



# Transparency of Charlson Comorbidity Index (CCI) Code Definitions in Real-World Research: A Systematic Review

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## So What?

- Only 1 in 42 studies published their CCI code list — yet CCI has multiple adaptations with known code variability.
- Assume nothing, when interpreting RWE studies.
- Always publish complete operational definitions and code lists for every study element, including CCI.

## BACKGROUND

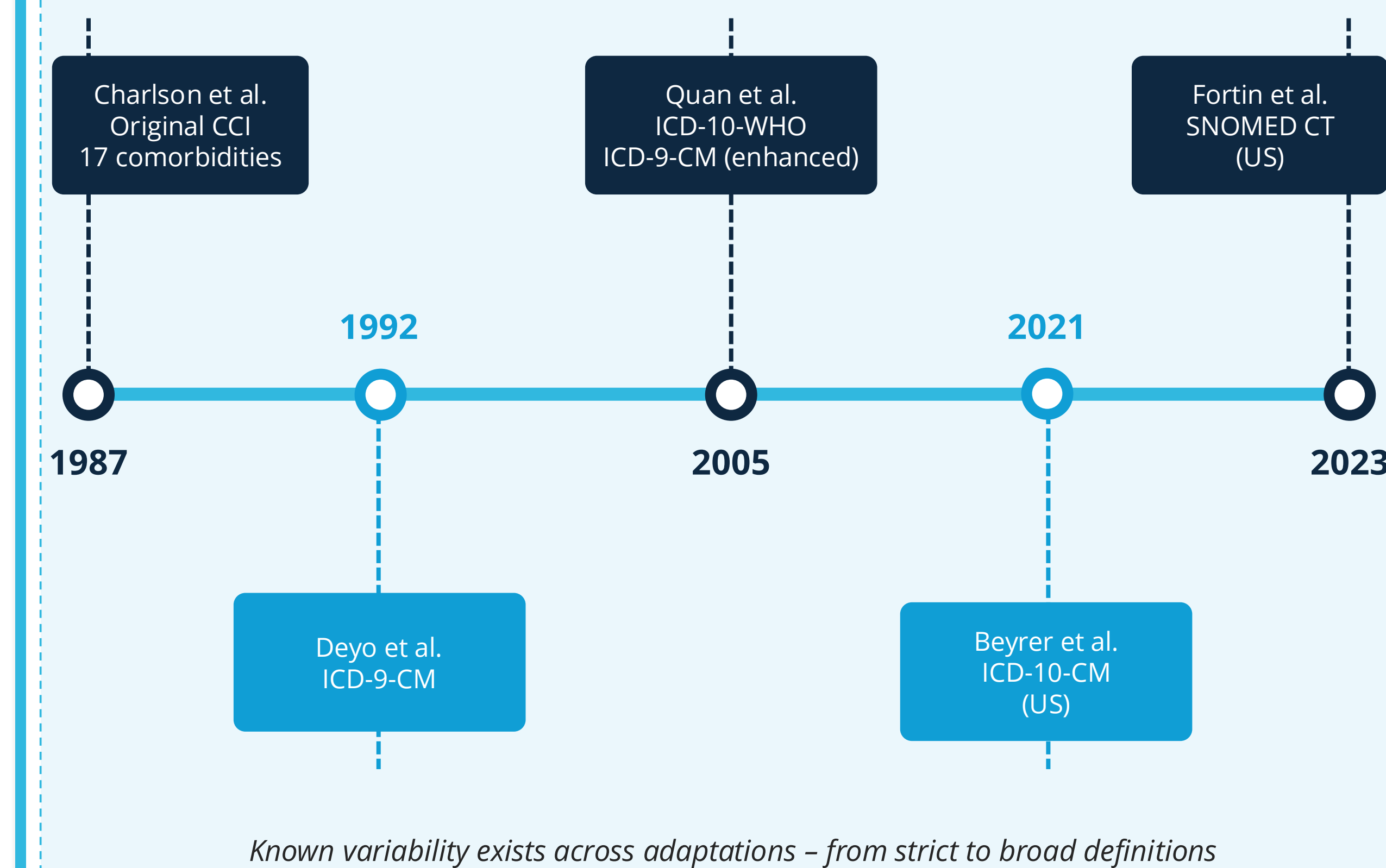
### Context

The Charlson Comorbidity Index (CCI), introduced in 1987, is among the most widely used tools in real-world research (RWR) to quantify comorbidity burden and predict health outcomes and mortality. CCI is commonly used to characterize and compare patient cohorts across studies.

### The Gap / Problem

Since 1987, CCI has been adapted across multiple coding systems — ICD-9-CM, ICD-10-WHO, ICD-10-CM, and SNOMED CT — with known variability across adaptations. Despite this variability, most RWR studies do not disclose which CCI adaptation or specific code list was used, creating a critical transparency gap.

Figure 1: CCI Adaptations Across Coding Systems



## OBJECTIVES

### Primary Objective

To assess the transparency of CCI operational definitions and code lists in published RWR, specifically examining whether specific CCI code lists were explicitly indicated.

