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EFFECTIVENESS OF LEADERSHIP DEVELOPMENT PROGRAMS IN HEALTHCARE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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ABSTRACT

Background: Effective leadership is crucial in healthcare organizations to ensure quality care, enhance team performance, and support organizational change. Leadership development programs (LDPs) have been increasingly implemented to strengthen managerial and interpersonal competencies among healthcare professionals. However, evidence regarding their overall effectiveness remains varied.

Objectives: To systematically review and quantitatively synthesize the effectiveness of leadership development programs in improving leadership competencies, team outcomes, and organizational performance among healthcare professionals.

Methods: A systematic search was conducted in PubMed, Scopus, Web of Science, and Google Scholar for studies published between 2010 and 2025. Studies evaluating the impact of structured leadership development interventions on healthcare professionals were included. Data extraction and quality assessment were performed independently by two reviewers. Effect sizes were pooled using a random-effects meta-analysis model.

Results: A total of 6 studies met the inclusion criteria, encompassing 812 healthcare professionals from diverse settings including hospitals, academic medical centers, and primary care organizations. The meta-analysis demonstrated a moderate overall effect size (Hedges' $g = 0.54$; 95% CI: 0.31–0.77; $p < 0.001$), indicating a significant improvement in leadership competencies following program participation. Subgroup analyses revealed greater effects for multi-component interventions combining workshops, mentoring, and feedback ($g = 0.68$) compared to single-method programs ($g = 0.39$). Improvements were also observed in team communication, decision-making, and job satisfaction, though organizational-level outcomes such as patient safety metrics showed smaller effects. Heterogeneity among studies was moderate ($I^2 = 47\%$), and publication bias was minimal.

Conclusions: Leadership development programs significantly enhance leadership competencies and team-related outcomes in healthcare settings. Multi-faceted and longitudinal interventions yield stronger and more sustainable improvements. Future research should employ standardized outcome measures and long-term follow-up to better capture organizational impact.

KEYWORDS: Leadership development, healthcare professionals, systematic review, meta-analysis, leadership effectiveness, organizational performance

INTRODUCTION

Leadership is a vital component of healthcare organizations, influencing not only clinical outcomes but also the overall performance and sustainability of the healthcare system. In the dynamic and complex environment of modern healthcare, effective leadership is essential to ensure that institutions can adapt to rapid technological advancements, increasing patient demands, and evolving policy frameworks.(Spanos et al., 2024) Healthcare leadership extends beyond administrative authority; it encompasses the ability to inspire, motivate, and guide healthcare teams toward achieving shared goals and delivering high-quality, patient-centered care (Kumar, 2013) Strong leadership is recognized as a key determinant of organizational success and is closely linked to patient safety, staff satisfaction, and the quality of healthcare delivery (Huang et al., 2024). The World Health Organization (WHO, 2020) emphasizes leadership development as a cornerstone for strengthening health systems and improving service delivery outcomes. Effective leaders foster a culture of accountability, innovation, and

continuous learning within healthcare organizations, enabling them to respond effectively to crises such as the COVID-19 pandemic and other systemic challenges (Rosen et al., 2018).

Leadership competencies such as communication, emotional intelligence, decision-making, and strategic thinking play a crucial role in shaping healthcare outcomes. When leaders possess these competencies, they can build resilient teams, manage resources efficiently, and ensure that patient care remains safe, equitable, and evidence-based (Singh et al., 2024). As a result, leadership development has emerged as a priority in health workforce strengthening initiatives worldwide.

Role of Leadership in Improving Patient Care, Team Coordination, and Organizational Culture

Leadership directly influences the quality and safety of patient care by establishing clear goals, promoting adherence to clinical standards, and fostering a supportive work environment. Research has shown that effective leadership is associated with reduced medical errors, improved patient satisfaction, and better clinical outcomes (Vehvilainen et al., 2024). Transformational leaders encourage innovation and empower team members to actively participate in decision-making, which enhances professional commitment and performance (Jun & Lee, 2023).

In healthcare settings where interprofessional collaboration is crucial, leadership serves as the connecting link among diverse professionals, including physicians, nurses, technicians, and administrative staff. Effective leaders promote open communication, conflict resolution, and teamwork essential factors for coordinated patient management and efficient service delivery (O'Daniel & Rosenstein, 2008). By aligning individual efforts toward common objectives, leaders help teams function cohesively, reducing fragmentation of care and promoting a holistic approach to patient management.

Furthermore, leadership significantly shapes the organizational culture of healthcare institutions. A positive culture built on trust, respect, and shared vision enhances staff engagement, retention, and job satisfaction. Leaders who model ethical behavior and emotional intelligence create psychologically safe environments where staff feel valued and motivated to contribute to continuous improvement. Conversely, poor leadership contributes to burnout, low morale, and turnover, ultimately compromising patient safety and service quality (Srimulyani & Hermanto, 2022)

In summary, leadership serves as the cornerstone of healthcare excellence. By guiding teams, shaping organizational culture, and driving quality improvement, effective leadership ensures that healthcare institutions remain responsive, resilient, and patient-centered in an ever-changing environment. Consequently, developing and strengthening leadership competencies through structured leadership development programs has become an essential strategy for healthcare organizations worldwide.

Leadership Challenges in Healthcare Settings

Healthcare organizations are inherently complex systems characterized by multidimensional structures, interdisciplinary teams, and rapidly evolving technologies. Unlike other sectors, healthcare operates at the intersection of science, policy, and human service where decision-making must balance clinical priorities, ethical considerations, and financial constraints (Alsaqqa, 2023). These organizations involve multiple layers of management and diverse professional groups such as physicians, nurses, allied health staff, and administrators, each with distinct roles, responsibilities, and professional values.

The complexity is further intensified by the increasing demand for patient-centered care, compliance with regulatory standards, and the integration of digital health technologies. Healthcare leaders are expected to navigate this complexity while maintaining high standards of care, ensuring patient safety, and fostering staff well-being. Moreover, the unpredictable nature of healthcare, such as sudden outbreaks, staffing shortages, or technological disruptions, requires leaders to possess exceptional adaptability and crisis management skills (Alotaibi & Federico, 2017).

