Review title

Physical functioning in pediatric intensive care survivors and its associated determinants: A scoping review protocol.

Authors

de Boer RM[1], Bossen D[1], Maaskant JM[2], van der Schaaf M[1´2], Alsem MW[2], Knoester H[3], Gemke RJBJ, [4´5´6], van Woensel JBM[3], Oosterlaan J[7], Engelbert RHH [1´2]

1 Achieve, Faculty of Health, Amsterdam University of Applied Sciences, Amsterdam, the Netherlands.
2 Amsterdam UMC, University of Amsterdam, Department of Rehabilitation, Amsterdam Movement Sciences, Meibergdreef 9, Amsterdam, The Netherlands.
3 Pediatric Intensive Care Unit, Emma Childrens Hospital, Amsterdam University Medical Centers, Meibergdreef 9, Amsterdam, The Netherlands.
4 Reproduction and Development, Amsterdam UMC, Amsterdam, The Netherlands.
5 Amsterdam Public Health Research Institute, Amsterdam, The Netherlands.
6 Department of Paediatrics, Amsterdam UMC, Vrije Universiteit Amsterdam, VU University medical centre, de Boelelaan 1117, Amsterdam, The Netherlands.
7 Emma Children's Hospital, Amsterdam UMC, University of Amsterdam, Emma Neuroscience Group, department of Pediatrics, Amsterdam Reproduction & Development, Amsterdam, The Netherlands.

Correspondence: Prof. dr. R.H.H. Engelbert, r.h.h.engelbert@hva.nl

Abstract

Objective:

The objective of this scoping review is threefold: (1) to describe outcomes of and determinants for physical functioning in pediatric intensive care unit (PICU) survivors evaluated during and/or after their PICU stay, (2) to provide an overview how physical functioning and its associated determinants in this population are reported, measured and classified in accordance with the International Classification of Functioning, Disability and Health-Children and Youth framework (ICF-CY) components and (3) to synthesize key gaps in knowledge and research and clinical recommendations related to our review questions.

Introduction:

Optimal physical functioning in children is of major importance in their developmental trajectories and for the prevention and recovery of health problems across lifespan. PICU children are at high risk of poor physical functioning during and after critical illness. A recent overview of the literature, concerning evaluation of physical functioning in PICU survivors according to the ICF-CY components, is lacking.

Inclusion criteria:

This review includes empirical studies reporting outcomes and determinants of physical functioning in PICU survivors evaluated during and/or after PICU stay. All English language studies reporting empirical data will be included with no restrictions set on the types of study designs used.

Methods:

This review will be conducted in accordance with the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) statement. To locate studies eligible for inclusion, the electronic databases Pubmed, EMBASE, CINAHL and Cochrane Library will be searched from the earliest records to October 2019. Study selection will be performed by two independent reviewers. Covidence software will be used to screen titles and abstracts as well as the full-text of included studies. Data extraction will be conducted using a customized form. The extracted data will be presented in diagrammatic or tabular form with an accompanying narrative summary.

Keywords:

children; clinical outcomes, ICF-CY**,** Pediatric intensive care; Physical functioning; Pediatric post intensive care syndrome

Rationale

Ongoing morbidity is common in pediatric intensive care unit (PICU) survivors. This accounts for both previously healthy children as well as those with underlying chronic diseases for which PICU admission was necessary (1-5). In recent literature, a wide range of poor physical, neurocognitive and psychological functioning outcomes have been identified in adults during and after their ICU stay (Post Intensive care syndrome; PICS) (6-9). A growing number of studies in PICU survivors report effects on physical, neurocognitive, psychological, and social health in children after PICU discharge. Recently a framework for PICS-p is defined (10-12).

In general, optimizing the level of physical functioning in children is of major importance in their developmental trajectories and the prevention and recovery of various health problems across lifespan (13, 14). PICU survivors are at high risk of poor levels of physical functioning, what can have a large impact on global functioning and health in both a short- and long-term perspective (7, 10, 15). Recent studies have shown that, in addition to quality of life, physical functioning is one of the most important domains that should be universally assessed and treated to optimize recovery from critical illness (5, 16, 17).

