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Review Article

The essence of frailty: A systematic review and qualitative synthesis on frailty concepts and definitions

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ABSTRACT

Background: One of the major threats looming over the growing older population is frailty. It is a distinctive health state characterised by increased vulnerability to internal and external stressors. Although the presence of frailty is well acknowledged, its concept and operationalisation are hampered by the extraordinary phenotypical and biological complexity. Yet, a widely accepted conception is needed to offer tailored policies and approaches. The ADVANTAGE Group aims to analyse the diverse frailty concepts to uncover the essence of frailty as a basis for a shared understanding.

Method: A systematic literature review was performed on frailty concepts and definitions from 2010 onwards. Eligible publications were reviewed using concept analysis that led to the extraction of text data for the themes "definition", "attributes", "antecedents", "consequences", and "related concepts". Qualitative description was used to further analyse the extracted text passages, leading to inductively developed categories on the essence of frailty.

Results: 78 publications were included in the review, and 996 relevant text passages were extracted for analysis. Five components constituted a comprehensive definition: vulnerability, genesis, features, characteristics, and adverse outcomes. Each component is described in more detail by a set of defining and explanatory criteria. An underlying functional perspective of health or its impairments is most compatible with the entity of frailty.

Discussion: The recent findings facilitate a focus on the relevant building blocks that define frailty. They point to the commonalities of the diverse frailty concepts and definitions. Based on these components, a widely accepted broad definition of frailty comes into range.

1. Introduction

Frailty is regarded as a health condition of decreased functional reserves leading to a vulnerable state with the inherent risks of a multitude of adverse outcomes. These include, but are not limited to, disability, increased health care use, and premature death [1]. As a considerable and growing share of older people qualify to be labelled as frail, the condition has become a major concern for ageing societies and their health care systems [2]. On the one hand, frailty interferes with the way old people like to live and feel, on the other hand, it substantially adds to the rise of health care costs [3]. Therefore,

appropriate diagnostic and therapeutic strategies are needed to counteract frailty and to impede the occurrence of its negative health-related outcomes.

An ineluctable requisite for efficiently managing frailty is a common understanding of what frailty is. Unfortunately, a consensus on the definition and concept of frailty has not yet been reached [4]. This uncertainty is rooted in the intrinsic characteristics of frailty. Indeed, the condition can neither be classified as a corollary of the ageing process nor as a disease. It is heterogeneous in its manifestation and defies clinical staging, e.g., clear definition of onset. These characteristics indicate that frailty does not fit into the traditional medical mind-

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set of “health and disease”. A shift away from the disease-centred paradigm towards a “complex systems” approach is therefore needed to grasp the multidimensional processes and the “complex interplay of biological and non biological factors” on which frailty is based [5,6].

In the past decades, many definitions have been proposed, and substantial advancements in the understanding of frailty have been achieved. While definitions like “Old debilitated individuals, who cannot survive without substantial care from others” [7] are clearly outdated, a more holistic perspective, integrating clinical, functional, social, and cognitive aspects of the ageing process is now prevailing.

The aim of the present study was to systematically review recent publications on the meaning and conceptual definitions of frailty in order to identify essential aspects and components of the condition as a prerequisite for a commonly agreed definition. The study was undertaken as part of the European Joint Action (JA) Initiative on the Prevention of Frailty, called ADVANTAGE and aimed at developing a comprehensive strategic framework for the prevention and management of frailty at the European level [8].

2. Material and methods

2.1. Systematic literature search

PubMed and Prospero databases were searched. The PubMed search included iterative pre-tests with single and combined entry terms and filters to optimise coverage and selective properties. Entry terms were retrieved from titles and abstracts: frail*, vulnerab*, frail elderly (MeSH) combined with definition*, mean*, understand*, concept*, character*, phenomenon*, construct*, syndrome. Exclusion terms from titles and abstracts were also tested using the Boolean operator “NOT”: clinical trial, observatory study, cohort study, epidemiologic methods (MeSH). Filters were tested using a combination of publication type filters (reviews, systematic reviews, congress reports, consensus, expert opinions), time frames (from 2000 or 2010), and publication components (epidemiologic methods, MESH).

