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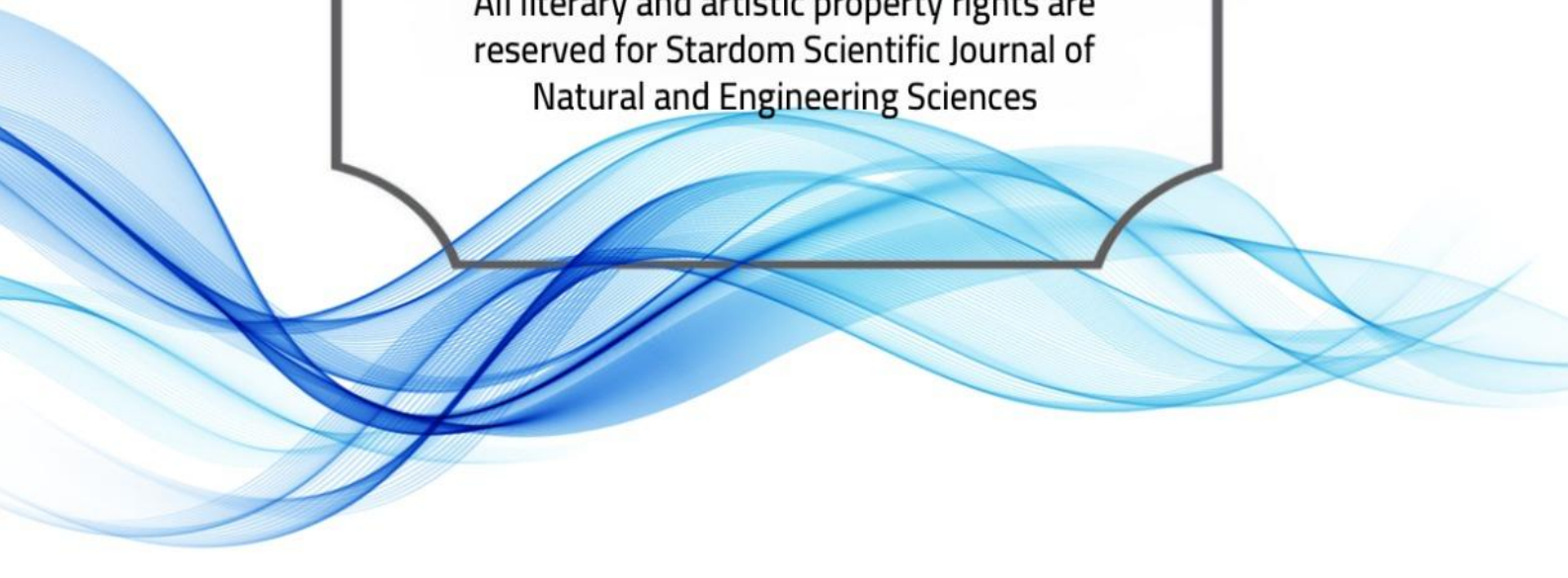
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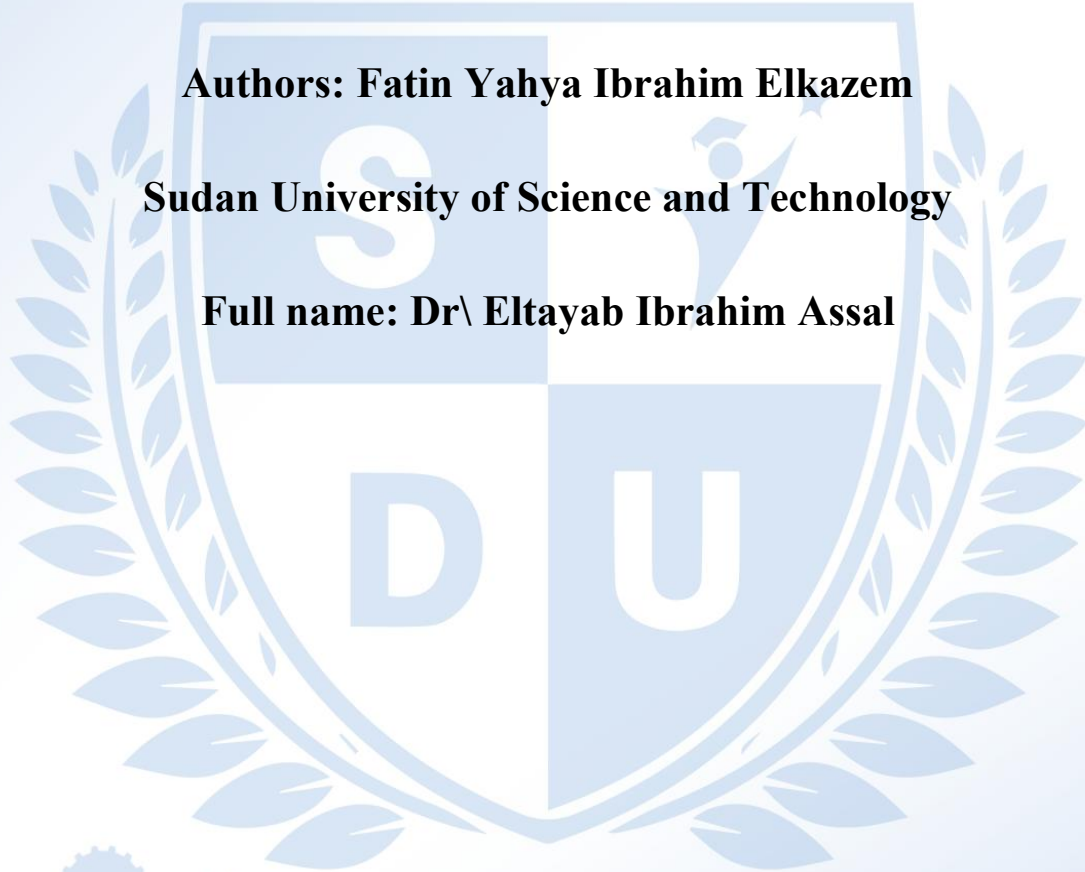
Total Quality Management In Hospitals: Implementation, Barriers, And Implications For Sudan

