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The Impact of a Short Online Medical Leadership Competencies Framework (MLCF)-based Leadership Training Program on Leadership Competencies Development of Healthcare Students and Junior Professionals: A Pre-Post Study.

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Abstract

Background: Leadership competencies are crucial for the students of medical, nursing, and other health disciplines due to their prospective roles in decision-making, teamwork, communication, and health crisis management. However, the contribution of the formal teaching sessions in health professions curricula to leadership and communication skills is inconsistent globally, including within the Palestinian undergraduate education system. To address this gap, the researchers evaluated the effectiveness and impact of the online leadership training program on the participants' leadership competencies, aiming to identify effective adjuncts to formal curricula. **Methods:** This study employed a one-group pretest–post-test design. The intervention was an online training program conducted via Zoom Meetings Platform for a duration of 2 hours. The training curriculum was designed in accordance with the Medical Leadership Competency Framework (MLCF). Participants were recruited through a call for registration posted on the website of the International Medical Education Trust 2000. Pre-training/post-training impact assessment was conducted using the Medical Leadership Competence Scale (MeLeCoS). Data

were analyzed using descriptive statistics and paired t-tests. **Results:** A total of 76 participants (65.8% undergraduates and 34.2% postgraduates) were enrolled in the study. The training significantly enhanced the participants' leadership competencies, as evidenced by the increase in the mean MeLeCoS score from 3.65 (±0.54) to 3.98 (±0.55) out of 5 (mean difference 0.33; 95% CI 0.20–0.45; $p<0.001$). Significant improvements were observed in five MeLeCoS factors (all $p<0.001$). No significant differences in the MeLeCoS scores between both sexes, study discipline, or training phase (p-values > 0.05). **Conclusion:** The online leadership training program markedly improved the participants' leadership competencies and emerged as a potential adjunct to formal curricula.

Keywords: Competencies, Curriculum, Healthcare, Leadership, Online, Training.

1. Introduction

Leadership is essential for students in the healthcare fields, considering their future involvement in ethical decision-making, teamwork, communication, and the management of health crises [1,2]. Many physicians assume a leadership role during their careers, making it essential for leadership training to be integrated into medical education [3,4]. Similarly, leadership is integral to nursing practice at all levels and is essential for enhancing the continuous improvement of the nursing practice, thereby improving the quality of the patient care [5,6]. However, the time assigned for leadership training in medical and nursing school curricula is limited. For example, data from the Leadership in Undergraduate Medical Education National Survey (LUMENS), which included thirty medical schools in the United Kingdom (UK), showed that only 2% of the total duration of undergraduate medical education in the UK is spent on leadership training [7].

Early-career physicians have demonstrated low confidence in their preparedness to assume medical leadership roles, particularly during their transition from students to professionals who are expected to be responsible and accountable decision-makers [3]. The stress endured by the newly graduated physicians is not only attributed to the lack of leadership training and competence, but also to the lack of self-assessment. Self-assessments influence career choice and performance, which, in turn, help identify one's own true incompetencies [8]. Consequently, it is crucial for leadership training to be integrated into undergraduate health sciences education to promote the preparedness of the emerging healthcare professionals and strengthen their performance in their future roles.

The techniques used for developing leadership in healthcare settings vary widely [9,10]. Some studies have discussed the fact that leadership programs vary in consistency and have heterogeneous and poor-quality methods, and, as a result, they highlighted the need for well-designed, accredited, and integrated leadership programs [10]. This includes integrating training in leadership skills, such as providing feedback, conflict resolution, and technical knowledge, as well as personal development, into post-graduate curricula [11]. Along with the increase in leadership training, the development of leadership competency assessment tools and frameworks has also become common in the health professions. An example of these frameworks is the one developed by the Academy of Medical Royal Colleges, which is the Medical Leadership Competency Framework (MLCF), which consists of the following five categories [12,13]: 'setting direction', 'demonstrating personal qualities', 'working with others', 'managing services', and 'improving services'. It aims to help design leadership training curricula, promote personal development, and highlight strengths through self-assessment [12–15]. Another tool is the 4Cs Framework of influence, which emphasizes the importance of 'character', 'competence', 'connection', and 'culture' in leadership and influence development [16].

