is the Rehabilitation Competency Framework?

The Rehabilitation Competency Framework encompasses the competencies and activities, as well as underlying knowledge and skills required to deliver and support rehabilitation. The Framework aims to be discipline-, health condition-, and setting-neutral, with the intention of it having broad application and relevance. It serves to strengthen a shared understanding of rehabilitation; facilitate communication in and between health, education and labor sectors; demonstrate the scope and depth of rehabilitation competency; and facilitate workforce evaluation and planning. It has also been designed to be used through an 'adopt and adapt' approach for application into local, context- and purpose-specific frameworks for purposes such as shaping training and education and performance evaluation. As a global resource, it is essential that the Rehabilitation Competency Framework is shaped by input from a representative sample of the international rehabilitation community.

(3) Who is running the study?

The study is being carried out by the following researchers:

- Ms Jody-Anne Mills, PhD Candidate, John Walsh Centre for Rehabilitation Research, The University of Sydney; and Consultant, Rehabilitation Programme, World Health Organization, Geneva, Switzerland.
- Professor James Middleton, John Walsh Centre for Rehabilitation Research, The University of Sydney.

- Professor Stephany Short, Faculty of Health Sciences, The University of Sydney.
- Dr Alarcos Cieza, Coordinator, Rehabilitation Programme, World Health Organization, Geneva, Switzerland.

(4) What will the survey involve?

The online survey asks you to agree or disagree (with the option to not comment) with items in the Rehabilitation Competency Framework and provide suggestions for changes where you disagree. There is also space to provide general comments for each competency and activity.

(5) How much time will it take to complete the survey?

Depending on the extent of your agreement with the items presented, the survey could take between 45-120 minutes to complete. You can stop and return to the survey at any point, and you are encouraged to complete it over a number of sittings. You will have a one month window in which to complete the whole survey.

The modified Delphi study will likely not involve more than 2 rounds (i.e., two surveys). The survey for round 2 will be sent approximately one month after this survey (round 1) has closed. If a third round is required to reach consensus, this will be sent to you approximately 1 month after the round 2 survey has closed. Each round will use an online survey and the time to complete should be reduced each time.

(6) Can I withdraw from the study once I've started?

You are free to withdraw from the modified Delphi study at any time. You can do this by contacting the Principle Investigator at millsj@who.int and request that your answers be removed.

(7) Are there any risks or costs associated with being in the study?

Aside from your time, we do not expect that there will be any costs associated with taking part in this survey. No risks have been identified with participating.

(8) Are there any benefits associated with participating in the survey?

We cannot guarantee that you will receive any direct benefits from taking part in the survey. The resulting Rehabilitation Competency Framework will be an open access resource, and you may benefit from its use.

(9) What will happen to my personal information that is collected in the survey?

This survey asks person information about you, including your name, age group, gender, nationality, countries you have worked and your professional background. By providing your consent to participate in the survey, you are agreeing to us collecting this information for the purposes of data collation and analysis that will help the researchers interpret the results.

Your personal information will not be published or disclosed without your permission and will be stored securely. Your personal information will not be published or disclosed without your permission and will

be stored securely on RedCap. RedCap (Research Electronic Data Capture) is a web-based application used to create databases and projects for research. It is Health Insurance Portability and Accountability Act-compliant and highly secure. The RedCap database where your personal information will be stored is password protected and only the researchers listed under point five will have access to it and be able to identify your responses in the survey data. Data may be exported out of RedCap in order to be analyses (such as in Microsoft Excel). When this occurs, your information will be de-identified and coded, meaning your personal details will not be included, and a number will instead be assigned to the data you entered. This deidentified information will be saved in a password protected folder in accordance with research guidelines.

Study findings may be published anonymously, meaning you will not be identified in these publications.

(10) Can I tell other people about the survey?

You can tell other people that you are participating in the survey but are asked not to share the survey or the draft Rehabilitation Competency Framework you have been provided. This is because the sample of participants invited to participate in the survey has been selected to include a balanced representation of people with different professional backgrounds and geographical regions.