Article Type: Structured Narrative Review

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Abstract:

Total quality management (TQM) is a combination of leadership, staff involvement, patient-focused care, process control and continuous improvement. The overall idea of the structured narrative review is to synthesise the evidence related to hospital TQM implementation, barriers and implications in the context of Sudan. The literature was identified using PubMed/MEDLINE, Scopus, Web of Science, Google Scholar and official health-organization resources. Evidence was thematically synthesized and differentiated by integrated TQM, related quality approaches, or by contextual relevance. Studies conducted in hospitals mostly found links between TQM practices and the perceived quality of service or organizational performance. Leadership effects were dependent on context and there was a lack of consistency between provider assessments and patient experience. The evidence of the lean, laboratory quality-management systems and risk-management interventions guided specific improvement mechanisms, but did not establish the effectiveness of integrated TQM. Sudanese data showed low levels of professional involvement in quality improvement and organizational barriers, and no assessment of a hospital TQM program. A four-step process is suggested: a readiness assessment, standardization and training, pilot implementation, and evaluation with gradual expansion. The framework is a synthesis, which has not been tested, and is designed to provide a basis for future empirical study. While TQM could provide an organizational framework for improvement in Sudanese hospitals, further evaluation of the 'feasibility, effectiveness and sustainability' of TQM is needed at the local level.

Keywords: Total Quality Management; Healthcare Quality; Hospital Management; Quality Improvement; Implementation; Sudan

Introduction:

Healthcare quality encompasses the structures, processes, and outcomes through which care is delivered (1). Quality is an organizational responsibility when it comes to hospital services because they are dependent on coordination between clinical, nursing, diagnostic and administrative units. Patient-safety governance and national quality policy offer complementary mechanisms for accountability and improvement, particularly when there are limited resources (2,3).