The approaches used in evaluating leadership training programs were mostly subjective, non-standardized, and variable. When it comes to assessment, most studies on leadership training programs used either post-curriculum or pre/post surveys [17]. Integrating leadership curricula with comprehensive and standardized program evaluation methodologies, such as the Kirkpatrick framework and the Medical Leadership Competence Scale (MeLeCoS), facilitates standardized assessment of outcomes, thereby enhancing the measurement of participants' leadership competencies [12,14]. While numerous studies indicated enhancement in leadership skills across participants, the external validity and generalization of those finding were limited due to the heterogeneity in assessment methods across studies [14].

Evidence from various studies has shown that leadership training programs may enhance the leadership competencies of healthcare practitioners, thereby improving healthcare outcomes [15]. These programs have been shown to enhance decision-making abilities, teamwork, and patient care [18,19]. Despite this evidence, formal leadership training for healthcare professionals remains greatly absent globally [20,21], and in Palestine, this absence is evident. As Katoute et al. Stated that the health systems in the Middle East and North Africa (MENA) region not only lack leadership training, but they also face multiple leadership challenges, including the insufficient development of leadership skills, a lack of information for thorough and comprehensive decision-making, and the fact that leadership support is mostly confined to senior executives [20,21]. This lack of structured training underscores the pressing need to integrate leadership development into the Palestinian healthcare education, thereby enhancing both confidence and the patient care.

The literature on medical leadership training in Palestine is notably limited. That is, no studies directly investigated the leadership competencies of Palestinian healthcare workers. This gap highlights the need for the development of a leadership training program tailored to Palestinian institutions. The sparse literature reveals a knowledge gap emphasizing the need for developing new programs to address these deficiencies. The proposed online leadership training program was designed to address the leadership training gap in the curricula of the undergraduate medical and nursing education in Palestine. Alongside promoting leadership training within the Palestinian medical institutions, the program aims to advocate for a culture of leadership training that is currently lacking in the region [20]. The online training modality provides a feasible and accessible approach to leadership development, especially in under-resourced environments. Although the effectiveness of online leadership training has not been studied in Palestine, remote learning methods may address the operational and resource challenges faced by the Palestinian medical institutions.

The comprehensive aim of this study is to evaluate the effectiveness and impact of the online leadership training program on participants' leadership competencies. We aim to enhance Palestinian Literature in the context of leadership competencies development in health sciences educational settings by showing data and practical insights. Therefore, this study contributes to bridge the gap in the medical education literature in Palestine, and supports the forthcoming leadership training initiatives by the healthcare institutions in Palestine and other low- to middle-income countries (LMICs). Through this study, we aim to enrich the literature on the effectiveness of an online MLCF-based, affordable, and applicable training program, which may be an effective solution to bridge the gap in leadership training in LMICs.

2. Methods

2.1 Study Design and Setting:

A pre-post study design was implemented from June 3, 2025, to June 20, 2025 to evaluate the impact of a brief synchronous online training program on the development of leadership competencies among undergraduate medical and nursing students and junior practitioners. The participants' self-assessed leadership competencies were evaluated one week before and one week after the online training program. A study information sheet was shared with the participants, and the participants who voluntarily agreed to participate in the study signed an electronic informed consent. This study adhered to the Declaration of Helsinki. Ethical approval to conduct this study was obtained from the Institutional Review Board (IRB) at An-Najah National University (Reference number: Nurs. Sep.2025/36). The report of this study was drafted according to the Defined Criteria To Report INnovations in Education (DoCTRINE) [22] and the newly developed CheckList Of Standards of reporting in Education Research (CLOSER) and the Checklist for Intervention Description of Education Research (CIDER) [23].

