REVIEW ARTICLE

A Review of Trends in Quality Improvement Initiatives and Health Science Using Bibliometric and Visualisation Analysis

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ABSTRACT

The study of health science has long been integral to human well-being for centuries. Researchers have continuously strived to adopt quality improvement initiatives (QII) to enhance health science, benefiting both the community and industry. These efforts address contemporary health challenges, advance drug discovery, improve patient outcomes, and sustain healthcare systems amid increasing demands and limited resources. This study analyses trends in QII adoption in health science through bibliometric analysis. Using 199 research articles from the Scopus database, this review examines key elements, such as leading authors, countries, institutions, publication outlets, articles, and themes of QII in health science research over 30 years (1995 to 2024) using VOSviewer software. The findings provide future research direction for QII in health science. These insights enable researchers, policymakers and practitioners to make informed decisions regarding quality improvement of health sciences for both industry and society.

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INTRODUCTION

Health systems worldwide are under increasing pressure to deliver high-quality care with growing complexity and patient expectations. Poor-quality care is now recognized as a major contributor to preventable harm with an estimated 8–9 million deaths occur each year in from treatable conditions due to suboptimal care (1). Health science is an interdisciplinary field addressing health-related issues, essential for understanding and improving health outcomes (2). Health science significantly influences the world by enhancing various aspects of healthcare, education, and public policy (3). Therefore, improving the quality of health science is crucial for advancing healthcare quality, safety, and effectiveness (4).

Quality Improvement Initiative (QII) in health science refers to systematic, data-driven efforts to enhance healthcare processes and outcomes (5), which help healthcare organizations achieve better patient outcomes, prevent adverse events, and increase the overall reliability of care (6). Improving quality of care has become a global priority. International agencies and frameworks such as the World Health Organisation (WHO) stressed that achieving Universal Health Coverage requires parallel efforts to enhance care quality (7). Numerous researchers and practitioners have integrated QII into health sciences, demonstrating that QII has been successfully improved health science for the betterment of humanity. QII such as Plan-Do-Study-Act (PDSA) cycle offers a structured, iterative process for small-scale change testing in healthcare improvement (8). Lean focuses on eliminating waste and improving workflows (9), while Six Sigma reduces variability and defects using the DMAIC method (10).

Clinical audits also play a key role by benchmarking practices against standards to identify gaps and monitor progress (11). Despite the importance of QII, QII often face barriers such as staff resistance, a lack of supportive quality culture, and fear of blame for errors

(12). Frontline providers may be hesitant to adopt new practices and many organizations are struggle with resource constraints (13). Such technical and structural barriers are particularly acute in low-resource settings, where basic infrastructure or data for monitoring quality may be lacking (13). Given the urgency of improving care, the significance of studying QII has never been greater. Global health leaders have called for the 2020s to be a "Decade of Action" for healthcare quality, urging transformative changes rather than incremental tweaks. In this context, examining trends in QII provides timely insights to guide future efforts (14).

Therefore, this study maps the research of QII in health science using a bibliometric approach, which offers a quantitative and objective method to analyse trends, identify key contributors, and assess citation impact. Unlike systematic reviews, bibliometric analysis enables broader and faster assessments, helping to identify research gaps and future opportunities (15). This review addresses the following research questions (RQs):

1. What is the publication trend on QII in health science?
2. What are the leading publications outlets and key articles on QII in health science?
3. Who are the leading contributors in terms of authors, countries, and institutions for QII in health science?
4. What are the main research themes and future research directions for QII in health science?

The remaining of this study presents the data source, describes the bibliometric methodology, analyses and presents the findings. Lastly, conclusion is drawn.

DATA SOURCE AND METHODS

Scopus was selected for its rigorous indexing, extensive bibliometric data (16), and broad coverage (17). It is widely recommended for bibliometric analyses (18) and is recognized as a reliable source with metrics highly correlated to Web of Science.

Kumar et al. (16) proposed a four-step search strategy: (i) database search, (ii) scholarly filtration, (iii) language filtration, and (iv) subject filtration. This study performed database search in August 2024 using Scopus. In Step (i) database search, the keywords "quality improv*" and "health science*" were used to represent the central theme and 246 publications were identified from 1995 to 2024. In Step (ii) scholarly filtration, only journal articles and conference papers were included for their novelty and rigorous peer review. This excluded 44 publications, leaving 202 results. In Step (iii) language filtration, non-English publications were removed, resulting in 199 results. In Step (iv) subject filtration, all subjects were included, as QII in health science is multidisciplinary. Thus, 199 articles were selected for analysis.