The evolution of total quality management (TQM) grew out of a management philosophy focusing on preventing errors, continually improving processes, involving employees, and lowering the amount of variation in processes (4). In healthcare, these work hand in hand with culture and leadership practices to influence patient experience and operational performance processes (5,6). However, this term is applied inconsistently and either an integrated management system is studied or individual quality tools or staff perceptions about improvement are reported. Bibliometric mapping is a description of the establishment of this research field but does not provide the establishment of clinical effectiveness (7).

Evidence also varies from one point of view or place to another. In a Syrian hospital, provider and patient assessments were inconsistent, and in conflict-affected Yemen, research focused on provider-rated, not patient outcomes, of quality (8,9). This is important in Sudan, where transferred interventions need to be tailored according to local staffing, infrastructure, governance and service priorities. The involvement of stakeholders in planning, implementation and evaluation is also highlighted in national quality-policy research (10).

The purpose of this review is to integrate the strategies and obstacles in the implementation of TQM in hospitals, critically differentiate between TQM evidence and other related approaches, and discuss implications for Sudan. It offers a literature-based basis for an independent empirical study undertaken in Sudan and does not present any results from this study, but rather draws its conclusions from the literature synthesized in this paper.

Materials And Methods

Design and information sources

A structured narrative review was undertaken. Literature was identified through PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar, supplemented by recognized official health-organization publications. The principal publication period was January 2015 to September 2026; earlier foundational material was retained for the conceptual definition and assessment of quality.

Search, selection, and synthesis

Search terms combined “total quality management,” “TQM,” or “continuous quality improvement” with “hospital,” “healthcare services,” or “health system,” and terms addressing implementation, barriers, patient safety, patient satisfaction, developing countries, or healthcare quality in Sudan. These terms describe the search approach. Sources were selected for relevance to the review objectives, English-language availability, and publication in peer-reviewed journals or recognized official reports. Title and abstract screening was followed by assessment of accessible full texts. Duplicate, unrelated, and exclusively non-healthcare industrial material was excluded from the focused synthesis.

The narrative was organized around TQM principles, implementation strategies, outcomes, barriers, and implications for Sudan. Evidence was classified as integrated TQM in healthcare, related components or approaches, or contextual and policy material. Table 1 presents a selected set of primary studies chosen to compare hospital TQM studies, Sudanese evidence, and related quality studies from other settings; it is not an exhaustive list of the sources reviewed. The table identifies the evidence type of each study and flags small samples and indirect evidence. Conceptual frameworks and reviews are identified separately in the text. No pooled effect estimate was calculated; associations and author recommendations were distinguished from causal effects and from this review’s proposed framework.

Ethical considerations

This review used previously published literature and publicly available information, involved no human participants or identifiable individual data, and did not require ethical approval.

Results:

The synthesis moves from concepts and integrated TQM studies to related approaches, implementation strategies and barriers, Sudanese evidence, and the proposed framework; Table 1 summarizes selected primary studies.

TQM principles and related approaches

TQM combines leadership commitment, patient focus, employee involvement, continuous improvement, data-based decisions, and process orientation (4,5,6). These principles are interdependent: standard operating procedures have limited value without staff participation, and performance indicators require accountable follow-up. Donabedian’s structure-process-outcome model helps distinguish organizational inputs and processes from the patient outcomes they are intended to improve (1).

TQM is broader than a single improvement project. Continuous quality improvement emphasizes iterative testing; lean addresses waste and flow; accreditation and International Organization for Standardization (ISO)-based systems provide structured standards and external assurance. These approaches may support TQM but are not interchangeable with it. Hamilton and colleagues developed and evaluated a quality improvement framework at The Ottawa Hospital, Canada, comparing assessment scores

of educational improvement projects that applied the framework with projects from the previous year; scores improved overall, but not for the spread criterion (11). Fumai and colleagues conducted a scoping review of quality-management, accreditation, and ISO-related developments in Italian healthcare from 2016 to 2024 (12). Neither study evaluates an integrated TQM program, and neither provides evidence on clinical outcomes in Sudan.