2.2 Participants and Recruitment:

The target population included the undergraduate medical and nursing students and the junior practitioners in the Palestinian institutions. A call for participation in the training program was shared online on the Facebook page and the official website of the International Medical Education Trust 2000-Palestine (IMET2000-PAL) three weeks before the training. The participants' eligibility criteria included: [1] being an undergraduate medical or nursing student enrolled in the Palestinian medical or nursing faculties, or a junior practitioner recently graduated from the Palestinian medical or nursing faculties, and [2] filling out the pre-training and post-training surveys.

A total of 80 participants attended the online training session, 76 (95%) of whom met the eligibility criteria and were included in this study. The sampling nature would lead to a potential selection bias; students and junior practitioners with an interest in leadership and access to the Facebook page and the official IMET2000-PAL website would be more likely to participate in this program. The limitation of the generalization of this study's findings, due to this potential bias, is partially alleviated by the sufficient and representative sample included in this study.

3. Leadership Training Curriculum Development Process

3.1 Description of the Intervention Design:

The intervention was a short synchronous online training program titled the "Leadership Skills Training Program for Healthcare Students and Junior Healthcare Professionals". The training program was designed according to an outcome-based education (OBE) framework, which ensured alignment among the learning objectives, educational activities, and evaluation outcomes. The curriculum of this training program was designed using Kern's Six-Step Approach to Curriculum Development [24], as follows:

Steps 1 and 2: Problem identification, general needs assessment, and targeted needs assessment

Leadership competencies are essential for physicians and nurses; however, formal training on leadership competencies is often limited in the Palestinian undergraduate curricula. A scoping literature review was conducted to identify research work targeting leadership competencies development in the undergraduate medical and nursing education in Palestine. Literature on this field is notably limited; no studies directly investigated the leadership competencies of the Palestinian medical and nursing students or healthcare workers. Moreover, observations from faculty members and a revision of the curricula of the medical and nursing faculties in the major Palestinian institutions revealed a gap in the formal curricula, highlighted by the lack of structured training for leadership development. This gap prompts the need for the development of a leadership training program tailored to the Palestinian institutions.

Step 3: Goals and Objectives.

The proposed online leadership training program aims to enhance the quality of the Palestinian healthcare system by developing the leadership competencies of undergraduate medical and nursing students and newly graduated healthcare professionals. The specific objectives of this program were: [1] to introduce the participants to the importance of the effective communication in healthcare leadership, [2] provide them with different leadership styles and demonstrate their impact on healthcare teams and patient outcomes, [3] equip the participants with essential leadership and communication competencies, and [4] provide practice strategies for resolving conflicts and building consensus in healthcare teams.

By the end of the training program, participants were expected to demonstrate a measurable improvement in the following domains taken from the Medical Leadership Competency Framework (MLCF) [12,14]:

[1] Achieving learning and reflecting on performance

[2] Demonstrating responsible behaviour and shaping relations

[3] Fostering personal development and promoting quality improvement

[4] Developing self-management and supporting management in healthcare

[5] Promoting improvement and innovation in undergraduate medical and nursing education

[6] Introducing systemic perspectives into organizations

Step 4: Educational Strategies.

The educational strategies of this training program curriculum included an interactive lecture and case-based discussions to facilitate experiential learning and introduce the essential principles of the effective leadership in healthcare to the participants. The content of the online lecture was organized around the stages of leadership competencies development, based on the MLCF, and focusing on the main leadership competency domains: demonstrating personal qualities (such as self-awareness, emotional intelligence, and self-regulation), managing oneself (such as time management, adaptability, and resilience), acting with integrity (such as ethical decision-making and cultural sensitivity), and working with others (such as teamwork, empathy, and communication). The participants were introduced to diverse leadership styles, including transformational and shared leadership, through interactive discussions and case-based activities. Moreover, real-world clinical scenarios were used to facilitate the practical application of leadership theories.