This study conducted citation analysis to assess research trends (RQ1), publication outlet (RQ2), as well as to identify key researchers, countries, and institution (RQ3). Co-occurrence analysis was used to identify key themes (RO4). Therefore, VOSviewer was adopted as the graphical analysis tool for the bibliometric analysis, as it is widely used by researchers (19).

RESULTS

Publication Trends (RQ1)

The distribution of articles by year of publication shows that research of the QII in health research has experienced increasing interest from 1995 to 2024, particularly since 2015 (see Fig. 1). Publications increased by 220% from 2015 (n = 5) to 2016 (n = 16). The highest number of publications was in 2018 (n = 27).

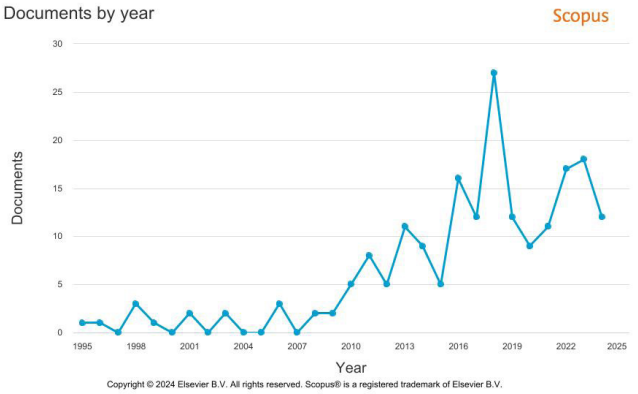

Figure 1: Publication trends of QII in health science from 1995 to 2024.

Publication Outlet (RQ2)

The publication outlet for the QII in health science research indicates that BMJ Open Quality is the leading outlet with 11 articles (see Table I). This is followed by BMC Health Services Research with 9 articles, and Nursing Leadership and Canadian Journal of Kidney Health and Disease with 5 articles respectively. Among these publication outlets, Academic Medicine has the highest h-index of 188, followed by BMJ Open (h-index = 160) and BMC Health Services Research (h-index = 146). Based on the Scimago Journal & Country Rank 2023 (SJR 2023), Academic Medicine is in Q1 (1.56) and has the highest CiteScore (7.8) from Scopus database.
Table I. Top journals contributing to the QII in health science research.

Publication performance (RQ2)

Global citations refer to the total amount of citations obtained without filtering discipline (20). Notable articles include "A generative co-design framework for healthcare innovation: Development and application of an end-user engagement framework" by Bird et al. (21) (n = 91 citations), followed by "The ISPOR good

Table I: Top journals contributing to the QII in health science research.

Rank	Source Title	CiteScore 2023	SJR 2023 (Ranking)	h-index	Number of Articles
1	BMJ Open Quality	2.2	0.56 (Q2)	22	11
2	BMC Health Services Research	4.4	1.03 (Q1)	146	9
3	Nursing Leadership	3.2	0.38 (Q2)	31	5
4	Canadian Journal of Kidney Health and Disease	3	0.65 (Q2)	32	5
5	Journal of Hospital Librarianship	1	0.24 (Q3)	14	4
6	Academic Medicine	7.8	1.56 (Q1)	188	4
7	Medical Reference Services Quarterly	4	0.71 (Q1)	28	3
8	Joint Commission Journal on Quality and Patient Safety	3.8	0.79 (Q1)	88	3
9	BMJ Open	4.4	0.97 (Q1)	160	3
10	BMC Pregnancy and Childbirth	4.9	1.06 (Q1)	114	3

practices for quality improvement of cost-effectiveness research task force report" by McGhan et al. (22) (n = 75 citations), and "Patient satisfaction with services in outpatient clinics at Mulago hospital, Uganda" by Nabbuye-Sekandi et al. (23) (n = 69 citations).

Authors (RQ3)

This review found that Luyt, K. from the Bristol Medical School, University of Bristol, United Kingdom and Nathens, A.B. from Institute of Health Policy, Management and Evaluation, University of Toronto, Canada are the leading authors for QII in health science research, with 4 articles each. However, no single author dominates in this research area, which presents a significant opportunity for researchers to spearhead this research field.