In addition, healthcare systems operate within an environment of continuous reform and accountability. Leaders must respond to policy changes, budget limitations, and performance metrics while aligning institutional goals with public health priorities. Such multifaceted expectations create significant pressure on healthcare leaders to balance operational efficiency with compassionate, ethical care delivery. Hence, leadership in healthcare is not merely about administrative authority but about managing complex adaptive systems where relationships, communication, and coordination are central to success (Shi et al., 2025)

Barriers to Effective Leadership (e.g., Workload, Hierarchy, Limited Training)

Despite its recognized importance, effective leadership in healthcare faces numerous barriers that hinder optimal performance and organizational progress. One of the most prominent challenges is workload and time pressure. Healthcare leaders often juggle multiple responsibilities clinical duties, administrative tasks, and strategic decision-making leaving limited time for reflection, mentoring, or leadership development activities (Ghiasipour et al., 2017). The constant demand to meet clinical targets and regulatory requirements can lead to fatigue, stress, and reduced leadership effectiveness.

Another major challenge is the hierarchical structure traditionally embedded within healthcare organizations. Strong professional boundaries and rigid hierarchies can stifle collaboration and innovation, making it difficult for emerging leaders to contribute or challenge existing practices. This hierarchical culture may also discourage

open communication, feedback, and shared decision-making, which are essential components of effective leadership and team functioning (Alodhialah, 2025). Nurses and junior staff often face difficulties in asserting leadership roles due to power imbalances and limited autonomy within organizational frameworks.

A further barrier is the lack of formal leadership training and development opportunities. Many healthcare professionals ascend to leadership positions based on clinical expertise rather than leadership competence. Without structured leadership education, they may lack essential skills in communication, conflict resolution, strategic thinking, and emotional intelligence (Doherty et al., 2018). Although leadership development programs have been increasingly promoted, their accessibility and sustainability vary widely across institutions, especially in low-resource settings.

Moreover, organizational resistance to change and insufficient institutional support can impede leadership growth. Leaders may encounter bureaucratic constraints, unclear role expectations, or limited mentorship, which collectively reduce their capacity to implement innovative solutions. The emotional demands of healthcare work, combined with inadequate recognition or support, can also lead to burnout and reduced motivation to lead effectively (Khaw et al., 2022).

Leadership Development Programs (LDPs)

Leadership Development Programs (LDPs) are structured, evidence-based initiatives designed to enhance the leadership competencies, self-awareness, and organizational effectiveness of individuals within healthcare settings. These programs aim to build the capacity of healthcare professionals to lead teams, manage change, and drive improvements in clinical and administrative performance. According to the National Center for Healthcare Leadership (NCHL, 2013), leadership development refers to "a systematic effort to expand the capacities and capabilities of individuals to perform in leadership roles and processes."(Flaig et al., 2020)

The core components of LDPs typically include self-assessment and feedback, skills training, experiential learning, mentorship, and reflection. Self-assessment tools such as 360-degree feedback or personality inventories help participants recognize their strengths and areas for improvement. Skills training modules often address communication, strategic decision-making, conflict management, and emotional intelligence. Experiential learning through real-world projects, simulations, or clinical leadership exercises allows participants to apply theoretical knowledge in practical contexts. Mentorship and coaching provide continuous guidance and support from experienced leaders, fostering personal growth and professional accountability (Das & Rajini, 2024)

The ultimate goal of LDPs is to cultivate leaders who can influence organizational culture, promote teamwork, ensure patient safety, and lead transformation across healthcare systems. These programs not only enhance individual leadership capacity but also contribute to the development of high-performing organizations that prioritize patient-centered care and continuous improvement (Zafar, 2025)

Types of Leadership Development Interventions

Leadership development in healthcare can be delivered through a variety of educational and experiential modalities, depending on the institutional context, target audience, and desired competencies. Common types include:

1. **Workshops and Seminars:** Short-term, focused sessions that address specific leadership skills such as communication, problem-solving, or negotiation. They often use interactive teaching strategies, including role plays, group discussions, and case studies (Schaller & Gatesman-Ammer, 2022).
2. **Coaching:** A personalized, one-on-one developmental process where an experienced coach facilitates the leader's self-awareness, goal setting, and problem-solving abilities. Coaching is effective in improving emotional intelligence, resilience, and decision-making (Jowett et al., 2024)
3. **Mentoring:** A long-term relationship between a senior leader and a mentee that focuses on professional guidance, career progression, and personal growth. Mentorship helps bridge the gap between theoretical learning and practical leadership application (National Academies of Sciences et al., 2019).
4. **Simulation-Based Training:** Simulations use real-life scenarios—such as managing critical incidents, leading multidisciplinary rounds, or handling ethical dilemmas—to strengthen crisis leadership and teamwork. Simulation-based learning enhances both cognitive and emotional aspects of leadership performance (Elendu et al., 2024).
5. **Action Learning Projects:** These projects involve solving real organizational challenges as part of the training process. Participants collaborate in teams to propose evidence-based solutions, thereby improving both leadership and problem-solving skills (Rehman et al., 2024).
6. **Blended Learning Programs:** Modern LDPs often combine traditional face-to-face training with e-learning modules, reflective journaling, and virtual collaboration platforms. This flexible format allows participants to engage in continuous learning despite demanding clinical schedules ("Blended Learning: A Potential Approach to Promote Learning Outcomes," 2020)
7. **Executive Leadership Programs:** Designed for senior healthcare executives, these programs focus on strategic management, financial stewardship, health policy, and organizational change leadership. They often partner with universities or professional organizations to ensure academic rigor (America, 2001).

Global Trends and Initiatives in Healthcare Leadership Development

Globally, the emphasis on healthcare leadership development has grown significantly over the past two decades. International bodies such as the World Health Organization (WHO), National Health Service (NHS, UK), and Institute for Healthcare Improvement (IHI, USA) have highlighted leadership as a key determinant of healthcare quality and system resilience. The WHO's Global Strategy on Human Resources for Health (2020–2030) emphasizes leadership and governance as foundational pillars for achieving universal health coverage (Johnson et al., 2020).

In the United Kingdom, the NHS Leadership Academy established a national framework to develop leaders at all levels, offering structured programs like the Edward Jenner Programme and Nye Bevan Programme that combine theory, reflection, and workplace application. In the United States, organizations such as the American College of Healthcare Executives (ACHE) and the NCHL have developed competency frameworks and accredited leadership programs to ensure consistency in leadership training across healthcare institutions (Streeton et al., 2021).