Step 5: Implementation.

The program was implemented in an online, synchronous training session for 2 hours via the Zoom Meetings platform. The training was organized by the International Medical Education Trust 2000-Palestine (IMET2000-PAL). The training was delivered by the Dean of the Faculty of Medicine at the Arab American University of Palestine (AAUP). The training developer and instructor has a Master's degree in Medical Education, and was selected as the instructor to bridge the content created with the experience in both academic and healthcare leadership.

Step 6: Evaluation and Feedback.

An online survey using Google Forms was used to assess the impact of this training program and collect participants' feedback. The participants were required to complete the pre-training online survey one week prior to the training session, and the post-training online survey one week after the training session. The evaluation form consisted of two sections: [1] training evaluation and participants' feedback (from the post-training survey), and [2] the Medical Leadership Competence Self-Assessment Scale (MeLeCoS), which was included in the pre- and post-training surveys [14]. The MeLeCoS self-assessment tool used included six factors with a total of 37 items. The six MeLeCoS factors relate to different aspects of leadership: factor 1 ('Achieving learning and reflecting on performance') and factor 2 ('Demonstrating responsible behaviour and shaping relations') focus on assessing the leadership of students, individually, factor 3 ('Fostering personal development and promoting quality improvement') and factor 4 ('Developing self-management and supporting management in healthcare') reflect students' leadership performance in the management and improvement of healthcare facilities, and lastly, factor 5 ('Promoting improvement and innovation in undergraduate medical education') and factor 6 ('Introducing systemic perspectives into organisations') portray students' overall leadership involvement during undergraduate studies and their contribution to providing a leadership-promoting environment.

While the validity of the MeLeCoS was established in a previous study[14], the content validity of this tool in assessing the leadership competencies in medical and nursing students, as well as junior practitioners, was ensured by a panel of experts in medical education. The pretest and post-test reliability of the questionnaire were determined by calculating Cronbach's Alpha. The Cronbach's Alpha values for the pre-test and post-test were 0.931 and 0.953, respectively, indicating excellent internal consistency. This means that the MeLeCoS questionnaire is a reliable instrument for medical and nursing students, as well as junior practitioners, to self-assess their leadership competence, with good content validity.

The evaluation of the training program followed the Kirkpatrick Model of training evaluation[25]. Level 1 (Reaction) was measured using a post-training online survey that assessed participants' perceptions of content, delivery, overall satisfaction, and likelihood of recommending the program. Level 2 (Learning) was evaluated through pre- and post-training administration of the Medical Leadership Competence Self-Assessment Scale (MeLeCoS), a validated instrument that measures leadership competencies across six domains. The instrument demonstrated excellent reliability in this study (Cronbach's $\alpha = 0.931$ pre-test; 0.953 post-test), supporting its suitability for detecting changes in competence. Level 3 (Behavior) was indirectly assessed through items measuring participants' self-reported likelihood of applying acquired leadership skills in future clinical or academic settings. While direct organizational outcomes were not measured, the evaluation indirectly addressed Level 4 (Results) by assessing improvements in leadership domains related to innovation, quality improvement,

and systemic thinking. These domains collectively represent competencies that contribute to long-term system-level impact. This evaluation approach provided a comprehensive assessment of participants' immediate reactions, learning gains, anticipated behavior change, and potential broader influence on educational and healthcare environments.

3.2 Outcomes

The primary outcome of this study includes a measurable improvement in the participants' total MeLeCoS score and scores of the MeLeCoS domains. Secondary outcomes include the participants' self-reported effectiveness of the program, likelihood of applying the learned skills in practice, and the likelihood of recommending the training program to colleagues.