The level of physical functioning in childhood can be classified according to the International Classification of Functioning, Disability and Health-Children and Youth framework (ICF-CY) (18). Both clinically and methodologically of importance, physical functioning assessment and describing the level of functioning in PICU survivors should preferably cover all components of the ICF-CY framework. This will provide support in clarifying the clinical course of physical functioning, identifying patients at risk of poor level of physical functioning and provides important information for personalized treatment strategies. Whether outcome measures used in PICU patients cover the different physical functioning related ICF components has yet to be evaluated. To our knowledge, a recent overview of the literature, concerning evaluation of physical functioning in PICU survivors according to the ICF-CY components, is lacking.

Therefore the objective of this scoping review is threefold: (1) to describe outcomes of and determinants for physical functioning in PICU survivors evaluated during and/or after their PICU stay, (2) to provide an overview how physical functioning and its associated determinants in this population are reported, measured and classified in accordance with the ICF-CY components and (3) to synthesize key gaps in knowledge and research and clinical recommendations related to our review questions.

Identification of research questions:

Three research questions are formulated: (1) what is known about physical functioning and its associated determinants in PICU survivors evaluated during and/or after their PICU stay, (2) how are these outcomes of and determinants for physical functioning in this population reported, measured and classified in accordance with the ICF-CY components and (3) which key gaps in knowledge and research and clinical recommendations are made by the cited authors related to our review questions.

Inclusion criteria

The inclusion criteria below have been developed based on the Population, Concept and Context (PCC) framework.

Participants

This review will consider studies including PICU survivors up to the age of 18 years at PICU admission.

Concept

This review will consider empirical studies reporting outcomes and determinants of physical functioning in PICU survivors evaluated during and/or after their PICU stay. Physical functioning refers to the description used in the ICF-CY framework. More specifically, physical functioning will be conceptualized as an umbrella term encompassing body functions and structures, activities and participation related to movement and are the result of the interaction between the child's health condition and both personal and environmental factors. Physical functioning also encloses the term disability as an umbrella term for impairments, activity limitations and participation restrictions in the domain of physical health (18).

To capture all possible relevant studies, the search will be extended to the construct 'quality of life', because physical functioning is often included as one aspect of quality of life.

Context

Articles will be considered for inclusion in this review within the context of the Pediatric Intensive Care Unit (PICU).

Types of sources

All English language studies reporting empirical data will be included with no restrictions set on the types of study designs used. Reviews will be included as a secondary source for synthesizing key

gaps in knowledge and research and clinical recommendations related to our objectives. Conference abstracts and study protocols will not be included but will be used to search for additional relevant articles. Articles published from the earliest database records to 10th of October 2019 will be included

Methods

We will follow the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for Scoping Reviews (PRISMA-ScR) guidelines (19) and the Joanna Briggs Institute (JBI) methodology for scoping reviews (20) for conducting scoping reviews.

Search strategy

As recommended by JBI scoping review's manual, a three-step search strategy will be used.

To identify keywords and index terms relevant to the topic, an initial limited search in PubMed has been undertaken using a combination of MeSH terms and keywords referring to: (physical) functioning or functional, pediatric intensive care unit and critical illness. This informed the development of a search strategy including identified index terms and keywords. The search terms used to identify pediatric studies will be identical to the search filter developed by the Cochrane Childhood Cancer (21), adjusted for the relevant age category of this study. The search strategy, refined in collaboration with a university librarian, will be deployed in four bibliographic databases. The full electronic search strategy for Pubmed is detailed in Appendix A. A third-phase search will look at the references in the articles included in the review in order to identify additional relevant studies.

Information sources

The following databases will be searched: Medline via Pubmed, EMBASE, CINAHL and Cochrane Library.