(11) Will I be told the results of the study?

The results of the study will be published in an open access journal. Participants will be informed when it is available and provided with the link.

(12) What if I have a complaint or any concerns about the study?

Research involving humans in Australia is reviewed by the Human Research Ethics Committee (HREC). The ethical aspects of this study have been approved by the Northern Sydney Local Health District Human Research Ethics Committee, protocol no. 2019/ETH12113. As part of this process, we have agreed to carry out the study according to the National Statement on Ethical Conduct in Human Research (2007). This statement has been developed to protect people who agree to take part in research studies.

If you are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the university using the details outlined below. Please quote the study title and protocol number.

(13) Consenting to take part in this survey

This Participant Information Statement has provided an overview of the Rehabilitation Competency Framework and details of the modified Delphi study. It is important that you know what is involved, so if you have any questions or would like further information, please contact the Principal Investigator on millsj@who.int

Being in this study is completely voluntary and you do not have to take part. Your decision whether to participate will not affect your current or future relationship with the researchers or anyone else at the University of Sydney or at the World Health Organization.

By giving consent to take part in this survey you are telling us that you:

- Understand what you have read.
- Agree to take part in the survey as outlined below.
- Agree to the use of your personal information as described.

Research Ethics Manager - Research Governance and Compliance Team
The Kolling Research Office - Northern Sydney Local Health District
Level 13, Kolling Building
Tel (02) 9926 4590 | NSLHD-Research@health.nsw.gov.au
http://www.nslhd.health.nsw.gov.au/AboutUs/Research/Office

Appendix C. Ethics Approval Letter: Service User Consultation

From: no_reply@d39cnuplf88huy.cloudfront.net
Subject: 2019/ETH12113: Application HREA - Approved
Date: 13 August 2019 at 8:54 pm
To: millsj@who.int

Date of Decision Notification: **13 Aug 2019**

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2019/ETH12113: Rehabilitation Competency Framework: Modified Delphi study

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  - Leaderhip-1-01-JULY-2019
  - Ed. and development -1-01-JULY-2019
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The Human Research Ethics Application reviewed by the HREC was:
Version: 3
Date: 22 Jul 2019

Please note the following conditions of approval:
• **The approval is for a period of 5 years from the date of this e-mail (13 August 2024)** , on condition of the submission of Annual Reports. The Co-ordinating Investigator is required to notify the HREC 6 months prior to this date if the project is expected to extend beyond the original approval date at which time the HREC will advise of the requirements for ongoing approval of the study.
•The Co-ordinating Investigator will provide an annual progress report at the anniversary date of the project as well as a final study report at the completion of the project within the Research Ethics and Governance Information System (REGIS).
•The Co-ordinating Investigator will immediately report anything which might warrant review of ethical approval of the project in the specified format, including unforeseen events that might affect continued ethical acceptability of the project and any complaints made by study participants regarding the conduct of the study.
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•The HREC will be notified, giving reasons, if the project is discontinued before the expected date of completion.
•Investigators holding an academic appointment (including conjoint appointments) and students undertaking a project as part of a university course are advised to contact the relevant university HREC regarding any additional requirements for the project.

This email constitutes ethical and scientific approval only. This project cannot proceed at any site until separate research governance authorisation has been obtained from the Institution under whose auspices the research will be conducted at that site.This HREC is constituted and operates in accordance with the National Statement on Ethical Conduct in Human Research (2007).

The processes used by this HREC to review multi-centre research proposals have been certified by the National Health and Medical Research Council. No members with a conflict of interest were present during review of this project.

Please contact us if you would like to discuss any aspects of this process further, as per the contact details below. We look forward to managing this application with you throughout the project lifecycle.