3.3 Statistical Analysis

Data were analyzed using SPSS version 27.0. Univariate analysis using descriptive statistics was conducted to describe the variables and summarize them in the form of means, standard deviations, frequencies, and percentages. A paired t-test was used to compare the mean scores of the MeLeCoS scale and its domains pre- and post-training. Subgroup analysis using an independent sample t-test was conducted to compare the mean improvement in the MeLeCoS (post minus pre MeLeCoS scores) among the study groups (males versus females, medical versus nursing, and undergraduate versus postgraduate). The significance level was set at 5%, and any p-value below 0.05 was considered statistically significant.

4. Results

4.1 Sociodemographic Characteristics of the Participants

The study included a total of 76 participants, 44 (57.9%) were female, and 32 (42.1%) were male. 54 (71.1%) participants were in the field of Medicine, and 22 (28.9%) participants were in the field of nursing and midwifery. 50 (65.8%) of the total participants were undergraduate students, while the remaining 26 (34.2%) participants were postgraduate and junior practitioners. The characteristics of the participants are summarized in Table 1 and Figure 1.

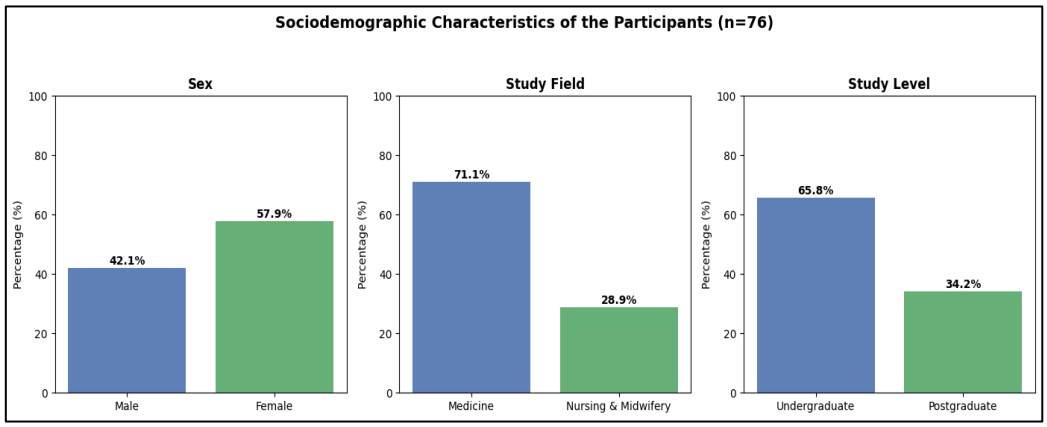

Figure 1. Sociodemographic Characteristics of the Participants (n=76).

Table 1. Sociodemographic Characteristics of the Participants (n=76).

Variable	Frequency (n)	Percentage (%)
Sex:		
Male	32	42.1
Female	44	57.9
Study Field:		
Medicine	54	71.1
Nursing and Midwifery	22	28.9
Study Level:		
Undergraduate	50	65.8
Postgraduate	26	34.2
Total	**76**	**100**