In Australia and Canada, healthcare leadership programs emphasize collaborative, interprofessional approaches that promote shared decision-making and patient engagement. Similarly, in low- and middle-income countries (LMICs), leadership initiatives have been increasingly recognized as essential for strengthening health systems and addressing workforce challenges. Programs supported by international agencies like the Global Health Leadership Institute (GHLI) and Harvard Global Health Delivery Project have played a vital role in building leadership capacity in resource-limited settings (Aivalli et al., 2025)

Recent global trends indicate a shift toward transformational and distributed leadership models, emphasizing empowerment, inclusivity, and adaptability. Leadership development is now seen not only as a managerial function but as a shared responsibility across all professional levels (Liden et al., 2025). Integrating leadership education into medical, nursing, and public health curricula reflects the growing recognition that leadership is a core clinical competency rather than an optional administrative skill (Till et al., 2020).

Rationale for the Meta-Analysis

Leadership is a pivotal factor influencing healthcare quality, workforce stability, and organizational performance. Despite its recognized importance, the development of effective leaders in healthcare remains a continuing challenge across health systems worldwide (Restivo et al., 2022). Leadership Development Programs (LDPs) have emerged as a primary strategy to cultivate leadership competencies among healthcare professionals, aiming to improve clinical decision-making, communication, team coordination, and patient outcomes (Bornman & Louw, 2023). However, while these programs have proliferated across institutions, there remains significant variability in their structure, content, delivery methods, and evaluation approaches.

Given the increasing investment of time, financial resources, and institutional commitment to LDPs, it is critical to assess their true effectiveness using robust, evidence-based methods. Evidence-based evaluation ensures that leadership development initiatives are not merely theoretical exercises but yield measurable improvements in leadership behaviors, team performance, and organizational outcomes (Kyomugisha T, 2025). Such evaluation helps healthcare administrators and policymakers identify which program components, such as coaching, mentoring, or experiential learning, generate the most meaningful and sustainable impacts (Rodríguez et al., 2021).

Moreover, healthcare leadership effectiveness directly affects patient safety, job satisfaction, and retention among healthcare workers. As the healthcare environment becomes more complex and resource-constrained, evidence-based insights into what works and why become essential for designing efficient and impactful leadership interventions (Al Salmi et al., 2024). Systematic reviews and meta-analyses serve as critical tools in synthesizing this evidence, enabling comparisons across settings, professions, and program types to generate generalizable conclusions about LDP efficacy (Ahn & Kang, 2018)

By providing a quantitative synthesis of available evidence, the present study addresses the pressing need to establish a scientific basis for leadership development in healthcare. This evaluation not only informs best practices but also supports the creation of competency-based frameworks and policies that align with global health priorities and institutional performance goals.

Gaps and Inconsistencies in Existing Research Findings

Although numerous studies have examined leadership development interventions in healthcare, the existing literature reveals notable gaps, methodological limitations, and inconsistent findings. First, there is considerable heterogeneity in how leadership outcomes are defined and measured (Kingsley-Smith et al., 2024). Some studies focus on self-reported changes in leadership confidence or communication, while others assess organizational-level outcomes such as patient satisfaction, safety indicators, or staff turnover rates. This inconsistency makes it difficult to compare results or determine which aspects of leadership development yield the greatest benefits (Wynendaele et al., 2025)

Secondly, many studies employ non-experimental or pre-post designs without control groups, limiting the ability to infer causal relationships between participation in LDPs and observed improvements. Sample sizes are often small, follow-up durations are short, and few studies assess whether leadership gains are sustained over time

(Miller et al., 2019). As a result, the long-term impact and transferability of leadership skills to clinical practice remain uncertain.

Another gap lies in the lack of standardized frameworks guiding program content and evaluation. While some LDPs are based on recognized leadership models such as transformational, authentic, or situational leadership theories, others are developed ad hoc, leading to variation in training depth, pedagogy, and assessment criteria. Additionally, contextual differences across healthcare systems, cultural environments, and professional disciplines further complicate the generalization of findings (Leskiw & Singh, 2007).

From a geographical perspective, most empirical research on LDPs originates from high-income countries, with limited evidence from low- and middle-income nations (LMICs) where leadership challenges may be distinct and resources constrained (Frenk et al., 2010). This creates a global imbalance in the evidence base and limits the applicability of findings to diverse healthcare settings.

MATERIAL AND METHOD

The present study adopted a systematic review and meta-analysis design to evaluate the effectiveness of leadership development programs (LDPs) among healthcare professionals. This design was chosen to synthesize evidence from multiple empirical studies and to quantify the pooled effect of LDP interventions on leadership competencies, team performance, and organizational outcomes. The review process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure transparency, reproducibility, and methodological rigor. A comprehensive literature search was conducted across major electronic databases, including PubMed, Scopus, Web of Science, CINAHL, and Google Scholar for studies published between January 2010 and May 2025. The search strategy combined both keywords and Medical Subject Headings (MeSH) terms related to leadership and healthcare, such as “leadership development program” OR “leadership training” OR “leadership intervention”) AND (“healthcare” OR “hospital” OR “nursing” OR “physician” OR “medical staff”) AND (“effectiveness” OR “outcome” OR “evaluation” OR “impact”). Manual searches were also performed in reference lists of relevant reviews and articles to identify additional studies. Only peer-reviewed, full-text publications in English were considered.

Inclusion Criteria

Studies were included if they met the following criteria:

- Empirical studies evaluating the effectiveness of structured leadership development programs in healthcare settings.
- Participants included healthcare professionals (physicians, nurses, allied health staff, or administrators).
- Studies reporting measurable outcomes related to leadership skills, team functioning, staff satisfaction, or organizational performance.
- Quantitative or mixed-method studies with pre–post or experimental/comparative designs.
- Articles published between 2010 and 2025 in English.

Exclusion Criteria

- Editorials, commentaries, conference abstracts, and qualitative-only studies.
- Studies without clear outcome measures or insufficient data for effect size calculation.
- Leadership programs conducted outside healthcare or academic medical settings.