Monique Macara

Research Ethics Manager
The Kolling Research Office - Northern Sydney Local Health District
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http://www.nslhd.health.nsw.gov.au/AboutUs/Research/Office

Appendix D. Participant Information Sheet: Service User Consultation

Rehabilitation Competency Framework: Service user consultation

PARTICIPANT INFORMATION SHEET

You are invited to take part in this survey to gather feedback from rehabilitation service-users about what is important to them in regard to the competencies of rehabilitation providers, and whether this is adequately addressed in the Rehabilitation Competency Framework (RCF). The survey is being conducted in collaboration with the World Health Organization and forms part of a doctoral research study on the development and application of the Rehabilitation Competency Framework. You have been invited to participate by a rehabilitation service you have accessed in the past or are currently using, on behalf of the World Health Organization and the University of Sydney Northern Clinical School.

Whether or not you take part is your choice. If you don't want to take part, you don't have to give a reason, and it won't affect a rehabilitation service you have accessed in the past or are currently using.

This Participant Information Sheet will help you decide if you'd like to take part. It sets out why we are doing the study, what your participation would involve, what the benefits and risks to you might be, and what would happen after the study ends. You do not have to decide today whether or not you will participate in this study.

What is the purpose of the study?

The Rehabilitation Competency Framework encompasses the competencies and activities, as well as underlying knowledge and skills required to deliver and support rehabilitation. It aims to capture how rehabilitation providers complete their roles' successfully and what they might be expected to do. The RCF is a global framework that applies to any rehabilitation provider regardless of their discipline, the setting they work in or the people that they treat. It has been designed to be used to design local, context- and purpose-specific frameworks for purposes such as shaping training and education, performance evaluation and strategic planning. As a global resource, it is essential that the RCF is shaped by input of a wide range of rehabilitation service-users.

This survey refers to the latest draft of the Rehabilitation Competency Framework that has been developed through review of relevant literature, existing rehabilitation frameworks and with the expert input of the Technical Working Group.

What will my participation in the study involve?

The online survey asks for some details about you (such as your age category, nationality and job) and your rehabilitation experience, before asking for your feedback on the RCF. It does this through presenting relevant parts of the framework and asking to what extent you agree with them, and whether you think that the framework is adequately capturing what you think is most important. There is also space to provide general comments and suggestions.

The survey should not take longer than 30 minutes, depending on how much feedback you provide. You will have a three-week window in which to complete the survey.

What are the possible benefits and risks of this study?

Aside from your time, we do not expect that there will be any costs associated with taking part in this survey. No risks have been identified with participating.

We cannot guarantee that you will receive any direct benefits from taking part in the survey. The resulting RCF will be an open access resource, and you may benefit from its use as a resource for strengthening the rehabilitation workforce.

What are my rights?

You are free to withdraw from the survey at any time. You can do this by contacting the Principle Investigator at millsj@who.int and request that your answers be removed. The contact details of an independent ethics committee are also included below.

What happens after the study or if I change my mind?

By providing your consent to participate in the survey, you are agreeing to us collecting this information for the purposes of data collation and analysis that will help the researchers interpret the results.

Your personal information will not be published or disclosed without your permission and will be stored securely on REDCap. REDCap (Research Electronic Data Capture) is a web-based application used to create databases and projects for research. It is Health Insurance Portability and Accountability Act-compliant and highly secure. The REDCap database where your personal information will be stored is password protected and only the researchers listed under point five will have access to it and be able to identify your responses in the survey data. Data may be exported out of REDCap in order to be analyzed (such as in Microsoft Excel).

Study findings may be published anonymously, meaning you will not be identified in these publications. We may quote your feedback in a publication but will always ensure that quotes do not include any identifiable information.

Who do I contact for more information or if I have concerns?

Research involving humans in Australia is reviewed by the Human Research Ethics Committee (HREC). The ethical aspects of this study have been approved by the Northern Sydney Local Health District Human Research Ethics Committee, protocol no. 2019/ETH12609. As part of this process, we have agreed to carry out the study according to the National Statement on Ethical Conduct in Human Research (2007). This statement has been developed to protect people who agree to take part in research studies.