Integrated TQM and organizational performance

Puthanveettil and colleagues used a descriptive cross-sectional survey of managers and medical staff in Indian hospitals, analyzed with structural equation modelling, to examine TQM implementation practices (6). Management initiative, continuous process improvement, and teamwork were prominent factors, and awareness differed between professional groups. The authors noted a limited sample size and the need for longitudinal studies. The study supports relationships among organizational practices and performance measures, rather than a demonstrated causal effect on clinical outcomes.

Masudin and colleagues examined TQM, information technology, and green supply-chain practices in a survey of 231 respondents in Indonesian hospitals, analyzed with structural equation modelling and artificial neural networks (SEM-ANN) (13). TQM was positively associated with sustainability performance, but management initiative strengthened the relationship of information technology with sustainability performance and weakened that of TQM; its moderating effect on green supply-chain practices was not significant. Leadership therefore cannot be assumed to have a uniformly beneficial moderating effect. Sustainability measures are not clinical outcomes, and a sample in which 93% of respondents came from private hospitals limits transfer to Sudanese public hospitals.

Zafar and colleagues surveyed 30 nurses and head nurses in one tertiary-care hospital in Multan, Pakistan, using a self-administered questionnaire and stratified convenience sampling (14). Respondents reported favorable perceptions of quality, safety, and satisfaction. These were staff perceptions, not independently measured patient-safety events or patient satisfaction, and the small single-site sample limits generalization.

Patient experience and workforce engagement

Eissa and colleagues conducted a descriptive analytical cross-sectional study of 390 doctors, nurses, and patients at a Syrian university hospital (8). Provider and patient assessments differed, which cautions against using staff confidence as a substitute for patient experience or clinical outcomes. Limitations included a single hospital, self-reported data, and limited sample representativeness; most physician respondents were trainees. Yirga's cross-sectional study of 382 patients in public hospitals of Sidama Regional State, Ethiopia, used convenience sampling and partial least squares structural equation modelling (PLS-SEM) to link perceived service quality, satisfaction, and loyalty (15). Satisfaction partly mediated some relationships between service quality and loyalty. These outcomes concern perceived quality, satisfaction, and behavioral intentions, rather than the effectiveness of integrated TQM or clinical outcomes.

In Saudi Arabia, Alluhaybi and colleagues conducted a cross-sectional study associating nurse-manager leadership styles with staff-nurse work engagement (16). This supports attention to relational leadership and workforce participation, but it is component-level

evidence and not an evaluation of TQM. In Yemen, Alsalit and colleagues surveyed 410 healthcare professionals in four TQM-implementing hospitals in Sana'a, measuring European Foundation for Quality Management (EFQM)-based TQM dimensions and perceived service quality with service-quality (SERVQUAL)-adapted dimensions from the workers' perspective (9). Processes, policy and strategy, partnerships, and resources were positively associated with perceived service quality, whereas leadership was not significantly associated ($\beta = 0.009$, $p = .873$). A post-hoc exploratory mediation analysis suggested indirect relationships of leadership through processes and through policy and strategy. These cross-sectional, provider-reported findings do not permit causal inference and do not measure patient experience. Staff engagement should consequently be evaluated alongside workload, practical support, and the quality processes through which leadership operates.

Continuous improvement, standardization, and data

A systematic review of 15 studies of lean implementation in hospitals, published between January 2015 and December 2023, identified recurring challenges related to resources, organizational resistance, knowledge and training, process inefficiency, communication, sustainability, and patients (17). Lean's contribution concerns specific workflows and waste reduction; its findings do not establish the overall effect of TQM. Process mining applied to cancer care pathways in four hospitals in Tuscany illustrates how routine records can reveal variation in care delivery, although its infrastructure requirements may limit direct transfer to settings with incomplete records (18).

