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Research Problem

Digital transformation requires strategic leveraging of the digitizing of systems to improve workflows and change the organization¹. Digital transformation is rapidly occurring in hospitals across the globe², with the wide-spread uptake of eHealth³. Such technologies are implemented with the goal of satisfying the quadruple aims of healthcare⁴ (Figure 1).

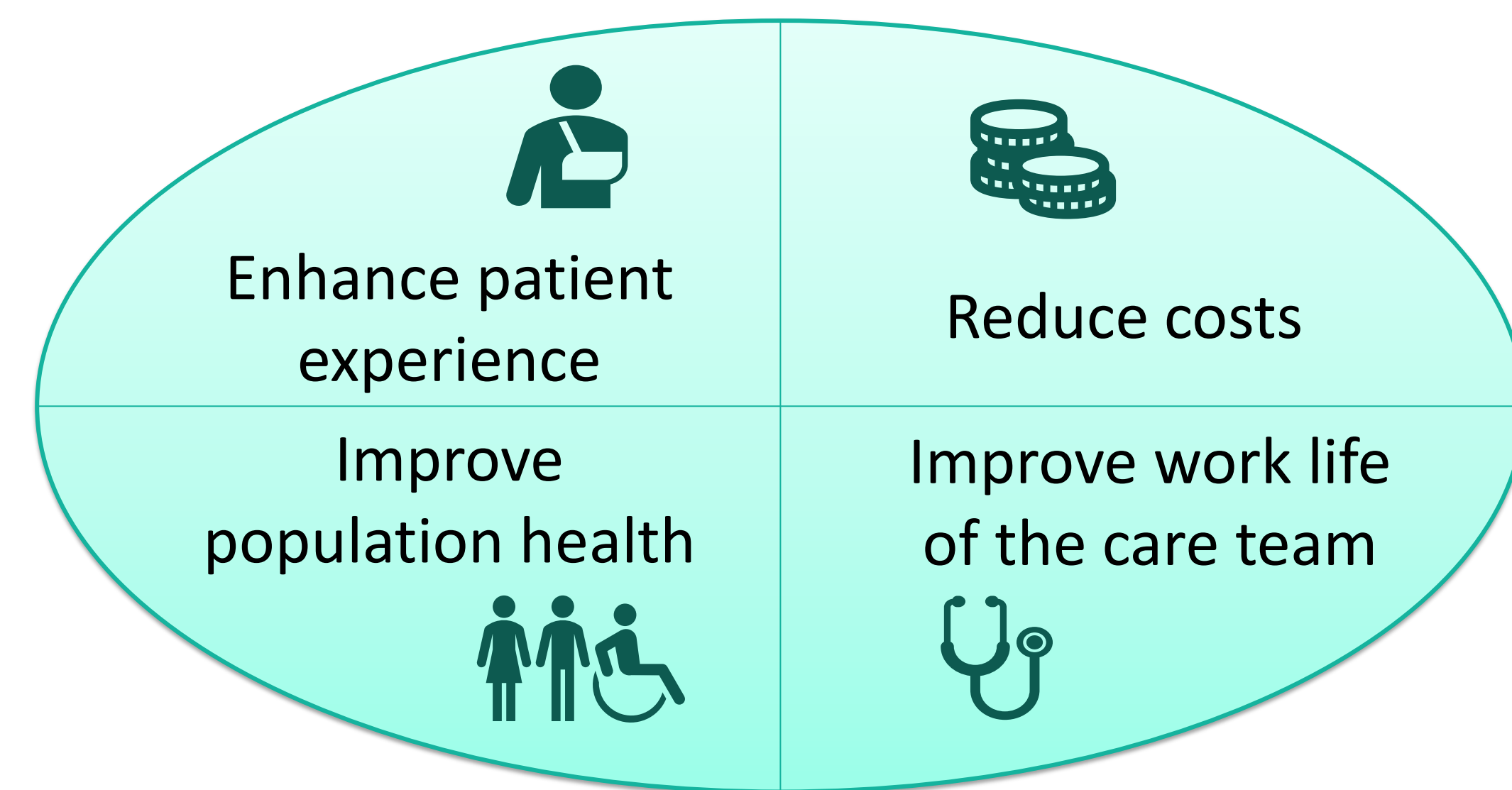


Figure 1. Quadruple aims of healthcare

But the outcomes of these transformations are inconclusive². Planning a strategic roadmap for successful outcomes can be difficult, due to a “busy” digital health landscape. Providers are faced with competing drivers for change and a myriad of technologies to advance their digital health agenda.