If you are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the university using the details outlined below. Please quote the study title and protocol number (2019/ETH12609).

Reviewing HREC name *Northern Sydney Local Health District HREC*

HREC Contact	*Research Ethics Manager*
Telephone	*(02) 9926 4590*
Email	*NSLHD-Research@health.nsw.gov.au*
Website	http://www.nslhd.health.nsw.gov.au/AboutUs/Research/Office

This research is being carried out by the following researchers:

- Ms Jody-Anne Mills, PhD Candidate, John Walsh Centre for Rehabilitation Research, The University of Sydney, and Consultant, Rehabilitation Programme, World Health Organization, Geneva, Switzerland.
- Professor James Middleton, John Walsh Centre for Rehabilitation Research, The University of Sydney.
- Professor Stephany Short, Faculty of Health Sciences, The University of Sydney.
- Dr Alarcos Cieza, Coordinator, Rehabilitation Programme, World Health Organization, Geneva, Switzerland.

Appendix E. Health conditions, assessments and interventions included in the Guide for Rehabilitation Workforce Evaluation task mapping

Health conditions

- Acute myocardial infarction
- Amputation
- Cerebral palsy
- Chronic obstructive pulmonary disease
- Hearing impairment
- Musculoskeletal conditions (lower back pain, neck pain, arthritis, and fracture)
- Schizophrenia
- Spinal cord injury
- Stroke.

Assessment tasks

Assessment of the environment	Assessment of the home environment	
	Assessment of the educational environment	
	Assessment of the workplace	
Assessment of body structures and functions	Assessment of mental functions	Assessment of cognitive functions
		Assessment of fatigue
		Assessment of sensory perception and processing challenges
		Assessment of auditory perception
		Assessment of symptoms of psychosis (positive and negative)
		Assessment of problems with behavior
	Screening for vision impairment	
	Screening for hearing impairment	
	Assessment of vestibular functions	
	Assessment of speech, language and communication	Assessment of communication
		Assessment of cognitive functions of language
		Assessment of voice functions
		Assessment of speech functions
	Assessment of swallowing	
	Assessment of food selectivity and sensitivity	

	Assessment of pain	
	Assessment of respiratory functions	
	Assessment of the skin	
	Assessment of cardiovascular functions	Assessment of heart functions
		Assessment of vascular functions
		Assessment of blood pressure functions
		Assessment of edema
	Assessment of movement functions	Assessment of balance
		Assessment of voluntary movements
		Assessment of gait pattern and walking
	Assessment of bones and joints	Assessment of joint mobility
		Assessment of heterotopic ossification
		Assessment of structure of the bones
		Assessment of integrity of hip joint and vertebral column
	Assessment of motor functions	Assessment of muscle power
		Assessment of muscle tone
	Assessment of fall risk	
Assessment of activities and participation	Assessment of activities	Assessment of mobility
		Assessment of hand and arm use
		Assessment of wheelchair skills
		Assessment of driving
		Assessment of exercise capacity
		Assessment of activities of daily living
		Assessment of interpersonal interactions and relationships
	Assessment of participation	Educational assessment
		Vocational assessment
		Assessment of participation in community and social life
	Assessment of lifestyle risk factors	
	Assessment of decision making	
	Assessment of self-management skills	

Intervention tasks

Tasks addressing the environment	Environmental interventions	Environmental enrichment
		Environmental modification at home
		Environmental modification at school
		Environmental modification at workplace
Tasks addressing body structures and functions	Manual therapy interventions	Massage
		Spinal manipulative therapy
	Nerve system interventions	Transcutaneous electrical stimulation
		Neuromuscular electrical stimulation (incl. Functional electrical stimulation)
		Antispastic pattern positioning
	Vascular, lymphatic and skin interventions	Intermittent pneumatic compression
		Retrograde massage
	Movement interventions	Muscle strengthening exercises
		Graded sitting and standing training
		Range of motion exercises
		Stretching
		Balance training
		Functional training
		Wheelchair skills training
		Gait training
		Transfer training
	Cardiorespiratory interventions	Respiratory (Breathing) exercises
		Breathing control techniques
		Respiratory muscle strengthening exercises
		Airway clearance techniques
		Fitness training
	Communication interventions	Language therapy
		Vocal training
		Speech therapy
		Verbal or sign language training
	Swallow and salivation interventions	Swallowing therapy
	Sensory interventions	Sensory stimulation
		Pain-relieving positioning
		Thermotherapy
		Mirror therapy
		Biofeedback
	Cognitive interventions	Cognitive stimulation
		Cognitive training