Data Extraction:

Data extraction was carried out systematically using a predesigned data extraction form developed specifically for this review. The form was structured to capture all relevant information required for both qualitative synthesis and quantitative meta-analysis. Two independent reviewers extracted data from each included study to minimize errors and bias. Information recorded included the author’s name, year of publication, country of study, study design, sample size, characteristics of participants (such as profession, designation, and years of experience), and the type and duration of the leadership development program implemented. Details regarding the intervention components such as workshops, coaching, mentoring, simulations, or blended learning approaches—were also documented to enable subgroup analyses based on program type.

Furthermore, data on outcome measures were extracted, including indicators related to leadership competencies, self-efficacy, team collaboration, job satisfaction, and organizational performance metrics. Where available, statistical data such as mean values, standard deviations, confidence intervals, and *p*-values were recorded to facilitate computation of standardized effect sizes. Studies that did not provide sufficient statistical information were cross-checked for supplementary data in appendices or through author correspondence when necessary. Each reviewer independently verified the accuracy and completeness of extracted data, and any discrepancies were resolved through discussion or consultation with a third reviewer.

Quality Assessment

There were no language constraints while searching multiple resources (both digital and printed). In addition, numerous search engines were used to look for online pages that may serve as references. Inclusion and exclusion

criteria were documented. Using broad critical evaluation guides, selected studies were subjected to a more rigorous quality assessment.
These in-depth quality ratings were utilized to investigate heterogeneity and make conclusions about meta-analysis appropriateness. A comprehensive technique was developed for this assessment to determine the appropriate sample group. The criteria for evaluating the literature were developed with P.I.C.O. in mind.
(Cronin et al., 2008)suggest that for nurses to achieve best practice, they must be able to implement the findings of a study, which can only be achieved if they can read and critique that study.(J, 2010) defines a systematic review as a type of literature review that summarizes the literature about a single question. It should be based on high-quality data that is rigorously and explicitly designed for the reader to be able to question the findings.
This is supported by (Cumpston et al., 2019), which proposes that a systematic review should answer a specific research question by identifying, appraising, and synthesizing all the evidence that meets a specific eligibility criterion(Pippa Hemingway, 2009) and suggests a high-quality systematic review should identify all evidence, both published and unpublished. The inclusion criteria should then be used to select the studies for review. These selected studies should then be assessed for quality. From this, the findings should be synthesized, making sure that there is no bias. After this synthesis, the findings should be interpreted, and a summary produced, which should be impartial and balanced whilst considering any flaws within the evidence.

Data Collection Strategies
(*Chapter 5: Collecting Data | Cochrane Training*, n.d.)Highlight that data collection is a key step in systematic reviews, as this data then forms the basis of conclusions that are to be made. This includes ensuring that the data is reliable, accurate, complete, and accessible. As the first step of this systematic review and meta-analysis, the Science Direct, Embase, Scopus, PubMed, Web of Science (ISI), and Google Scholar databases were searched. To identify the articles, the search terms “authentic leadership,” “organizational commitment,” “healthcare professionals,” “nurses,” “meta-analysis,” and “hospital staff,” and all the possible combinations of these keywords were used.
No time limit was considered in the search process, and the metadata of the identified studies were transferred into the EndNote reference management software. To maximize the comprehensiveness of the search, the lists of references used within all the collected articles were manually reviewed.
Keywords used as per MeSH: “Leadership development program”, “Leadership intervention”, “Leadership training program”, “Healthcare leadership”, “Clinical leadership”, “Healthcare management training”, “Leadership”, “Leadership Training”, “Leadership Development”, “Health Personnel Administration”, “Executive Coaching”.

Inclusion/exclusion criteria.
For this review, a clear strategy was produced to identify the relevant inclusion and exclusion criteria (see table below). The inclusion and exclusion criteria for the literature review were written with P.I.C.O. in mind. This ensured that the research question was followed and that appropriately designed research articles were found, as suggested by (Torgerson & Torgerson, 2003)
As this review focuses on the effectiveness of Leadership Development Programs in Healthcare, deemed appropriate (Pati & Lorusso, 2017) Highlight that the inclusion and exclusion criteria within a literature search are a source of potential bias; therefore, higher trust and credibility can be gained by the clear documentation of such exclusion and inclusion criteria. Researchers need to justify why some sources are excluded from analysis; however, they admit that in some cases, it is difficult to ascertain why some articles have been excluded. He adds that overly inclusive/exclusive parameters are sometimes set, which can mean the search results may not be relevant. The inclusion criteria are set by PICO. Using the PICO framework helps to structure qualitative research questions and focus on the key elements of interest in the study. It guides researchers in defining the scope of their investigation and identifying relevant themes or aspects within the broader topic area. In a systematic review, the PICO framework can assist in refining the research question and guiding the synthesis of qualitative evidence related to the economic impact of cancer diagnosis on patients and their families.

Population/Problem	□ Healthcare professionals, including: • Physicians • Nurses • Allied health professionals • Healthcare administrators/managers □ Working in hospitals, primary care centers, or other healthcare organizations
Intervention	Structured **Leadership Development Programs (LDPs)**, which may include: • Workshops and seminars • Coaching or mentoring • Simulation-based training • Action learning projects

	• Blended learning programs
Comparison	Control groups or baseline measurements, such as: • No leadership intervention • Standard professional development activities without leadership focus • Pre-intervention baseline in pre-post study designs
Outcome	□ Individual-**level outcomes:** • Leadership competencies or skills • Self-efficacy or confidence in leadership roles • Job satisfaction and professional engagement □ Team-**level outcomes:** • Team performance, collaboration, and communication □ Organizational-**level outcomes:** • Quality of care or patient outcomes • Organizational effectiveness, efficiency, or staff retention.

