



Technical Report

ISO/TR 6203

Health informatics — Personalized digital health — Common factors for frailty assessment

*Informatique de santé — Santé numérique personnalisée —
Facteurs communs pour l'évaluation de la fragilité*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 215, *Health informatics*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Frailty is a clinical condition characterized by an increased vulnerability to stressors, arising from cumulative declines across multiple physiological systems. This multidimensional syndrome results in diminished strength, endurance and resilience, and is commonly associated with adverse health outcomes, including falls, hospitalization and death. With the global population aging rapidly, understanding frailty is crucial for improving the quality of care and enhancing health outcomes among older adults. As a condition that exacerbates the risks of dependency and healthcare utilization, frailty places a significant burden on healthcare systems, making it a priority area in geriatrics and public health.

Traditionally, frailty is assessed through various indices and measurements, such as the Fried Frailty Phenotype (FFP), the Frailty Index (FI), the Edmonton Frail Scale (EFS), and the Hospital Frailty Risk Score (HFRS). Each of these instruments offers distinct insights into frailty by focusing on different health dimensions. For instance, the FFP emphasizes physical characteristics such as weakness and slowness, while the FI aggregates deficits across physical, cognitive and social domains. Although these instruments have been valuable in identifying frail individuals, they have limitations in capturing the dynamic and predictive aspects of frailty, particularly when applied in diverse healthcare settings. Moreover, traditional indices often require clinical assessments or extensive health records, which can limit their practical application in large-scale population health monitoring.

In their 2015 article, Rockwood, Theou, and Mitnitski explain that frailty instruments are used for multiple distinct purposes, including diagnosis, risk stratification, guiding clinical care, measuring outcomes and scientific investigation. The authors highlight the critical distinction between broad, dichotomous instruments for screening and more granular, scaled instruments for comprehensive assessment. The choice of instrument is guided by its intended purpose^[1].

In light of these limitations, there is a growing interest in developing predictive models that can forecast frailty onset and progression, rather than solely relying on current frailty status. Predictive models leverage administrative health data and advanced algorithms to identify individuals at risk of becoming frail, enabling earlier interventions that could potentially prevent frailty or mitigate its impact. This predictive approach is particularly valuable in resource-constrained settings, where proactively identifying at-risk individuals can optimize healthcare resource allocation and improve patient outcomes.

Several predictive models of frailty have been introduced in recent years, utilizing various types of data, including socio-demographic factors, clinical histories, and even genetic and biomarker data. Rockwood, Theou, and Mitnitski presents the latest evidence about frailty and the management of frail patients with acute cardiovascular disease and suggests avenues for future research^[1]. These models offer a promising alternative to traditional frailty indices by providing personalized risk assessments and supporting proactive healthcare strategies. However, there is still a need to establish standardized factors of frailty that can serve as foundation for developing robust, universally applicable frailty prediction models.

This document aims to identify common factors of frailty, which can inform the construction of standardized frailty assessment models in the future, and it is heavily influenced by Reference ^[1]. By examining these predictors, this document seeks to ultimately support the creation of a standardized approach to frailty prediction that can be integrated into routine clinical and public health practices.

Health informatics — Personalized digital health — Common factors for frailty assessment

1 Scope

This document reviews existing frailty indices and identifies common factors of frailty, laying a foundation for developing standardized frailty prediction models that can be used across clinical and demographic contexts to improve early identification and intervention efforts.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 frailty

state of increased vulnerability to poor resolution of homeostasis after a stressor event, which increases the risk of adverse outcomes, including falls, delirium, and disability

Note 1 to entry: Adapted from Reference [4].

3.2 personalized digital health

electronic services that support health of individuals when they can add and handle their health information

[SOURCE: ISO/TS 6201:2025, 3.4]

3.3 common factors

core set spanning physical, cognitive, psychological, and daily functioning domains to determine a patient's frailty (3.1)

Note 1 to entry: Adapted from Reference [5].

4 Frailty measurement instruments

4.1 General

To comprehensively assess frailty in older adults, various frailty measurement instruments have been developed, each focusing on distinct aspects of physical, psychological and social health. These instruments include the Fried Frailty Phenotype (FFP), the Frailty Index (FI), the Edmonton Frail Scale (EFS), the Tilburg Frailty Indicator (TFI), the Hospital Frailty Risk Score (HFRS) and the Clinical Frailty Scale (CFS), among others. This clause compares them by examining their theoretical underpinnings, primary values measured, and utility across different settings, underscoring the strengths and limitations of each approach.