Study selection

Following the search, all identified records will be collated and uploaded into Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia) and duplicates will be removed. To increase consistency among reviewers, two reviewers will pilot-test the inclusion criteria on a sample of 25 abstracts and 25 full-text articles. Agreement on each pilot-tested sample will be calculated. Consequently, if agreement among reviewers will exceed 75% or Cohen's kappa > 0.5 and the reviewers had no revisions to recommend, no changes will be made to the inclusion criteria (22). Otherwise, issues with the criteria will be discussed in a meeting with the two reviewers involved and the inclusion criteria will be refined if necessary. This process will be repeated until abovementioned agreement criteria have been met. At the end of the screening process an overall kappa will be

presented. Subsequently, all articles identified by the search will be independently screened by two reviewers for assessment against the inclusion criteria for the review. Irrelevant articles will be excluded after examination of titles and abstracts. Full-text versions of the articles potentially suitable for inclusion will be retrieved and evaluated against the same inclusion criteria. Reasons for exclusion of full text papers will be recorded and reported in the scoping review. A PRISMA flow diagram will be presented to visualize the process of identifying and selecting studies and also reasons for exclusion of full-text studies (19).

Data extraction

Data will be extracted from included papers by one reviewer using a data extraction instrument developed by the authors. The data extracted will include specific details about the population, concept, context, methods and key findings relevant to the review question. A draft extraction instrument is provided (see Appendix II). The data extraction instrument will be calibrated having two reviewers independently complete extraction from the first five included papers and comparing results. Consensus will be reached through discussion or by involving a third reviewer. The data extraction instrument may be refined during the process of extracting data from each included study, to leave openness for inclusion of additional unforeseen data that can be relevant for our review. Modifications will be detailed in the full scoping review.

A formal assessment of methodological quality of the included studies of this scoping review will not be performed, because the scoping review aim to provide an overview of the existing evidence, regardless of quality.

Data presentation

Data will be extracted and presented in tabular form and results will be presented in a narrative, descriptive section including a summary that will describe how the results relate to the reviews objective and question/s. The data extraction instrument presented in Appendix II will be used as the basis for developing and refining tables for data presentation.

Acknowledgments

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Conflicts of interest

The authors declare no conflict of interest.

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Appendix I: Search strategy

MEDLINE (Pubmed)

Search conducted on 10-10-2019

Search	Query	Records retrieved
#1	"Infant"[Mesh:NoExp] OR "Child"[Mesh] OR "Adolescent"[Mesh] OR "Pediatrics"[Mesh:NoExp] OR "Minors"[Mesh] OR minors[tiab] OR boy[tiab] OR boys[tiab] OR boyfriend[tiab] OR boyhood[tiab] OR girl*[tiab] OR kid[tiab] OR kids[tiab] OR infant*[tiab] OR toddler*[tiab] OR preschool child*[tiab] OR child*[tiab] OR children*[tiab] OR schoolchild*[tiab] OR school child*[tiab] OR adolescen*[tiab] OR prepuber*[tiab] OR youth*[tiab] OR teen*[tiab] OR under age*[tiab] OR underage*[tiab] OR pubescen*[tiab] OR puber*[tiab] OR pediatric*[tiab] OR paediatric*[tiab] OR peadiatric*[tiab] OR school age*[tiab] OR schoolage*[tiab]	3813791
#2	"Physical Endurance"[Mesh] OR "Motor Activity"[Mesh] OR "Activities of Daily Living"[Mesh] OR "Disability Evaluation"[Mesh:NoExp] OR "Quality of Life"[Mesh] OR "Recovery of Function"[Mesh] OR physical activit*[tiab] OR physical function*[tiab] OR physical health[tiab] OR physical impairment*[tiab] OR physical limitation*[tiab] OR physical activity limitation*[tiab] OR physical restriction*[tiab] OR physical decline[tiab] OR physical improvement*[tiab] OR physical well-being[tiab] OR physical wellbeing[tiab] OR physical endurance[tiab] OR physical performance*[tiab] OR physical disabilit*[tiab] OR physical morbidit*[tiab] OR physical mobility[tiab] OR physical evaluation[tiab] OR locomotor activit*[tiab] OR motor activit*[tiab] OR motor function*[tiab] OR motor performance*[tiab] OR activities of daily life[tiab] OR activities of daily living[tiab] OR activities of daily life[tiab] OR ADL[tiab] OR ADLs[tiab] OR daily life activit*[tiab] OR daily living activit*[tiab] OR limitation of activit*[tiab] OR participation restriction*[tiab] OR participation limitation*[tiab] OR functional health[tiab] OR functional recover*[tiab] OR recovery of function[tiab] OR functional status[tiab] OR functional performance*[tiab] OR functional morbidit*[tiab] OR functional disabilit*[tiab] OR functional decline[tiab] OR functional outcome*[tiab] OR functional deterioration*[tiab] OR functional evaluation*[tiab] OR disability evaluation*[tiab] OR health related quality of	929995