4.2 Online Leadership Training Impact Assessment using the MeLeCoS Self-Assessment

The participants' post-training overall mean of the MeLeCoS was significantly higher than the pre-training overall mean score (mean (SD) 3.98 (±0.55) out of 5 vs. 3.65 (±0.54) out of 5, mean difference = 0.33; 95% CI [0.20-0.45], p-value <0.001). These results indicate that the training session positively impacted the overall participants' leadership competence. Moreover, the training significantly and positively enhanced the self-reported participant's competences' rating in the following factors of the MeLeCoS: factor 1 achieving learning and reflecting on performance (mean (SD) 3.98 (±0.59) out of 5 vs 3.67 (±0.56) out of 5, mean difference = 0.31; 95% CI [0.15-0.46], p-value <0.001), factor 3 fostering personal development and promoting quality improvement (mean (SD) 4.02 (±0.56) out of 5 vs 3.70 (±0.64) out of 5, mean difference = 0.32; 95% CI [0.16-0.48], p-value <0.001), factor 4 developing self-management and supporting management in healthcare (3.67 vs 4.01, p-value <0.001), (mean (SD); 4.01 (±0.63) out of 5 vs 3.67 (±0.70) out of 5, mean difference = 0.34; 95% CI [0.17-0.50], p-value <0.001), factor 5 promoting improvement and innovation in undergraduate medical education (mean (SD) 3.64 (±0.91) out of 5 vs 3.19 (±0.95) out of 5, mean difference = 0.45; 95% CI [0.27-0.63], p-value <0.001), and factor 6 introducing systemic perspectives into organizations (mean (SD); 3.87 (±0.79) out of 5 vs 3.42 (±0.82) out of 5, mean difference = 0.45; 95% CI [0.28-0.62], p-value <0.001). However, the training did not significantly impact the self-reported participant's competences' rating in factor 2 of the MeLeCoS demonstrating responsible behaviour and shaping relations (mean (SD) 4.33 (±0.58) out of 5 vs 4.22 (±0.57) out of 5, mean difference = 0.11; 95% CI [-0.02-0.26], p-value =0.10) (Table 2 and Figure 2).

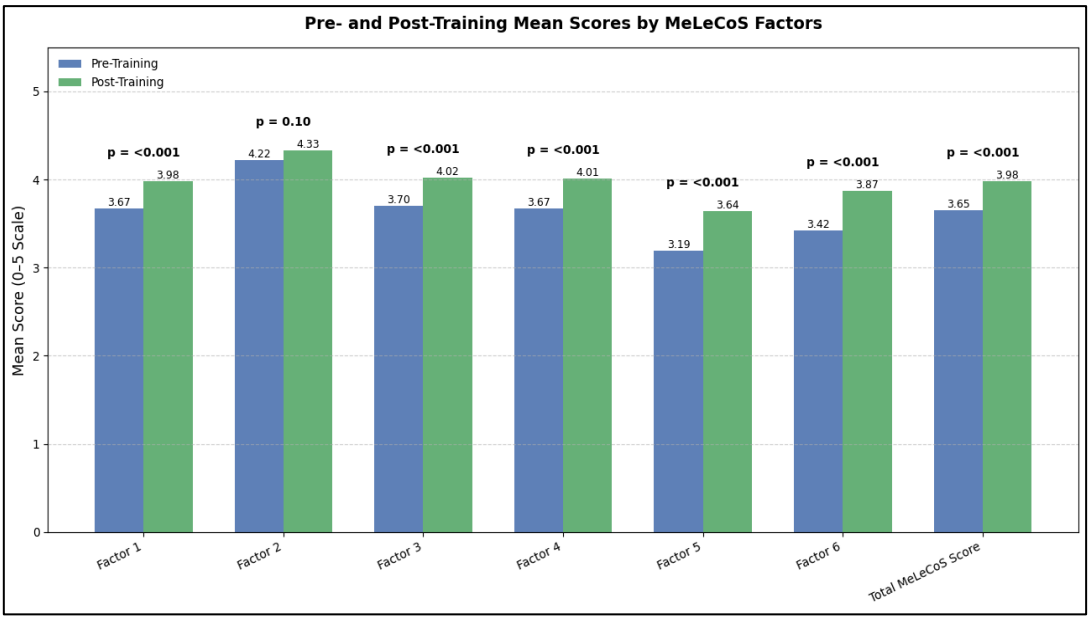

Figure 2. Pre- and post-training mean scores by the MeLeCoS Factors (n=76).

Table 2. Results of the Leadership Training Program Impact Assessment using the MeLeCoS (n=76).