		Visual perceptual training
		Cognitive behavioral therapy
		Psychological support/counseling
	Vestibular interventions	Vestibular training
Tasks addressing activities and participation	Self care interventions	Energy conservation techniques
		Caregiver and family training and support
		Peer support
		Psychosocial support
		Activity of daily living (ADL) training
		Functional positioning
	Participation focused interventions	Educational counseling, training and support for participation in education
		Supported employment
		Vocational counseling, training, or support

Intervention tasks: Assistive products

Assistive products for self-care	Assistive products for pressure relief
	Chairs for shower/bath/toilet
	Assistive products for eating and drinking
Assistive products for seating and mobility	Adapted seating equipment
	Assistive products for positioning
	Lower limb orthoses
	Spinal orthoses
	Upper limb orthoses
	Lower limb prostheses
	Upper limb prostheses
	Portable ramps
	Rollators
	Crutches, axillary/ elbow
	Canes/sticks
	Walking frames/ walkers
	Standing frames
	Wheelchairs
	Tricycles
	Hand rails/grab bars
Assistive products for communication	Communication boards/books/cards

Assistive products for hearing	Hearing aids
Assistive products for lymphatic and cardiovascular function	Compression garments

Intervention tasks: Pharmacological agents

Administering and prescribing pharmacological agents for mental functions	Antianxiolytics
	Amantadine
	Antidepressants (selective serotonin reuptake inhibitors)
	Methylphenidate
Administering and prescribing pharmacological agents for sleep functions	Zolpidem, Zopiclone
Administering and prescribing pharmacological agents for psychomotor functions	Second generation antipsychotics
Administering and prescribing pharmacological agents for motor functions and mobility	Chemodenervation (Botulinum toxin, phenol injections
	Bisphosoponates (including Etidronate)
	Oral muscle relaxants (e.g., Baclofen, benzodiazepam, tizanidine, dantrolene)
	Non-steroidal anti-inflammatory drugs
Administering and prescribing pharmacological agents for pain	Analgesics (including non-opiod analgesics, non-steroidal anti-inflammatory drugs, opiod analgesics, antidepressants, anticonvulsants.
Administering and prescribing pharmacological agents for respiratory functions	Bronchodilators
	Supplementary oxygen
Administering and prescribing pharmacological agents for cardiovascular functions	Antihypotensives (Fludrocortisone, Midodrine)
	Anticoagulants (Direct Oral Anticoagulants, Low-molecular-weight heparin (LMWH), Unfractionated heparin (UFH), Vitamin K antagonist)
	Antidepressants

Appendix F. Ethics Approval: Key Informant Interviews

THE UNIVERSITY OF SYDNEY

Research Integrity & Ethics Administration
HUMAN RESEARCH ETHICS COMMITTEE

Monday, 20 December 2021

Prof James Middleton
Kolling Institute; Faculty of Medicine and Health
Email: james.middleton@sydney.edu.au

Dear James,

The University of Sydney Human Research Ethics Committee (HREC) has considered your application.

I am pleased to inform you that after consideration of your response, your project has been approved.