A method for strategically undertaking digital transformation is to follow a roadmap to digital maturity. Digital maturity is assessed using dimensions, which allows an organization to evaluate its digital status and plan for future projects⁵. Yet, what dimensions should be used to assess digital maturity of hospitals is elusive. Failure to understand these dimensions could hamper digital transformation programs central to government agendas, prove detrimental to hospital outcomes, and result in a fragmented approach to implementing technology without critical underlying foundations.

Thus, the research question was: *what are the current methods for assessing digital maturity for hospitals?*

Method: Systematic Literature Review

To extract articles, medical databases and information systems journals were searched:

Search Terms	In	Year Published
“maturity model” “digital capability” “digital maturity”	“health” “healthcare”	Until 2020 inclusive

357 articles were returned, and after removing duplicates, 215 remained. All abstracts were screened, resulting in 66 articles whose eligibility was determined by reading the full text (Figure 2). Primary studies that met the inclusion criteria (focus on digital maturity in hospitals) were deemed applicable (n=30). To analyze these papers, inductive analysis in NVivo 12 was performed, with data extracted related to the maturity model dimensions (also termed themes, indicators, pillars, domains).

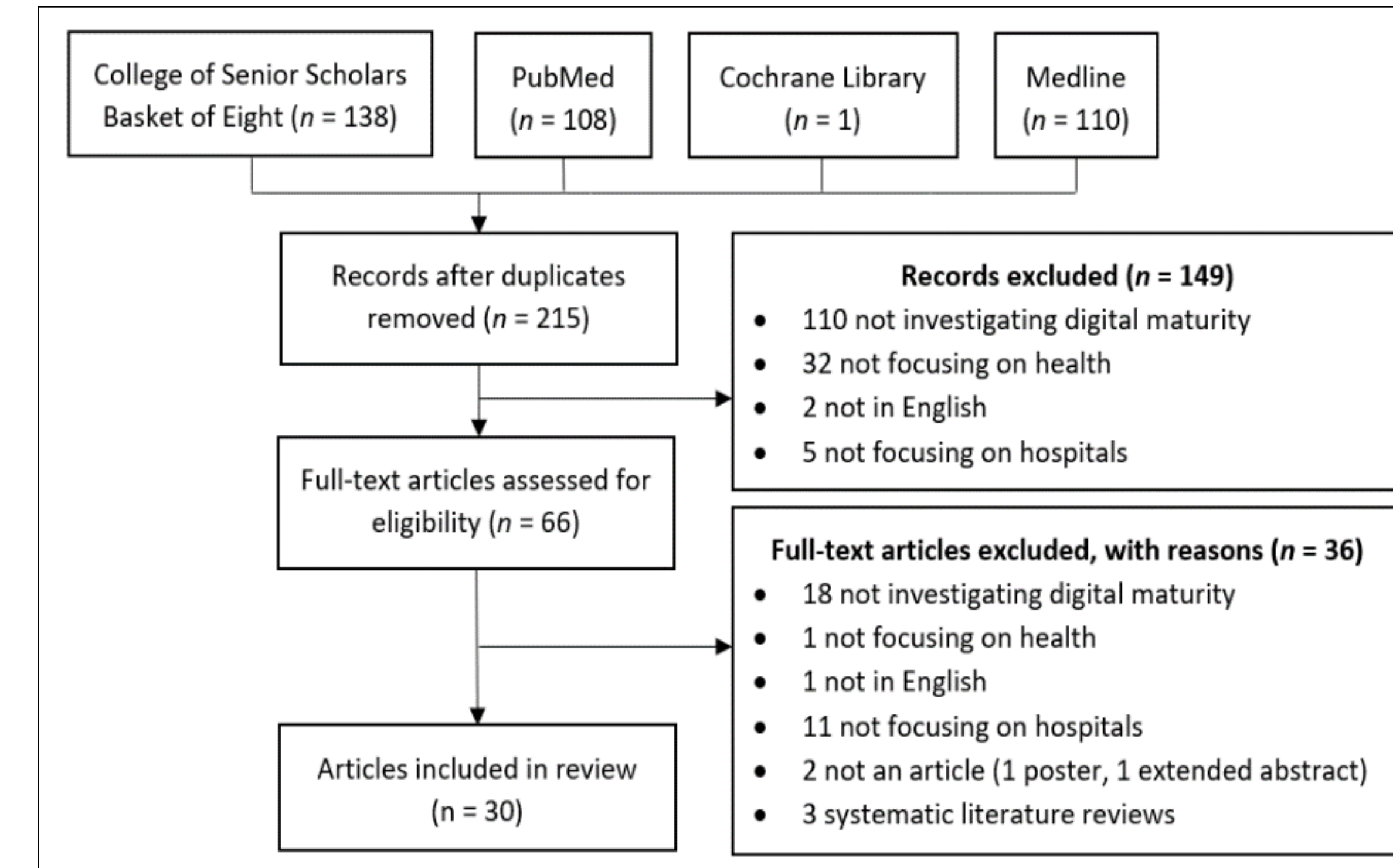


Figure 2. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

Findings

The papers in this review detailed 28 unique maturity models (three papers proposed and validated a new maturity model (MM), 11 proposed a new MM, 15 validated an existing MM, and one was an extension), which included 245 raw digital maturity dimensions. Through inductive analysis involving constant comparison⁶, these 245 raw dimensions were consolidated into eight dimensions (Figure 3).

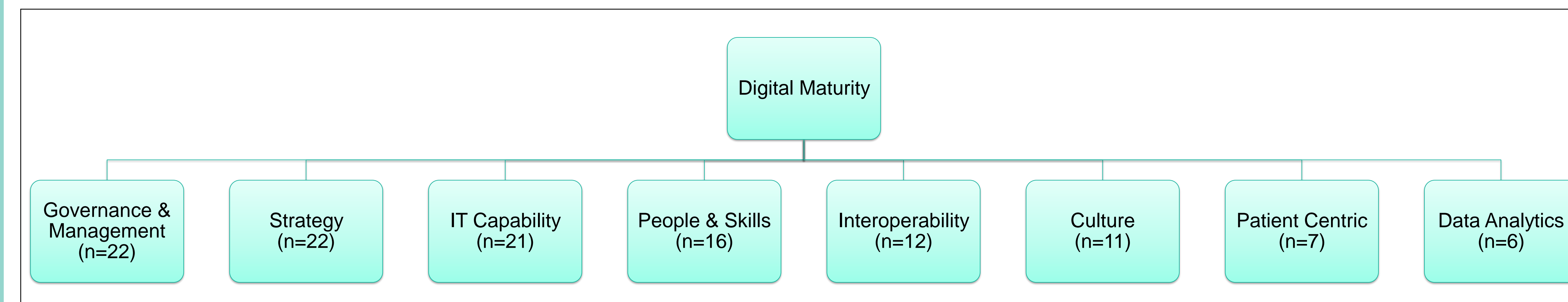