An Ethiopian institutional cross-sectional assessment of 89 health-center laboratories in the Oromia region found that 71 (79.8%) were at the lowest quality-system level (star zero), 6 at star one, 9 at star two, and 3 at star three. Written procedures, equipment maintenance, review of customer satisfaction, verification of results, quality indicators, and quality plans were associated with better laboratory service (19). This supports strengthening basic systems, but it is neither a before-and-after evaluation nor a comparison of training or mentorship formats. Practical training and managerial support therefore remain recommendations, rather than comparatively tested delivery formats.

A retrospective controlled study in China evaluated a healthcare failure mode and effects analysis (HFMEA)-based quality-management model for "Internet + Nursing Services," a digital home-nursing platform (20). It compared 170 patients from 2022 with 400 patients from 2023 before propensity score matching, and its outcomes are associated with the HFMEA-based model and the digital platform together. The single-center, nonrandomized design, possible residual confounding, differences between the two periods, and the specialized platform limit causal interpretation and transfer. A Swiss multicenter home-care study of 88 organizations, 3,223 employees, and 1,466 clients examined safety climate and quality practices, with cross-sectional associations that cannot establish hospital TQM effectiveness (21). These sources support particular safety mechanisms in home care rather than a complete management package.

Performance measurement should distinguish clinical outcomes, patient experience, process adherence, and organizational performance. The technical brief of the Agency for Healthcare Research and Quality (AHRQ) provides criteria for selecting quality measures, while national quality-policy guidance links measurement to governance (3,22). Such guidance supports indicator selection; it does not validate a particular

indicator set for Sudan. A small, feasible set with clear definitions and reliable denominators is preferable to collecting indicators that cannot inform corrective action.

Implementation strategies and barriers

The synthesis suggests beginning with organizational readiness: baseline gaps, staff knowledge, available resources, reporting practices, and leadership accountability. A multidisciplinary quality team can link clinical and administrative priorities and assign responsibility for review and corrective action. National-policy evidence emphasizes stakeholder consultation, while Nemoto's TQM-balanced-scorecard model proposes an accountability structure (10,23). The latter is a conceptual framework, not a tested intervention.

Training should connect quality concepts to routine work, including problem identification, process mapping, incident reporting, and iterative improvement. Standardization should focus on selected high-risk or frequently delayed processes. The Canadian framework offers a structured sequence for improvement projects, and the Ethiopian laboratory findings illustrate the importance of procedures and measurement (11,19). Neither supports assuming that a brief training event alone produces sustained hospital improvement.

Leadership, staff participation, resources, and information systems recur across the evidence, but their relative importance differs by study. Weak follow-up can separate quality initiatives from resource decisions; resistance can increase when staff are excluded from planning or experience monitoring as blame. Lean implementation research identifies these organizational constraints, while the Sudanese survey documents limited support, access to learning, time, and mentorship (17,24). Table 2 links the proposed implementation phases to their supporting evidence and limits.

Feedback should include both staff and patients. Provider-patient differences in Syria demonstrate why reporting from one group is insufficient, and the Yemeni study's provider proxy measures leave patient experience unmeasured (8,9). In fragile systems, interruptions in staffing, supplies, access, and governance may disrupt improvement cycles. African conflict-setting evidence concerns primary healthcare delivery and is informative by analogy rather than a direct hospital TQM evaluation (25).

Sudanese evidence and implications

The Sudanese health-system analysis of strengths, weaknesses, opportunities, and threats (SWOT) 2017 was a structural and managerial weaknesses analysis and does not detail current post-conflict conditions (26). The second study, conducted in Sudan, was an online cross sectional survey of 1007 health care professionals, using convenience sampling, from July to November 2024 (24). The respondents included 74.7% physicians and 15.7% nurses and 18% had prior experience of quality-improvement projects. The most frequently reported barriers were lack of organizational support (59.1%), no access to quality-improvement learning content (48.6%), lack of time (39.8%), and lack of mentorship (31.5%). Representativeness is limited by the voluntary nature of the online participation in the study and the fact that physicians predominate. The findings indicate engagement and readiness gaps among respondents; they do not provide national estimates or evaluate hospital TQM implementation.