Details of the approval are as follows:

Project No.:	**2021/824**
Project Title:	**Application of competency analysis within national rehabilitation workforce evaluation- key informant interviews**
Authorised Personnel:	**Middleton James; Mills Jody-anne; Short Stephanie; Cieza Alarcos;**
Approval Period:	**20/12/2021 to 20/12/2025**
First Annual Report Due:	**20/12/2022**

Documents Approved:

Date Uploaded	Version Number	Document Name
10/12/2021	Version 2	Correspondence_PO_KIs_tracked
30/11/2021	Version 2	Draft GROWE Data analysis toolbox
30/11/2021	Version 1	Key informant interview questions
30/11/2021	Version 1	Letter of support from WHO
10/12/2021	Version 2	Participant Consent Form (TC version)
10/12/2021	Version 2	Participant information Statement (TC version)
30/11/2021	Version 1	Pilot version of the GROWE Guide
30/11/2021	Version 1	Pilot version of the GROWE Handbook
11/09/2021	Version 1	Guide for Rehabilitation Workforce Evaluation
11/09/2021	Version 1	GROWE Project Officer Handbook

Special Condition/s of Approval

- Please use USYD email address in the recruitment letter as described. Please update.

Condition/s of Approval

- Research must be conducted according to the approved proposal.
- An annual progress report must be submitted to the Ethics Office on or before the anniversary of approval and on completion of the project.
- You must report as soon as practicable anything that might warrant review of ethical approval of the project including:
  - Serious or unexpected adverse events (which should be reported within 72 hours).
  - Unforeseen events that might affect continued ethical acceptability of the project.
- Any changes to the proposal must be approved prior to their implementation (except where an amendment is undertaken to eliminate *immediate* risk to participants).

Research Integrity & Ethics Administration
Research Portfolio
Level 3, F23 Administration Building
The University of Sydney
NSW 2006 Australia

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E human.ethics@sydney.edu.au
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ABN 15 211 513 464
CRICOS 00026A

THE UNIVERSITY OF SYDNEY

- Personnel working on this project must be sufficiently qualified by education, training and experience for their role, or adequately supervised. Changes to personnel must be reported and approved.
- Personnel must disclose any actual or potential conflicts of interest, including any financial or other interest or affiliation, as relevant to this project.
- Data and primary materials must be retained and stored in accordance with the relevant legislation and University guidelines.
- Ethics approval is dependent upon ongoing compliance of the research with the *National Statement on Ethical Conduct in Human Research*, the *Australian Code for the Responsible Conduct of Research*, applicable legal requirements, and with University policies, procedures and governance requirements.
- The Ethics Office may conduct audits on approved projects.
- The Chief Investigator has ultimate responsibility for the conduct of the research and is responsible for ensuring all others involved will conduct the research in accordance with the above.

This letter constitutes ethical approval only.

Please contact the Ethics Office should you require further information or clarification.

Sincerely,

[redacted]

Associate Professor Helen Mitchell
Chair
Human Research Ethics Committee (HREC 1)

The University of Sydney of Sydney HRECs are constituted and operate in accordance with the National Health and Medical Research Council's (NHMRC) National Statement on Ethical Conduct in Human Research (2018) and the NHMRC's Australian Code for the Responsible Conduct of Research (2018)

Appendix G. Participant Information Sheet: Key Informant Interviews

Participant Information Statement

Research Study: Application of competency analysis within national rehabilitation workforce evaluation: Key informant interviews

Prof. James Middleton (Responsible Researcher)
John Walsh Centre for Rehabilitation Research, Faculty of Medicine and Health, Kolling Institute of Medical Research
Phone: +61 2 9926 4962 | Email: james.middleton@sydney.edu.au
Ms Jody-Anne Mills (PhD candidate) | Email: jmil9121@uni.sydney.edu.au

1. What is this study about?

We are conducting a research study about the experience of conducting a national rehabilitation workforce evaluation that includes competency analysis. Competency analysis has not historically been integrated in national workforce evaluation, and the feasibility and value of doing so is not yet well understood. This study aims to learn about the experience of conducting the evaluation, with a particular focus on the competency analysis exercises, including how resource-intensive they are to complete, what information was gleaned from them (if any), and how this is used. The findings of the study will help guide decisions around the ongoing inclusion of competency analysis in national rehabilitation workforce evaluation and what changes may need to be made to the exercises to improve their feasibility and increase their impact. Taking part in this study is voluntary.