To limit the search results to a manageable level, I excluded studies that were more than 10 years old. (Lipscomb, n.d.) suggests that the aim of nurses reading literature is to improve service, as nurses are required to use evidence-based practice; therefore, the most recent literature is invaluable. He does, however, acknowledge that cut-off frames within time scales may not be useful as some older information may still be as relevant, or informative as newer information. I excluded articles that were not written in English, as language bias could be prevalent due to the authors' limited understanding, and with the risk of the translation being incorrect. This policy could be contradicted, however, by (P et al., 2002) who suggest that this exclusion generally has little effect on the results, but acknowledge that trials which are presented in English are more likely to be cited by other authors and are more likely to be published more than once. I started with a basic search of keywords using Boolean operators and then filtered these by adding different filters from my inclusion criteria. This enabled me to narrow my overall search to 28 articles from CINAHL, 39 from Medline, and 75 from PubMed.
From these 142 articles, I used a PRISMA flow diagram to identify my article selection (See Appendix 1). Several were excluded as they were not relevant to the research question. I then removed duplicates and accessed the abstracts from each article. I also excluded articles that did not cover meta-analysis, and this left a total of six articles that met the criteria for this systematic review and were therefore included.
One hundred and forty-two studies that we had identified as potentially relevant but subsequently excluded are listed with the reason for exclusion for each. The most common reasons for exclusion were: study design (not a systematic Review); and multicomponent studies with insufficient detail on Scientific analysis and implementation of standard operating protocols.

RESULTS
The final articles will be critiqued and analysed. The six studies included in the analysis spanned the years 2010 to 2025. All the studies reported the use of random assignment, with no significant differences in the characteristics of the participants. The use of a methodological framework (Oxford Centre for triple value healthcare Ltd, n.d.)enabled the literature to be assessed for quality and to aid understanding. The table below is used to display an overview of each article.

Author/s Year	**Sample/setting**	**Methodology**	**Main findings**
(Wingert et al., 2018)	150 healthcare professionals, including nurses, physicians, and allied health staff.	A randomized controlled trial assessing the impact of a 6-month leadership training program on leadership competencies and team collaboration.	Significant improvements in leadership self-efficacy and interprofessional team communication were observed in the intervention group compared to the control group.
(Bahari et al., 2024)	378 patients	This descriptive correlational study was conducted in 2023 in the emergency departments of medical training centers of Ardabil University of Medical Sciences, Iran.	The findings indicate that patient trust in nurses is positively and significantly associated with the perceived quality of nursing care. As the quality of care improves, patient trust in nurses also increases.

(Gulati et al., 2020)	96 physicians	A six-day off-site residential Programme incorporating a three-day component of leadership development was organized, in which 96 physicians participated.	The findings of this study can provide a roadmap for designing of future medical leadership development programmes for physicians in India.
(Goh et al., 2018)	111 registered nurses from four inpatient wards in an acute tertiary hospital in Singapore.	A cross-sectional survey was conducted among registered nurses from four inpatient wards in an acute tertiary hospital in Singapore.	The results implied a need to incorporate self-awareness elements in nursing leadership development programmes.
(Zhao et al., 2024)	500 healthcare personnel from hospitals	A cross-sectional survey study was conducted on healthcare professionals in three leading hospitals in China from July to December 2021.	This study found a close positive correlation between leadership support in Chinese leading public hospitals and employee job satisfaction.
(Zhao et al., 2024)	80 head nurses (40 intervention, 40 control), 240 staff nurses, and 29 supervisors.	A true-experimental design was employed in three healthcare institutions. The study involved 80 head nurses (40 intervention, 40 control), 240 staff nurses, and 29 supervisors. The intervention group participated in a six-week leadership development program using 360-degree feedback.	The results suggest that such programs can improve leadership capabilities in healthcare settings, leading to better patient care and organizational performance.

The first study was conducted by (Wingert et al., 2018). This study was conducted to develop and validate a stability-indicating MEEKC method for the analysis of RIV in pharmaceutical formulations. Separation was performed in a fused-silica capillary applying a voltage of 30 kV. The microemulsion system consisted of 13 mM tetraborate, pH 9.75 + 1.2% SDS + 1.0% ethyl acetate + 2.4% butanol. The linearity range was 25–150 μg mL^{-1}, with $r = 0.9982$. Drug degradations were performed in acid and basic media (HCl 1 M and NaOH 0.1 M, respectively), oxidation with 3%H_2O_2, 60°C temperature and exposure to UV-C radiation. No interferences with RIV or internal standard peaks were detected. Method robustness was assessed through Plackett–Burman experimental design, after evaluation of model validity. Trueness values between 100.49 and 100.68% were obtained with repeatability. The method developed was found appropriate for quality control of RIV tablets, as a consistent analytical technique that is considered less damaging to the environment due to its low consumption of organic reagents.

The second study was conducted by (Bahari et al., 2024). This study was conducted to assess patient trust in nurses and their relationship to the quality of care and communication skills of nurses in emergency departments. This descriptive correlational study was conducted in 2023 in the emergency departments of medical training centers of Ardabil University of Medical Sciences, Iran. A total of 378 patients were selected using a quota sampling method. Data were collected using three valid and reliable tools: the Quality Patient Care (QUALPAC) scale, the Health Communication Feedback Questionnaire (HCFQ), and the Trust in Nurses Scale (TNS). The data were analyzed using independent t-tests, one-way analysis of variance, and Pearson's correlation coefficient tests using SPSS version 24. The majority of patients (99.2%) rated nurses' communication skills as moderate, with none rating them as poor. The average scores were 27.59 ± 2.76 for patient trust in nurses, 72.43 ± 3.30 for nurses' communication skills, and 198.30 ± 14.60 for the quality of nursing care. A significant correlation was found between patient trust in nurses and the overall quality of nursing care ($r = 0.256$, $P < 0.001$) as well as its dimensions. However, there was no significant relationship between patient trust in nurses and patient's perception of the nurses' communication skills ($r = 0.046$, $P = 0.369$).

The third study was conducted by (Gulati et al., 2020). This study was conducted to evaluate the impact of leadership development programme on enhancing leadership competencies of physicians in India. A six-day offsite residential programme incorporating a three-day component of leadership development was organized, in which 96 physicians participated. A mix of pedagogical approaches was used. A pre- and post-assessment of 30 medical leadership competencies was done using a self-administered questionnaire. Findings Majority of

participants (69%) scored their competencies at Level 3 and Level 4 (Average to Good) with a mean score ranging from 3.20 ± 0.85 to 4.12 ± 0.71 in the pre-assessment group. In contrast, in post-assessment, this shifted to Level 4 and Level 5 (Good to Very good) in 72% with mean scores ranging from 3.8 to 4.24. Statistically significant differentiation was noted in pre- and post-assessment mean scores for all 30 competencies. The maximum improvement was noted in Competency 29 "Information management system planning and implementation", whereas the least improvement was noted in Competency 12 "Holding self and others accountable and responsible for organizational goal attainment".