On the basis of these pre-tests, the final search strategy covered the time from 1/2010 to 3/2017 and was structured as following:

1. Frail* [ti] AND [concept* [ti/abs] OR construct* [ti/abs] OR definition* [ti/abs]]
2. Filter “reviews” - splitting the results into a review arm and non-review arm
3. Filter for the non-review-arm: NOT epidemiological methods [MeSH].

All articles were screened reading the abstracts. Publications that focused on the concept or definition of frailty and its evolution were considered. Of further interest were articles providing insights into the mechanisms of frailty and their effects. Records were excluded if they dealt with: 1) original quantitative studies (and prevalences), 2) specific target groups (e.g., patients with HIV or diabetes mellitus), 3) health care interventions or management options, 4) surgical contexts, 5) very specific biochemical aspects, 6) focus on methods or statistics, 7) experiences with frailty, 8) animal studies, 9) considerations of law and ethics, and 10) editorials. Publications not in English language were also excluded (see Fig. 1). One reviewer screened all abstracts for eligibility. Sixteen partners assessed full texts and reviewed them.

PROSPERO was consulted as a further literature source [9]. It is an international database of prospectively registered systematic reviews that are health-related. The term “Frail*” was used for the search. Exclusion criteria were the same as for the PubMed search.

2.2. Extraction of relevant text data

The ADVANTAGE definition group reviewed all selected articles and extracted text passages that were relevant for the analysis of frailty. The

method of concept analysis gave guidance on what to look for when reviewing the articles. In particular, Rodger’s revolutionary concept analysis suggests focusing on themes that generally make up a concept, such as antecedents, attributes/characteristics, and consequences of a term [10]. Related concepts should also be considered to depict commonalities and differences. A further emphasis lies on identifying unresolved issues for future research [10]. We added the theme “definitions”, as the articles already contained a large number of definitions, which were central to our study aim. On this basis, 16 European partners participated in the systematic selection of relevant text passages using an ad hoc developed template (see suppl. material) for the extraction themes depicted in Fig. 2.

2.3. Analysis of extracted text data

After collating relevant text passages under the broad concept themes across all publications, pre-sorted text passages were further analysed. One investigator developed and tested an analysis template and provided guidance on how to apply the method of qualitative description to the text passages of each theme. Qualitative description remains close to the literal meaning of the text data and presents facts, descriptions, and explanations in every-day terms [11]. A core team of the ADVANTAGE Definition Group undertook this second analytical step and discussed findings in audio conferences. The procedure of qualitative description led to the creation of a table for each concept theme, in which all inductively developed categories were listed together with their key phrases from the original text passages and the appropriate publication sources. Thus, a variety of qualifying terms were obtained that further describe and characterise each concept theme.

In a final analysis step, the method of concept mapping was applied to relate the inductively developed categories to each other. Concept mapping allowed visualising the hierarchical and relational nature of the categories across the concept themes [12].

3. Results

3.1. Selected publications and text passages

Overall, 79 publications were analysed [13–90]. The PubMed search yielded 494 hits and 74 relevant publications remained for analysis (Fig. 1). Three additional publications were located from reference sources and included [21,37,56,67]. The Prospero source yielded 61 hits. After the exclusion of papers on target groups (N = 16), on interventions (N = 12), on surgery (N = 8), on frailty measures (N = 5), and on public health aspects (N = 7), 13 relevant reviews remained. Of those, only one study group had published a review by 3/2017 [90].

Overall, 48 out of 78 publications covered the frailty concept as a whole, 14 focused on physical frailty and its biological foundations [16,17,19–21,23,25,45,55,59,60,64,74,75], 11 mainly dealt with cognitive aspects [14,18,28,33,34,53,67,68,81,82,88], while three focused on psychological [30,40] and two on social frailty [48,90]. Fifty-three out of the 78 publications had the format of a narrative review, 12 were expert opinions [27,36,48,59,60,63,77–79,81,82], nine were systematic reviews [18,34,40,41,56,57,83,88,90], three were congress reports [23,24,89], and one was a concept analysis [85]. In most cases, authors were from a single (N = 52;66%) or two countries (N = 18;23%). Nine papers resulted from the cooperation of three or more countries [21,25,36,44,54,57,75,79,89]. The 78 publications yielded 996 text passages as a basis for the qualitative analysis (see Table 1). Thirty publications offered their own definition of frailty or of a frailty subtype (e.g., physical frailty) and 67 included at least one approximate citation of a definition.

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