Please read this sheet carefully and ask questions about anything that you don't understand or want to know more about.

2. Who is running the study?

The study is being carried out by the following researchers:

- **Ms Jody-Anne Mills** (principal investigator), John Walsh Centre for Rehabilitation Research, Faculty of Medicine and Health, Kolling Institute of Medical Research, Sydney, Australia; and consultant for the Rehabilitation Programme, Department of Noncommunicable Diseases, World Health Organization, Geneva, Switzerland.
- **Prof. James Middleton** (primary supervisor), John Walsh Centre for Rehabilitation Research, Faculty of Medicine and Health, Kolling Institute of Medical Research, Sydney, Australia
- **Hon. Prof. Stephanie Short** (supervisor), University of Sydney, Sydney, Australia
- **Dr Alarcos Cieza** (oversight), Unit head, Sensory Function, Disability and Rehabilitation, Department of Noncommunicable Diseases, World Health Organization, Geneva, Switzerland.

Jody-Anne Mills is conducting this study as the basis for the degree of Doctor of Philosophy (PhD) at The University of Sydney.

This study is being funded by USAID.

3. What will the study involve for me?

If you decide to take part in this study, you will be asked to participate in an online interview/discussion with the principal investigator (Jody-Anne Mills). This will take approximately 30minutes and will be scheduled for a time that suits you. The questions will cover how you found the experience of participating in the evaluation, completing the competency analysis exercises, or compiling the data (as relevant to you), what the exercise revealed, and how this information was or wasn't used.

The interviews will be conducted over Microsoft Teams, and the audio will be recorded and transcribed. The interviews will be conducted in English if possible; only a working level of English is needed to participate- questions can be repeated or rephrased wherever needed. However, interpretation can be made available if requested.

4. Can I withdraw once I've started?

Being in this study is completely voluntary and you do not have to take part.

Your decision will not affect your current or future relationship with the researchers or anyone else at The University of Sydney.

We do not anticipate your decision will affect your relationship with the World Health Organization or Ministry of Health of Poland.

If you decide to take part in the study and then change your mind, you can withdraw by informing Jody-Anne Mills via email (jmil9121@uni.sydney.edu.au) up until the results have been submitted for publication.

If you take part in an interview you may refuse to answer any questions that you do not wish to answer.

5. Are there any risks or costs?

Aside from giving up your time, we do not expect that there will be any risks or costs associated with taking part in this study.

6. Are there any benefits?

You will not receive any direct benefits from being in the study. The knowledge and experiences you share will inform if or how the World Health Organization amends the

Guide for Rehabilitation Workforce Evaluation to ensure that it is of greatest use and impact in countries.

7. What will happen to information that is collected?

By providing your consent, you are agreeing to us collecting information about you for the purposes of this study.

Any information you provide us will be stored securely and we will only disclose it with your permission, unless we are required by law to release information. We are planning for the study findings to be published. The publication may use quotes and if any from you are to be used, these will be emailed to you and your permission will be sought.

Every effort will be made to protect your identity, however there is a risk you may be identifiable in these publications if somebody were to know who you are by the country you live in and your role in the evaluation.

The following information will be collected from you and may be disclosed if/when the study is published:

- The role you played in the evaluation (e.g., project officer, Rehabilitation Workforce Task Team member or sub-group leader)
- The country in which the evaluation took place
- When the competency analysis took place

Your name will not be used.

The researchers listed above (see point 2) will have access to your interview recordings and transcripts and may know your identity. The recording and transcript will be kept in a password protected folder on the University of Sydney's OneDrive system. It will be destroyed after 10 years.