Neither Sudanese source evaluates an integrated TQM program or establishes its effect on patient outcomes. International evidence can be used to guide the selection of candidate domains, but the estimated effects cannot be directly transferred due to variations in the hospital environment, staff, information systems and conflict exposure. The Indonesian sustainability model, Syrian perceptions, Ethiopian laboratory standards, and Swiss home-care findings address different constructs and services (8,13,19,21).

Candidate priorities include leadership accountability, practical staff training, patient feedback, documentation, medication and infection-safety processes, and monitoring essential supplies. These are not locally validated priorities, but are recommendations that have been synthesized and adapted to the context. Hospitals should select a feasible starting point through readiness assessment and stakeholder involvement rather than adopt all TQM tools simultaneously (3,10,24).

Implementing Total Quality Management in Sudan's fragile health system introduces specific ethical challenges that extend beyond standard operational metrics. In resource-constrained settings, quality initiatives must ensure equitable resource allocation so that performance targets do not inadvertently penalize under-resourced departments or marginalize vulnerable patient groups. As hospitals shift toward data-driven decision-making—a core component of TQM—establishing strict protocols for data integrity, patient privacy, and transparent reporting becomes essential. Ethical quality management in this context also requires protecting informed consent and ensuring that the drive for standardized processes does not compromise patient dignity. Therefore, any TQM framework applied in Sudanese hospitals must be tied to a localized ethical governance model that balances clinical targets with moral accountability and social equity.

Proposed phased framework

Figure 1 presents a proposed four-phase pathway: (1) foundation and commitment, including readiness assessment and selection of initial indicators; (2) standardization and training of priority processes by a multidisciplinary team; (3) pilot implementation in selected departments with staff, patient, and process feedback; and (4) evaluation against baseline with gradual expansion, with feedback returning to Phase 1. Table 2 lists the evidence supporting each phase and its limits. Only Phase 1 draws on direct Sudanese evidence; the other phases rest on related approaches, policy guidance, or general improvement frameworks. The pathway is the authors' literature-based synthesis, has not been tested or validated.

Discussion:

Quality is viewed as an organizational process in the literature, but the evidence suggesting its effectiveness is not as conclusive as its theoretical promise. The cross-sectional surveys and perception measures, sustainability models, and reviews are the most common. More specific mechanisms are provided by related approaches, but the outcomes resulting from an HFMEA-based intervention or associations obtained in a laboratory system cannot be associated with TQM as a whole (19,20). This distinction prevents over-counting patient safety, efficiency and organizational resiliency data.

The results also call into question a straightforward picture of leadership. Indian evidence emphasizes management initiative (6), Saudi evidence links leadership styles to staff engagement (16), and the Yemeni study's post-hoc exploratory analysis suggests indirect associations between leadership and perceived service quality through processes and policy and strategy (9). In Indonesia, a moderating effect is found for TQM, but is negative, while for information technology (IT), it is positive (13). These findings may be due to differences in constructs, respondents, service context, and analysis, but these factors were not tested formally in this review. Leadership should therefore be examined through the processes and support it enables, rather than as a uniformly positive score.

Patient experience remains an evidence requirement that is separate to the other evidence requirements. Provider assessments may identify readiness, culture, and implementation practices, but do not establish patient satisfaction or clinical benefit. To determine effectiveness, patient-reported and/or objective outcome data would need to be collected, and the design would need to measure change over time.

The starting point for Sudan is a manageable number of processes that are well defined, locally selected, have clear accountability, and have measurable, proportional outcomes. The suggested route is for discussion and field testing purposes, it does not offer a proven effective intervention. Training, reliable documentation and feedback are potential facilitating mechanisms, while access to services, staffing, supplies, and leadership continuity are also important. Even when professionals are committed, these conditions could limit the scope and speed of implementation.