Figure 3. Number of Articles per Dimension of Digital Maturity

Governance and management includes leadership, risk management, and policies for transformation⁷. *Strategy* considers how technologies assist an organization to achieve its goals, and the organization’s adaptability to internal and external changes⁸. *IT capability* includes IT infrastructure and technologies⁸, whereas *interoperability* focuses on the coordinated manner of accessing and exchanging data within and across organizations⁸. *People and skills* refer to the capability and knowledge of people, both internal and external to the organization⁸, whereas *culture* refers to how willing people are to change⁷. The *patient-centric* dimension encompasses including patients, caregivers and families in health decisions⁹. *Data analytics* uses data for effective decision making for the organization, patients, and population health⁸.

Discussion

Key implications for effective digital maturity assessment:

1. Most studies focused on IT capabilities and organization-level (e.g., governance and management, strategy) dimensions. This has largely been at the oversight of patient-centric and data analytics dimensions.
2. The impact of the eight dimensions on the quadruple aims of healthcare has not been assessed. It is imperative to determine the efficacy of advancing maturity across dimensions, with respect to such aims.
3. The included studies were limited in scope. They described how to enact some of these dimensions in an independent manner, leaving the dependencies and interrelationship open to interpretation and variability.
4. At different stages of a hospital’s digital transformation, various dimensions may need to be assessed. Some notable maturity models have taken this into account by deconstructing digital maturity into stages with respective dimensions⁸; an important, but often overlooked consideration in a maturity model.

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