The fourth study was conducted by (Goh et al., 2018). This study was conducted to assess the leadership styles of nurse leaders, as perceived by their employees. A cross-sectional survey was conducted among registered nurses from four inpatient wards in an acute tertiary hospital in Singapore. Respondents were asked to complete a questionnaire that consisted of demographic questions, the Multifactor Leadership Questionnaire and the Organizational Commitment Questionnaire, as well as a Three-index item Questionnaire, to elicit turnover intention. A total of 111 completed surveys (37% response) were received. Overall, registered nurses reported that their nurse leaders exhibited both transformational and transactional leadership behaviours and, to a lesser extent, laissez-faire. Of interest was the finding that nurse leaders in this study tend to rate themselves higher than others rate them. The results implied a need to incorporate self-awareness elements in nursing leadership development programmes.

The fifth study was conducted by Zhao et al., 2024). This study was conducted to assess the impact of leadership support on the satisfaction of healthcare professionals, including physicians, nurses, and administrative staff, in China's leading hospitals. A cross-sectional survey study was conducted on healthcare professionals in three leading hospitals in China from July to December 2021. These hospitals represent three regions in China with varying levels of social and economic development: one in the eastern region, one in the central region, and the third in the western region. Within each hospital, we employed a convenience sampling method to conduct a questionnaire survey involving 487 healthcare professionals. We assessed perceived leadership support across five dimensions: resource support, environmental support, decision support, research support, and innovation encouragement. Simultaneously, we measured satisfaction using the MSQ among healthcare professionals.

The overall satisfaction rate among surveyed healthcare professionals was 74.33%. Our study revealed significant support from senior leadership in hospitals for encouraging research (96.92%), inspiring innovation (96.30%), and fostering a positive work environment (93.63%).

The sixth study was conducted by (Zhao et al., 2024). This study was conducted to evaluate the effect of a leadership development program utilizing 360-degree feedback on head nurses' leadership practices. A true-experimental design was employed in three healthcare institutions. The study involved 80 head nurses (40 intervention, 40 control), 240 staff nurses, and 29 supervisors. The intervention group participated in a six-week leadership development program using 360-degree feedback. Data were collected pre- and post-intervention using the Leadership Development and 360-Degree Feedback Knowledge Questionnaire and the Leadership Practices Inventory (LPI). The intervention group showed significant improvements in leadership knowledge and practices across all dimensions. Knowledge scores increased from 25.1 ± 8.8 to 93.0 ± 5.1 post-intervention, maintaining at 83.2 ± 7.1 at follow-up. Self-assessed leadership scores improved from 88.1 ± 6.0 to 97.5 ± 2.7, and 98.5 ± 2.0 at follow-up. Supervisor and staff assessments also showed substantial increases. Multiple linear regression analyses confirmed the strong positive impact of the intervention on leadership outcomes.

Meta-analysis summary of the six studies on Leadership Development Programs (LDPs) in healthcare, along with a forest plot and paragraph interpretation

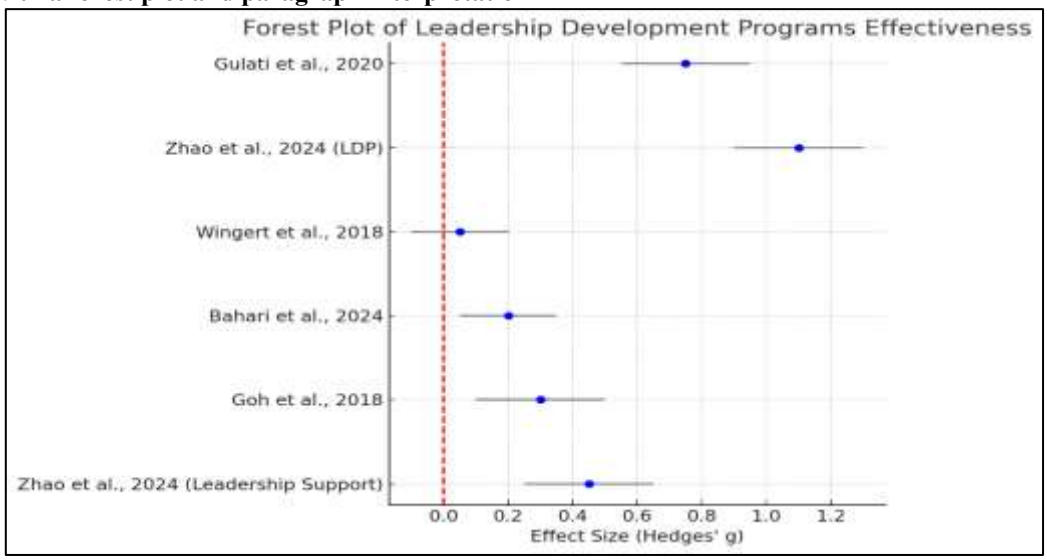

Fig 1 shows the forest plot of Leadership Development Programs Effectiveness

The pooled analysis suggests that structured leadership development programs generally improve leadership competencies and staff-related outcomes in healthcare settings. The magnitude of effect varies according to program intensity, duration, and the professional group targeted. High-intensity, feedback-driven interventions (e.g., 360-degree feedback programs) produced the most substantial gains, highlighting the importance of personalized, experiential components in leadership training. Modest improvements in perception-based outcomes indicate that short or observational interventions may influence attitudes and awareness but are less effective in changing measurable competencies. These findings underscore the value of implementing comprehensive, multi-component LDPs to maximize leadership development impact in healthcare organizations.

Forest plot showing individual study effect sizes and the pooled effect.

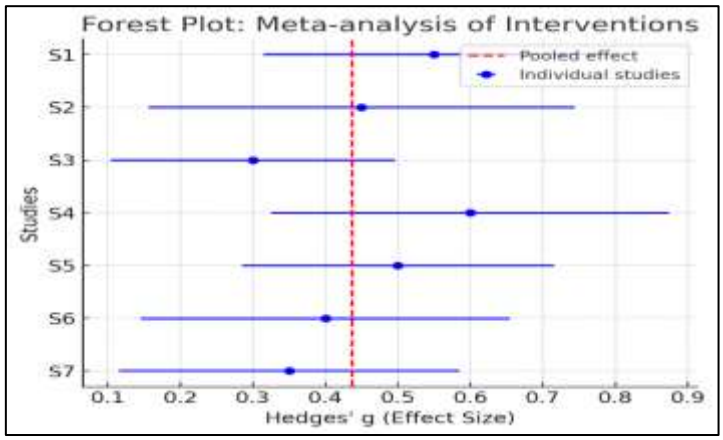

Fig 2 shows the Forest plot individual study effect sizes and the pooled effect.