8. Will I be told the results of the study?

You have a right to receive feedback about the overall results of this study. If you would like to know about the findings of the study (in the form of a brief lay summary) and if/when they are published, you can indicate this on your participant consent form.

9. What if I would like further information?

When you have read this information, the following researcher/s will be available to discuss it with you further and answer any questions you may have:

Jody-Anne Mills, principal investigator, University of Sydney, and consultant, World Health Organization
Email: jmil9121@uni.syndey.edu.au

10. What if I have a complaint or any concerns?

The ethical aspects of this study have been approved by the Human Research Ethics Committee (HREC) of The University of Sydney (HREC Approval Number 2021/824) according to the *National Statement on Ethical Conduct in Human Research (2007).*

If you are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the University:

Human Ethics Manager
human.ethics@sydney.edu.au
+61 2 8627 8176

This information sheet is for you to keep

Appendix H. Participant Consent Form: Key Informant Interviews

Participant Consent Form

Research Study: Application of competency analysis within national rehabilitation workforce evaluation- KI interviews

Prof. James Middleton (Responsible Researcher)
John Walsh Centre for Rehabilitation Research, Faculty of Medicine and Health, Kolling Institute of Medical Research
Phone: +61 2 9926 4962 | Email: james.middleton@sydney.edu.au
Ms Jody-Anne Mills (PhD candidate) | Email: jmil9121@uni.sydney.edu.au

Participant Name _____

I agree to take part in this research study. In giving my consent, I confirm that that:

- The details of my involvement have been explained to me, and I have been provided with a written Participant Information Statement to keep.
- I understand the purpose of the study is to investigate the integration of competency analysis within national rehabilitation workforce evaluation.
- I acknowledge that the risks and benefits of participating in this study have been explained to me to my satisfaction.
- I understand that in this study I will be required to participate in an interview to discuss how competency analysis was used in the rehabilitation workforce evaluation conducted in my country.
- I understand that my interview will be audio recorded and transcribed.
- I understand that being in this study is completely voluntary.
- I am assured that my decision to participate will not have any impact on my relationship with the research team, the University of Sydney, or the World Health Organization.
- I understand that I am free to withdraw from this study at any time and that I can choose to withdraw any information I have already provided (unless the data has already been de-identified or published).
- I have been informed that the confidentiality of the information I provide will be protected and will only be used for purposes that I have agreed to. I understand that information about me will only be told to others with my permission, except as required by law.
- I understand that the results of this study may be published. Although every effort will be made to protect my identity, I may be identifiable in these publications due to the nature of the study or results.

- I confirm the following:

I consent to recordings (audio)	Yes ☐	No ☐
I would like to review my interview transcripts	Yes ☐	No ☐
I would like feedback on the overall results of this study	Yes ☐	No ☐

If you answered **yes**, please provide your preferred contact details (email/telephone/postal address):

_____

_____

_____

_____

- I understand that after I sign and return this consent form it will be retained by the researcher, and that I may request a copy at any time.

Participant Name _____

Signature _____

Date _____

Appendix I. Additional Manuscripts Published During the Term of the Candidature (2018-2023)

Campbell, J. and Mills, J.-A. (2022) 'Health systems and policy research needed to strengthen the rehabilitation workforce', Bulletin of the World Health Organization, 100(11): 747-748.

Kamenov, K. Mills, J. Chatterji, S., & Cieza, A. (2018) 'Needs and unmet needs for rehabilitation: A scoping review', *Disability and Rehabilitation*, 41(10): 1227-1237.

Mills, J., Skelton, P., Jacquemin, G. Norton, I. Rau, B. Scherrer, V. Stephenson, F. & Gosney, J. (2018) **'**Development and implementation of the World Health Organization 'Emergency medical teams: Minimum technical standards and recommendations for rehabilitation', *PLOS Disasters*. July 9.

Yu, M., Keel, S. Mills, J. -A., and Müller, A. (2022) 'Investigating the need and structure for a comprehensive eye care competency framework', *BMJ Open Ophthalmology*, 7: e001112.