MeLeCoS-Questionnaire Factors	Pre-Session Mean (± SD)	Post-Session Mean (± SD)	Mean Difference	95% CI	p-value ᵅ
[1] Achieving learning and reflecting on performance.	3.67 (±0.56)	3.98 (±0.59)	0.31	[0.15-0.46]	<0.001
[2] Demonstrating responsible behaviour and shaping relations.	4.22 (±0.57)	4.33 (±0.58)	0.11	[-0.02-0.26]	0.1
[3] Fostering personal development and promoting quality improvement.	3.70 (±0.64)	4.02 (±0.56)	0.32	[0.16-0.48]	<0.001
[4] Developing self-management and supporting management in healthcare.	3.67 (±0.70)	4.01 (±0.63)	0.34	[0.17-0.50]	<0.001
[5] Promoting improvement and innovation in undergraduate medical education.	3.19 (±0.95)	3.64 (±0.91)	0.45	[0.27-0.63]	<0.001
[6] Introducing systemic perspectives into organisations.	3.42 (±0.82)	3.87 (±0.79)	0.45	[0.28-0.62]	<0.001
Total MeLeCoS	3.65 (±0.54)	3.98 (±0.55)	0.33	[0.20-0.45]	<0.001

ᵅ Paired t-test.
** Statistically significant (p-value < 0.05)*
MeLeCoS: medical students' leadership competence self-assessment scale.
SD: Standard deviation.
95% CI: 95% Confidence Interval
Scores range = 0-5

Participants' pre-training and post-training scores per individual items of the MeLeCoS Self-Assessment are summarized in Supplementary Material, Table 3.

Table 3. Results of the Leadership Training Program Impact Assessment using the Individual Items of the MeLeCoS (n=76).

Items	Pre-Session Mean (± SD)	Post-Session Mean (± SD)	Mean Difference	95% CI	p-value α	Factor
I question whether I have delivered the best possible performance.	3.79 (± 0.85)	4.18 (± 0.79)	0.39	[0.16-0.63]	0.002*	1
I reflect on my performance at the end of each study period or semester.	3.98 (± 0.96)	4.17 (± 0.81)	0.19	[-0.06-0.43	0.137	
I can control my self-learning well (e.g. I start studying early for exams).	3.45 (± 1.02)	3.77 (± 1.01)	0.32	[0.09-0.56]	0.007*	
I compare my knowledge and practices with those of my peers to question both content and actions.	3.34 (± 1.15)	3.59 (± 1.01)	0.25	[-0.02-0.52]	0.066	
I communicate goals clearly in working or learning groups so that we can work together to achieve them.	3.81 (± 1.06)	4.18 (± 0.79)	0.37	[0.08-0.65]	0.012*	
In controversial discussions, I make sure that the views of all participants are heard before decisions are made.	4.12 (± 0.88)	4.28 (± 0.80)	0.16	[-0.09-0.40]	0.203	2
I take responsibility for the active role assigned to me in a team (e.g. minute taker).	4.04 (± 0.88)	4.19 (± 0.81)	0.15	[-0.06-0.37]	0.147	
I motivate others in group work.	4.13 (± 0.85)	4.33 (± 0.77)	0.20	[-0.01-0.41]	0.062	
I behave responsibly during my studies (e.g. I contribute to a good working atmosphere during group work).	4.11 (± 0.89)	4.29 (± 0.76)	0.18	[-0.06-0.40]	0.145	
I behave ethically towards fellow students and teachers (e.g. I do not discriminate against anyone on the basis of cultural origin).	4.63 (± 0.70)	4.55 (± 0.66)	-0.08	[-0.28-0.12]	0.442	
I behave responsibly during clinical training, e.g. during a clinical clerkship.	4.41 (± 0.80)	4.45 (±0.76)	0.04	[-0.18-0.26]	0.727	
I behave ethically towards patients in clinical situations (e.g. I treat all patients equally, regardless of their social background).	4.51 (± 0.89)	4.58 (±0.70)	0.07	[-0.16-0.29]	0.549	