### Secondary Objectives

- Identify which CCI adaptations and citations were referenced
- Characterize patterns in code list publication vs. omission

## METHODS

### Study Design

Systematic literature review of US-based RWR studies using CCI (published 2020–2025) investigating type 2 diabetes mellitus (T2DM) or obesity indications. Each publication was evaluated for CCI code list publication, version/adaptation cited, and contextual CCI use.

Figure 2: Literature Review Study Selection

RWR studies using CCI | US-based | 2020–2025 | T2DM or Obesity



### LIMITATIONS

- Focused on T2DM/obesity indications; patterns may vary in other therapeutic areas
- Limited to US-based studies (2020–2025)
- Assessment based on published materials only; supplementary files not uniformly available
- CCI citation patterns in broader RWR literature may differ

## RESULTS

Figure 3: CCI Code List Transparency

Across 42 published studies

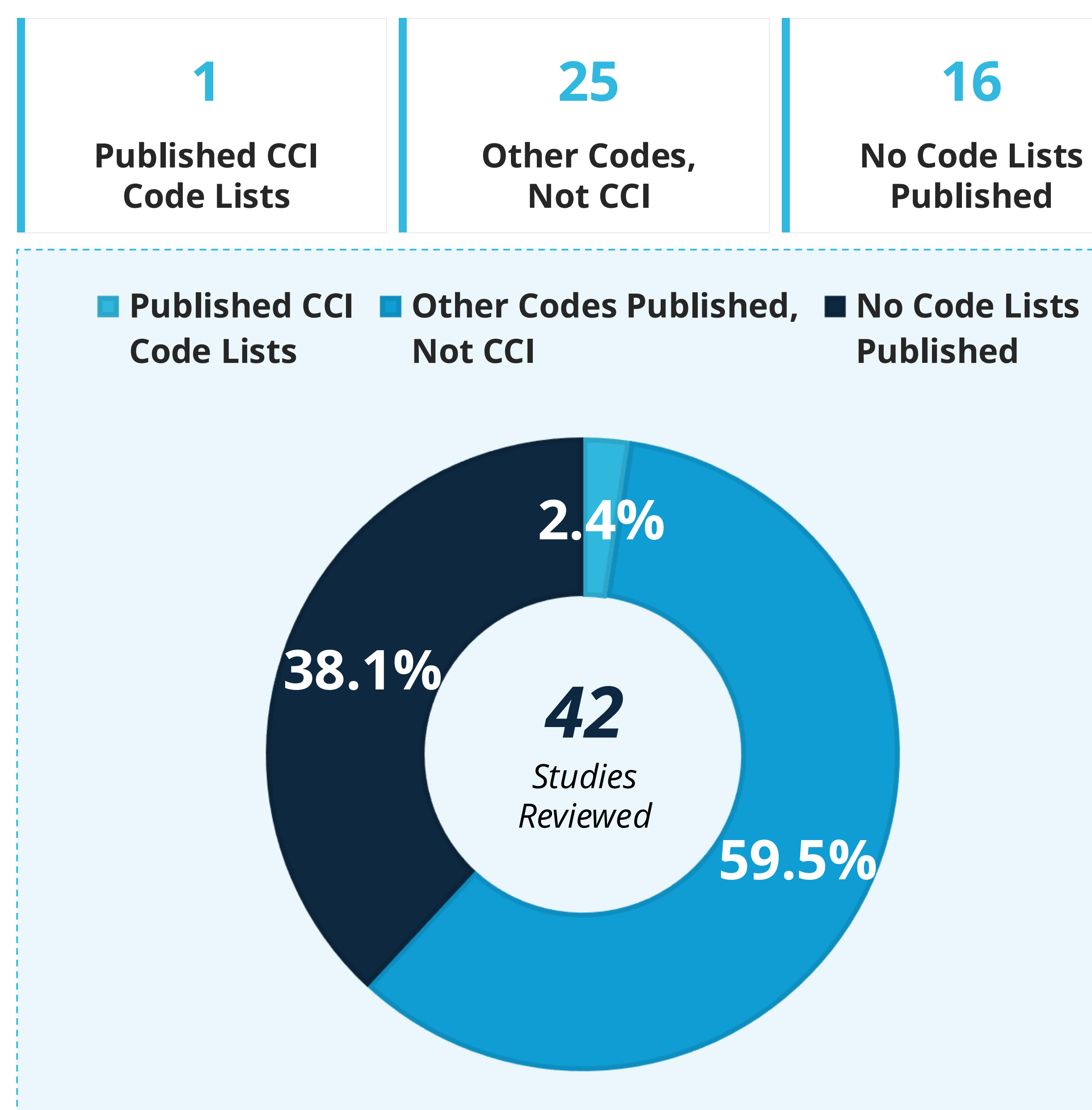
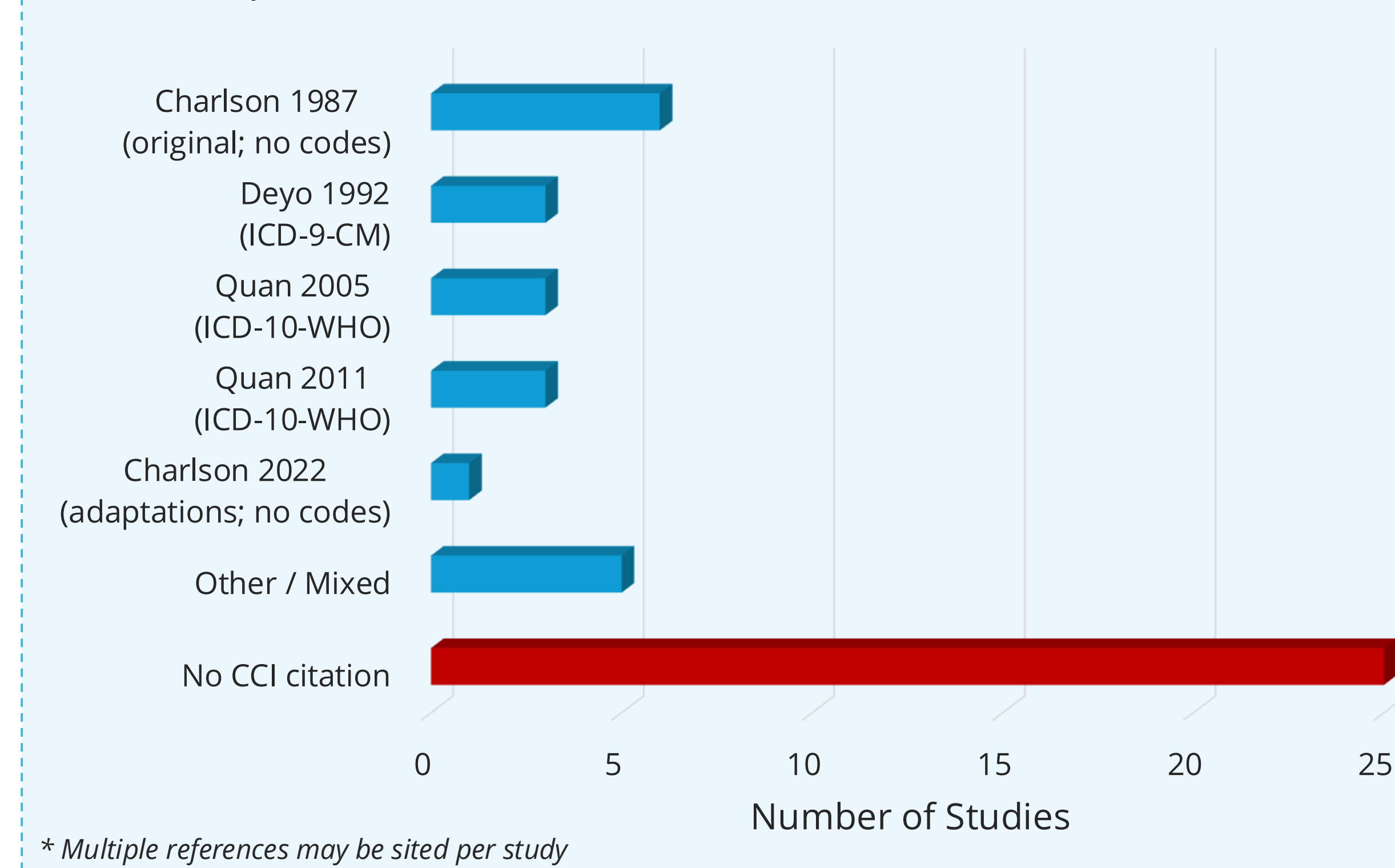


Figure 4: CCI Reference Citations Used

Across 42 published studies



## DISCLOSURES & ACKNOWLEDGMENTS

A Kamaau, J Kamaau, M Buck & C Parker: Employees of Navidence Inc. A Kamaau, C Parker: Co-Founders of Navidence Inc. G Galustjan & K Kallmes: Employees of Nested Knowledge. K Kallmes: Co-Founder of Nested Knowledge. No conflicts of interest to disclose.

## CONCLUSIONS

### Key Findings

- 1/42 studies (2.4%) publish specific CCI code lists
- 25/42 (59.5%) published code lists for other elements but NOT CCI — treating CCI as an assumed universal standard
- 16/42 (38.1%) published no code lists at all
- CCI citations varied widely — no consensus on adaptation

### What Papers Report for CCI

- CCI as an endpoint
- CCI results
- Citation to CCI paper (sometimes)

### What's Missing

- Specific code lists used
- CCI version / adaptation (most times)
- Any modifications made

### Why It Matters

- Cannot reproduce
- Cannot compare across studies
- Stakeholder concerns

## Clinical Research Implications

We **strongly** recommend researchers publish complete operational definitions and code lists for all study elements, including standardized measures like CCI, to ensure reproducibility and proper contextualization of findings.

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