Strengths and limitations

This review distinguishes integrated TQM from related approaches, classifies study settings and designs, and separates Sudanese evidence from transferred recommendations. As a narrative review, the synthesis is subject to selection and interpretation bias. Table 1 is a selected, not exhaustive, set of primary studies, and some of them have small samples or indirect relevance. English-language selection may omit relevant regional material. Studies measure heterogeneous constructs and cannot be combined into a common effect estimate. Some recent findings have limited replication, historical Sudanese evidence may not reflect present conditions, and related primary-care or home-care studies have restricted hospital applicability. The framework remains unvalidated.

Future research:

Future studies should distinguish provider reports from patient outcomes, examine variation across hospital types and settings, and evaluate the proposed phases prospectively. Before-and-after or controlled implementation designs, process and outcome indicators, resource-use assessment, and longer follow-up would strengthen conclusions about feasibility, effectiveness, and sustainability.

Conclusion:

Total Quality Management offers a coherent organizational philosophy for hospital quality improvement; however, the reviewed evidence primarily supports associative relationships and isolated operational mechanisms rather than a definitive causal effect of integrated TQM on clinical outcomes. Leadership, workforce participation, process management, and data utilization require strict contextual adaptation. Sudanese evidence identifies critical engagement and organizational-support gaps but does not evaluate a comprehensive hospital TQM program. Crucially, the proposed four-phase framework is strictly a hypothetical and conceptual model derived from literature synthesis. It has not been empirically validated within the Sudanese context. Therefore, it must be treated as a foundational hypothesis requiring rigorous empirical testing—such as quasi-experimental, before-and-after, or controlled implementation studies—before any claims of effectiveness, feasibility, or wider clinical adoption can be substantiated. Future research must prioritize transitioning this conceptual framework into empirically tested interventions to determine its actual viability in Sudanese hospitals.

Declaration:

Consent for Publication: Not applicable.

Conflict of Interest: The authors declare that they have no conflict of interest.

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Table 1. Selected primary studies: setting, design, evidence type, and interpretive limits.

Study	Setting/sample	Design	Evidence type	Finding and principal limit
Puthanveettil et al (6)	India; hospital managers and medical staff	Descriptive cross-sectional survey; structural equation modelling	Integrated TQM	Management initiative, continuous process improvement, and teamwork were prominent; awareness differed between professional groups. Limited sample size; longitudinal studies needed.
Zafar et al (14)	Pakistan (Multan); 30 nurses and head nurses, one tertiary-care hospital	Cross-sectional descriptive survey; stratified convenience sampling	Integrated TQM (small sample)	Favorable staff perceptions; self-reported, small single-site sample; patient outcomes not measured.
Eissa et al (8)	Syria; 390 doctors, nurses, and patients, one university hospital	Descriptive analytical cross-sectional survey	Integrated TQM	Provider and patient assessments differed; single site, self-reported data, limited representativeness; most physicians were trainees.

Study	Setting/sample	Design	Evidence type	Finding and principal limit
Alsait et al (9)	Yemen; 410 professionals, four hospitals in Sana'a	Cross-sectional regression; post-hoc exploratory mediation	Integrated TQM (provider-rated)	Processes, policy and strategy, partnerships, and resources associated with perceived quality; leadership not significant ($\beta = 0.009$, $p = .873$); no causal inference.
Yirga (15)	Ethiopia; 382 patients, public hospitals, Sidama Regional State	Cross-sectional; convenience sample; PLS-SEM	Related component (service quality)	Satisfaction partly mediated quality-loyalty relationships; perceptions, not TQM effectiveness or clinical outcomes.
Masudin et al (13)	Indonesia; 231 respondents, 93% from private hospitals	Cross-sectional survey; SEM-ANN	Integrated TQM with information technology and green supply-chain practices	TQM associated with sustainability performance; management initiative weakened the TQM relationship and strengthened the information-technology relationship; not clinical outcomes.