Countries (RQ3)

This study identified 40 countries contributing to QII research in health science. United States leads with 84 articles, followed by the Canada (n = 65 articles), United Kingdom (n = 17 articles), Netherlands (n = 7 articles), and Ethiopia (n = 6 articles). The high publication output in United States is largely attributed to substantial research funding, which supports scientific studies and academic output (24). An analysis of country collaborations in QII research identified five major clusters, with the largest (in red) covering Australia, Ethiopia, India, Iran, and Mexico (see Fig. 2).

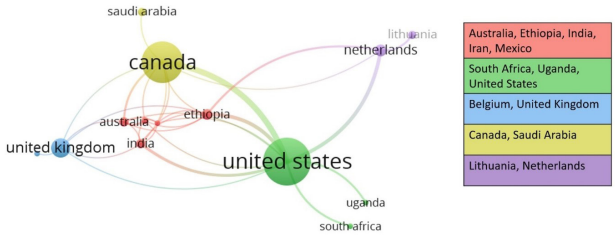

Figure 2: Leading country collaborations analysis produced by VOSviewer.

Institutions (RQ3)

This study found that the leading institution in the research of QII in health science is University of Toronto (Canada), with 24 published articles. This is followed by Sunnybrook Health Sciences Centre (Canada) with 18 articles, and University of Toronto's Faculty of Medicine (Canada) with 15 articles. This indicates that significant QII research in Canada is concentrated within these major institutions.

Theme and Future Directions (RQ4)

Keywords co-occurrence network analysis was performed on author keywords to identify the research themes. Two types of keywords co-occurrence network analyses were generated using VOSviewer: Network Visualisation (see Fig. 3a) and Overlay Visualisation (see Fig. 3b).

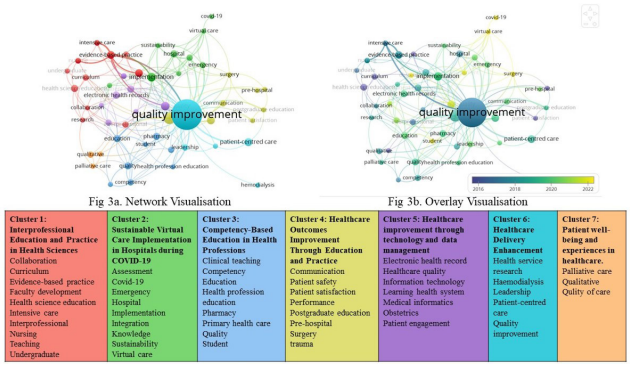

Figure 3: Network and Overlay visualisation produced by VOSviewer

The study identified seven clusters based on the keywords co-occurrence network analysis for network visualisation, with theme for each cluster is summarised in Fig. 3a. For example, Cluster 1, highlighted in red, includes 10 nodes and focuses on "Interprofessional education and practice in health sciences". The seven clusters suggest seven interesting future research directions: (1) Interprofessional education and practice in health sciences, (2) Sustainable virtual care implementation in hospitals during COVID-19, (3) Competency-based

education in health professions, (4) Healthcare outcomes improvement through education and practice, (5) Healthcare improvement through technology and data management, (6) Healthcare delivery enhancement, and (7) Patient well-being and experiences in healthcare. Based on the overlay visualisation as shown in Fig. 3b, keywords such as "health care quality", "virtual care", "student", "covid-19", and "obstetrics" are the most recent keywords that appears in the publications which provides direction for future publication.

CONCLUSION

The importance of health science to humanity has motivated numerous practitioners to adopt QII for continuous improvement of health science. This study highlights several key findings using bibliometric analysis. Research in this area is dominated by the United States and Canada, with collaboration extending to countries such as South Africa, Uganda, and Saudi Arabia. Additionally, this review found that the research of QII in health science has no dominating author, presenting a valuable opportunity for authors to be the leading author. The seven clusters from the keywords co-occurrence network analysis and the latest keywords suggest interesting future research directions for practitioners and researchers. The findings can assist practitioners in continuously advancing health science research for the betterment of humanity. This study is limited to articles from Scopus. Future research could expand coverage by incorporating databases such as WoS, PubMed, Google Scholar, CNKI (China), and J-STAGE (Japan). Additionally, using multiple visualisation tools like CiteSpace, Bibliometrix, and Gephi could enhance accuracy and minimise potential bias. Future exploration of QII in virology and nanotechnology may improve virus detection and precision medicine.

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