	life[tiab] OR HRQOL[tiab] OR QOL[tiab] OR quality of life[tiab] OR quality of living[tiab]	
#3	"Critical Care"[Mesh] OR "Intensive Care Units, Pediatric"[Mesh] OR intensive care[tiab] OR PICU*[tiab] OR ICU*[tiab] OR intensive care unit*[tiab] OR pediatric intensive care unit*[tiab]	192615
#4	#1 AND #2 AND #3	1612
#5	("Animals"[Mesh] OR "Invertebrates"[Mesh] OR "Plants"[Mesh] OR "Fungi"[Mesh] OR "Animal Experimentation"[Mesh] OR "Models, Animal"[Mesh] OR animal experiment*[tiab] OR animal model*[tiab]) NOT "Humans"[Mesh]	5272074
#6	#4 NOT #5	1605
#7	"Letter" [Publication Type] OR "Editorial" [Publication Type] OR "Comment" [Publication Type] OR "Congresses as Topic"[Mesh] OR "Clinical Conference" [Publication Type] OR "Congress" [Publication Type] OR letter[ti] OR editorial[ti] OR comment[ti]	1933285
#8	#6 NOT #7	1581
#9	AND english[Language]	1434

Appendix II: Data extraction instrument

PCC format	Inclusion criteria
Population	Studies including PICU survivors up to the age of 18 years at PICU admission.
Concept	Empirical studies reporting outcomes of and determinants for physical functioning in PICU survivors evaluated during and/or after their PICU stay.
Context	Pediatric Intensive Care Unit (PICU).
Types of Study design	All English language studies reporting empirical data will be included with no restrictions set on the types of study designs used. In addition, reviews will be included as a secondary source for synthesizing key gaps in knowledge and research and clinical recommendations related to our objectives. Conference abstracts and study protocols will not be included but will be used to search for additional, relevant articles.
Study Details and Characteristics	
ID and Title study:	
Journal:	
Study citation details	
• Author/s	
• Year of publication	
Country	
Context (e.g. PICU, PCardiacIC)	
Study design	
Objective/s	
Participants details	
• *N* (x controls, if applicable)	
• Age (*average, dispersion*)	
• Gender (*m/f*)	
• Diagnostic category at admission (= sample population):	

1) heterogeneous or 2) homogeneous sample (specify category in case of homogeneous sample; e.g. Respiratory failure, Sepsis, Postsurgical care, Trauma, Cardiac, Neurologic, Endocrine, Nephrologic, Burns, Hypovolemic/hemorrhagic shock, Malignancy, Other, ….)	
• Pre-existing comorbidity, n (%) (NS for not specified)	
• Severity of illness (describe scoring system used) (NS for not specified)	
• Hospital length of stay (*days; average, dispersion*) (NS for not specified)	
• PICU length of stay (*days; average, dispersion*) (NS for not specified)	
• Mech. Ventilation (*days; average, dispersion)*	
Details/Results extracted from study (in relation to the concept of the scoping review)	
Follow up: *N timepoints* *N participants per timepoint* *Days after PICU admission*	
Physical functioning outcome: NOTE: if more tools are used: specify per tool	
• Measurement tool(s) used	
• Measure/unit of outcome per tool (e.g. ROM, muscle strength, PF, activity limitations, ..)	
• Outcome (N (examined pt)): describe main findings narrative and/or quantitative if presented)	

• Overall interpretation/conclusion of outcomes/findings	
• Determinants (risk/progn factors) of outcome ((NS for not specified)	
Key gaps in knowledge and research/clinical recommendations made by the cited authors	*Copy-paste citations*