Study	Setting/sample	Design	Evidence type	Finding and principal limit
Mullela et al (19)	Ethiopia; 89 health-center laboratories, Oromia region	Institutional cross-sectional assessment	Related system (laboratory quality management)	71 (79.8%) at star zero; written procedures, maintenance, customer-satisfaction review, result verification, indicators, and quality plans associated with better service; not a training trial.
Elsharif et al (24)	Sudan; 1,007 healthcare professionals (74.7% physicians), July–November 2024	Online cross-sectional convenience survey	Direct Sudanese evidence	18% reported prior quality-improvement project experience; barriers included lack of organizational support (59.1%), no access to learning content (48.6%), lack of time (39.8%), and lack of mentorship (31.5%); not representative; not a TQM evaluation.

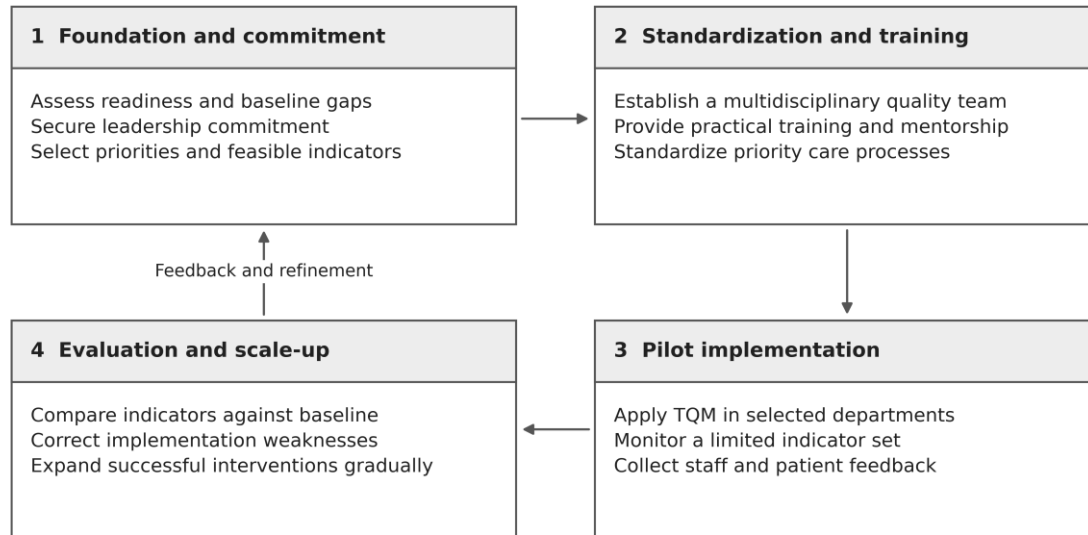
Note. The table is a selected, not exhaustive, set of primary studies. SEM-ANN, structural equation modelling with artificial neural networks; PLS-SEM, partial least squares structural equation modelling.

Table 2. Evidence supporting the proposed four-phase framework.

Phase	Supporting evidence	Interpretive limit
1. Foundation and commitment	Sudanese quality-improvement engagement and historical system context (24,26).	Supports assessing capacity; no TQM implementation evaluation.
2. Standardization and training	Ethiopian laboratory systems; Canadian improvement framework (11,19).	Related approaches; training format and Sudanese effect untested.
3. Pilot implementation	Stepwise improvement framework and national quality guidance (3,11).	Proposed small-scale application; no validated Sudanese pilot.
4. Evaluation and expansion	Improvement evaluation and quality-policy guidance (3,11).	Expansion contingent on local findings; no demonstrated effectiveness of this sequence.

A Context for implementation

Limited resources and workforce capacity; weak information systems
Leadership and cultural barriers; political and economic instability

B Proposed implementation pathway**Principles applied throughout**

Leadership • Patient-centered care • Staff involvement • Continuous improvement
Data-based decision-making • Process orientation

Figure 1. Proposed phased framework for total quality management implementation in Sudanese hospitals. Contextual constraints inform readiness, standardization and training, pilot implementation, and evaluation with feedback. The framework is the authors' literature synthesis and has not been empirically validated in Sudan. TQM: total quality management.

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