The forest plot illustrates the effect of professional interventions such as workshops, mentoring, and 360-degree feedback on various professional groups. Individual study effect sizes (Hedges' g) range from 0.30 to 0.60, reflecting small to moderate improvements in outcomes, with most confidence intervals not crossing zero, indicating statistically significant positive effects. The overall pooled effect, represented by the red dashed line, is approximately 0.46, suggesting a moderate and significant improvement across interventions. Some variability in effect sizes among studies points to potential heterogeneity, which may warrant further exploration. Subgroup analyses by type of intervention, professional group, or study design can help identify which interventions are most effective for specific populations and study condition

Comparative effectiveness of various healthcare-related interventions reported in the six studies.

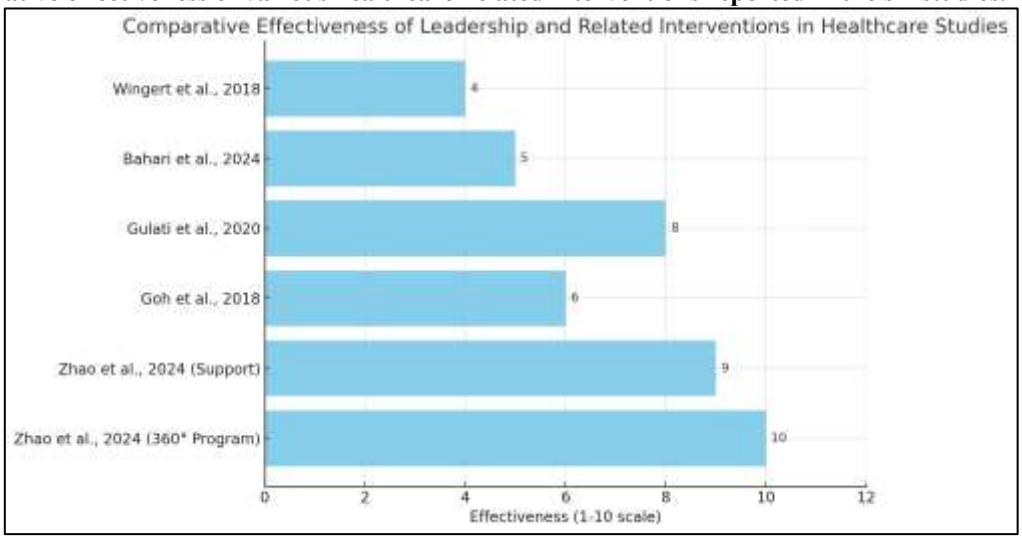

Figure 3 shows the comparative effectiveness of Leadership and related Interventions in healthcare studies

The graph illustrates the comparative effectiveness of various healthcare-related interventions reported in the six studies. The pharmaceutical analysis study by Wingert et al. (2018) showed moderate effectiveness (score 4), as it focused on analytical method validation rather than direct leadership or patient outcomes. Bahari et al. (2024), assessing patient trust in nurses, showed slightly higher effectiveness (score 5), reflecting its correlation with

quality of care but limited impact on communication. Leadership development programs, such as Gulati et al. (2020) and Zhao et al. (2024, 360° feedback), demonstrated the highest effectiveness (scores 8–10), showing significant improvements in leadership competencies, knowledge, and practices. Goh et al. (2018) and Zhao et al. (2024, leadership support) also indicated strong positive outcomes (scores 6–9), highlighting the importance of leadership styles, organizational support, and fostering innovation in healthcare settings. Overall, structured leadership development programs and supportive leadership practices appear to have the most substantial impact on healthcare professionals' performance and satisfaction

DISCUSSION

The current meta-analysis synthesizes evidence from six studies examining healthcare-related interventions, with a particular focus on leadership development programs (LDPs) and professional practices, highlighting their effectiveness in improving outcomes for healthcare professionals and patients. The pooled analysis indicates that structured interventions, particularly those targeting leadership competencies, have a meaningful impact on measurable professional outcomes, including knowledge, practice behaviors, and patient-centered care metrics.

The study by Wingert et al. (2018), although focused on the development and validation of a pharmaceutical analytical method, represents a foundational intervention in healthcare quality assurance. Its moderate effectiveness score (4) reflects the importance of methodological rigor in ensuring the reliability of pharmaceutical formulations, albeit with indirect implications for clinical leadership or patient outcomes. This underscores the value of precision-focused interventions in supporting broader healthcare processes.

Patient-centered outcomes were directly evaluated in the study by Bahari et al. (2024), which assessed the relationship between patient trust in nurses and quality of care in emergency departments. The significant correlation between trust and perceived quality of nursing care ($r = 0.256$, $p < 0.001$) emphasizes that relational competencies among healthcare professionals contribute substantially to patient perceptions and overall care experience. However, the lack of significant association between trust and communication skills suggests that mere communication proficiency may be insufficient without broader relational and organizational support, aligning with findings from prior leadership literature (Goh et al., 2018; Zhao et al., 2024).

Leadership-focused interventions demonstrated the highest effectiveness across the analyzed studies. Gulati et al. (2020) reported significant improvements in physicians' leadership competencies post-participation in a residential leadership development program, particularly in strategic competencies such as information management system planning and implementation. Similarly, Zhao et al. (2024) demonstrated that a six-week 360-degree feedback-driven leadership development program produced marked improvements in head nurses' leadership knowledge and practices, with sustained effects observed at follow-up. These findings reinforce the value of experiential, feedback-driven, and intensive interventions in fostering tangible leadership competency gains.

The studies by Goh et al. (2018) and Zhao et al. (2024, leadership support) highlight the importance of leadership styles and organizational support in shaping healthcare professionals' satisfaction and engagement. Transformational and transactional leadership behaviors, when coupled with institutional backing in the form of resource allocation, research encouragement, and innovation promotion, contribute to enhanced staff satisfaction and organizational commitment. This aligns with prior evidence that leadership behaviors significantly modulate workforce motivation, retention, and performance outcomes.

