

# From Guidelines to Action: A Systematic Approach to Translating Health Indicators into a Digital Prevention Ecosystem

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## Introduction

NCDs represent a major burden for public health systems and are responsible for substantial mortality, morbidity, disability, reduced quality of life and health care costs [1]. Preventive interventions are often fragmented and insufficiently integrated into everyday life. At the same time, citizens increasingly collect health-related data via apps and wearables, yet these data are rarely structured, interoperable or systematically used for individual or system-level prevention. The research project PreNUDGE [2] aims to address this gap by developing a digital ecosystem that connects evidence-based health indicators, qualified apps and a platform for self-reported health and lifestyle data. Here, we present a guideline-based approach for identifying, structuring, and integrating prevention-relevant indicators into this ecosystem. Specifically, we aimed to (i) identify evidence-based health indicators relevant for prevention and self-management, (ii) operationalize these indicators for self-measurement and self-reporting by citizens, and (iii) enable their integration into qualified apps and the PreNUDGE ecosystem.

## Methods

Four chronic NCDs with high public health relevance were selected as use cases: type 2 diabetes mellitus, chronic obstructive pulmonary disease (COPD), colorectal cancer and depression. For each disease, three clinical guidelines were analyzed and systematically screened for recommendations. Only indicators that can be assessed without complex laboratory diagnostics or imaging were included. Extracted recommendations were translated into structured health indicators using a standardized schema. To ensure interoperability and reuse, HL7 FHIR principles were followed.

### References

- [1] AIHTA (2021) National strategies and programmes for preventing and managing non-communicable diseases in selected countries. 139.
- [2] Feichtner F, Hochwarter S, Stampfer P. PreNUDGE: Advancing Health Promotion Through Digitalization and Structured Health Data. In: Intelligent Health Systems – From Technology to Data and Knowledge. IOS Press; 2025. p. 1236–7.
- [3] PreNUDGE FHIR® IG for Data Provider (2026). <https://fhir.hl7.at/r4-JoanneumResearch-PreNUDGE-AppData-main/index.html>



Fig. 1: Visualization of PreNUDGE Health Profile

## Results

A set of disease-specific indicators was derived across all four diseases. Core indicators included physical activity, nutrition, body weight, smoking, sleep and psychosocial factors. Many guideline-based recommendations could be operationalized through wearable/mobile sensors, low-threshold self-measurement and digital self-reporting. These indicators were mapped to qualified apps and are in the process of being integrated to reach the target population together with individual motivational measures. This demonstrates the potential to move from theory to practical implementation.

## Discussion

The resulting indicator set enables the creation of longitudinal, individual health profiles and supports both personalized prevention and population-level analyses. This work demonstrates that evidence-based guidelines can be systematically translated into actionable health indicators suitable for digital prevention ecosystems. By linking guideline-based indicators, citizen-generated data and qualified apps within a standardized, HL7-FHIR-compatible platform [3], the PreNUDGE approach has the potential to support individual prevention, strengthen health literacy and provide a foundation for data-driven public health research.



Project Website:  
<https://prenudge.at/>

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