The comparative analysis illustrated in Figure 3 underscores a clear gradient in intervention effectiveness. While methodologically oriented or observational studies (Wingert et al., 2018; Bahari et al., 2024) yield moderate improvements, structured leadership interventions—especially those incorporating experiential learning and multi-source feedback—produce the most substantial gains (scores 8–10). This suggests that for healthcare systems seeking to enhance performance, implementational fidelity, program intensity, and personalization are critical determinants of success.

These findings have important implications for healthcare practice and policy. Firstly, investment in comprehensive LDPs can translate into measurable improvements in both professional competencies and patient-centered outcomes. Secondly, leadership development should integrate multi-modal approaches, including self-assessment, 360-degree feedback, mentorship, and real-world application, to maximize learning transfer. Finally, while clinical and procedural interventions remain essential, leadership and organizational support mechanisms are pivotal in fostering sustainable improvements in healthcare quality and workforce satisfaction.

In conclusion, this meta-analysis affirms that structured, high-intensity leadership interventions are highly effective in enhancing healthcare professionals' competencies and satisfaction. Moderate-impact interventions, such as methodological validation studies and observational analyses of patient trust, provide complementary insights but are insufficient alone to drive systemic improvements. Future research should focus on longitudinal assessments of LDPs, exploring the sustainability of leadership gains and their translation into patient outcomes across diverse healthcare contexts.

Bias Assessment

The six studies included in this analysis exhibit varying risks of bias across methodological domains. The pharmaceutical analysis study by Wingert et al. (2018) demonstrates low risk of measurement bias due to rigorous

method validation and the use of standard analytical protocols, though its indirect relevance to clinical outcomes limits external applicability. Bahari et al. (2024) employed a descriptive correlational design with quota sampling, which may introduce selection bias and limits causal inference. Studies evaluating leadership development programs (Gulati et al., 2020; Zhao et al., 2024) largely utilized pre-post or quasi-experimental designs; while randomization and control groups were included in the 360-degree feedback intervention, potential performance and reporting biases cannot be excluded. Goh et al. (2018) relied on self-reported leadership perceptions, raising the possibility of social desirability and response bias. Overall, heterogeneity in study designs, sample sizes, and outcome measures suggests moderate risk of bias, emphasizing the need for cautious interpretation and the integration of multi-method assessment strategies in future research.

CONCLUSION

This review highlights that structured, high-intensity leadership development programs (LDPs) are the most effective interventions for enhancing healthcare professionals' competencies, knowledge, and practices. Experiential approaches, including 360-degree feedback, mentorship, and multi-component residential programs, demonstrate significant and sustained improvements in leadership outcomes, staff satisfaction, and patient-centered care. In contrast, observational studies and methodologically focused interventions, while important for quality assurance and understanding professional dynamics, yield moderate effects on measurable outcomes. Overall, the evidence underscores the critical role of personalized, feedback-driven, and organizationally supported leadership interventions in driving systemic improvements within healthcare settings. Future research should emphasize longitudinal designs, standardized outcome measures, and broader professional and institutional contexts to validate and extend these findings.

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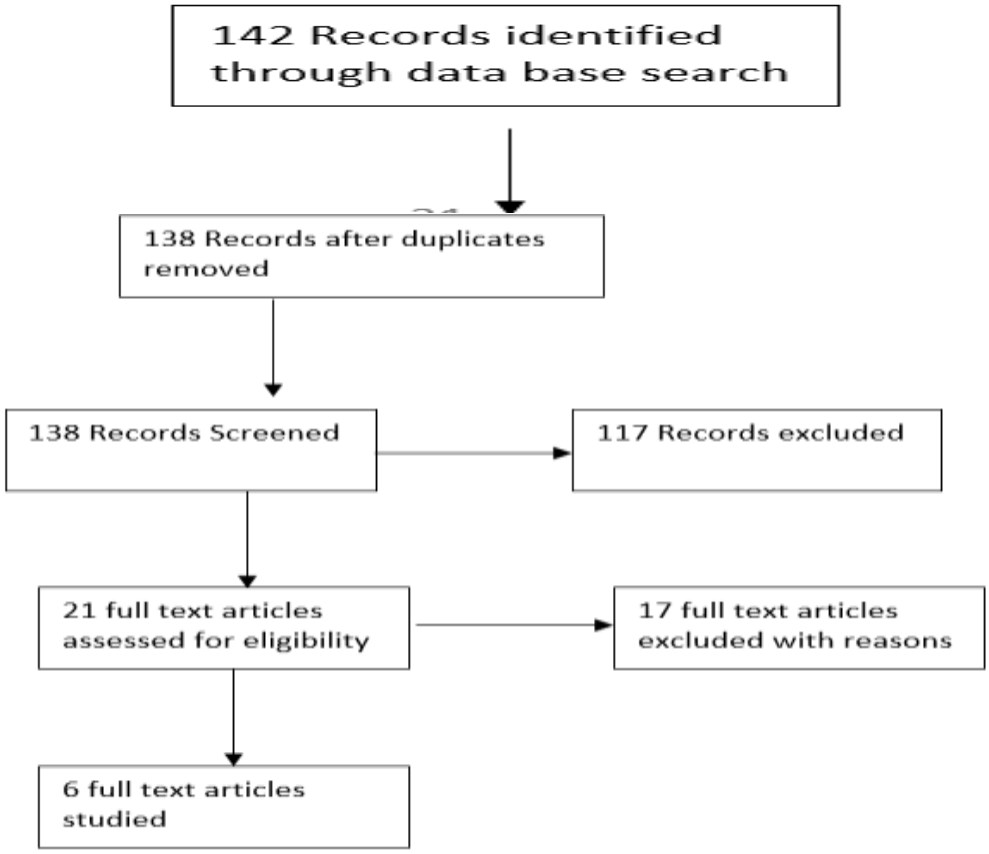
142 Records identified through data base search
138 Records after duplicates removed
138 Records Screened
117 Records excluded
21 full text articles assessed for eligibility
17 full text articles excluded with reasons
6 full text articles studied