I can build a professional relationship with patients.	3.93 (± 0.85)	4.26 (±0.66)	0.33	[0.11-0.55]	0.004*	
In history taking, I encourage patients to share their perspective.	4.07 (± 0.91)	4.08 (±0.92)	0.01	[-0.18-0.20]	0.887	
I use information from others, e.g. feedback, to continue my learning.	3.75 (± 0.95)	4.01 (±0.86)	0.26	[-0.01-0.53]	0.064	
If I recognize the influence of poor performance on the quality of results, then I discuss this with the people involved.	3.78 (± 0.95)	4.07 (±0.88)	0.29	[0.05-0.52]	0.018*	
In groups, I try to discuss identified problems further.	3.82 (± 0.84)	4.09 (±0.85)	0.27	[0.04-0.51]	0.019*	
After critical incidents, I voluntarily participate in the review of work processes in the affected work area.	3.41 (± 1.00)	3.96 (±0.86)	0.55	[0.25-0.86]	0.002*	**3**
I look for role models from whom I can learn something about the healthcare system or healthcare organizations.	3.95 (± 0.91)	4.16 (±0.71)	0.21	[-0.01-0.43]	0.053	
I organize additional extracurricular learning opportunities for myself (e.g. study groups with fellow students).	3.55 (± 1.06)	3.87 (±0.90)	0.32	[0.07-0.56]	0.012*	
In emotional situations, e.g. when receiving very critical feedback, I communicate in a controlled and objective manner.	3.63 (±0.91)	3.92 (±0.89)	0.29	[0.03-0.55]	0.032*	
I am involved in research (e.g. through my own research projects or research supporting activities).	3.37 (±1.16)	3.58 (±1.00)	0.21	[-0.04-0.46]	0.092	
I seek additional learning opportunities to recognize how decisions are made in the light of new knowledge and information.	3.95 (±1.03)	4.16 (±0.90)	0.21	[-0.03-0.45]	0.088	
I support other students in their studies (e.g. as a mentor or by providing learning materials).	3.93 (±1.12)	4.07 (±0.91)	0.14	[-0.15-0.42]	0.361	**4**
I seize learning opportunities to understand the basic principles of healthcare financing.	3.70 (±1.05)	4.17 (±0.85)	0.47	[0.20-0.74]	0.001*	
During my clinical training, I contemplate the use of resources (e.g. when ordering laboratory diagnostics).	3.63 (±0.98)	4.01 (±0.76)	0.38	[0.13-0.64]	0.004*	
I discuss the opportunities and limitations of change projects in student groups (e.g. the introduction of digital medical records).	3.53 (±0.92)	3.96 (±0.86)	0.43	[0.19-0.67]	<0.001*	

When changes are introduced in medical procedures (e.g. shortening the length of inpatient treatment), I keep myself informed about their effectiveness.	3.64 (±1.07)	4.20 (±0.83)	0.56	[0.27-0.84]	<0.001*	
I am involved in the student council and/or committees.	3.41 (±1.16)	3.51 (±1.09)	0.10	[-0.16 - 0.37]	0.427	**5**
I take part in projects or committees to improve undergraduate medical studies and teaching.	3.25 (±1.17)	3.70 (±1.01)	0.45	[0.19-0.70]	0.001*	
I am involved in student groups to improve the general conditions for studying (e.g. support for students with children).	3.12 (±1.15)	3.66 (±1.04)	0.54	[0.30-0.78]	<0.001*	
I take on leadership roles in a student group to implement teaching innovations (e.g. ultrasound tutorials).	3.16 (±1.25)	3.67 (±1.00)	0.51	[0.24- 0.79]	<0.001*	
I am involved in student groups to implement teaching innovations (e.g. ultrasound tutorials).	3.04 (±1.15)	3.68 (±0.96)	0.64	[0.37-0.92]	<0.001*	
I take responsibility for finances or resource planning in an organization (e.g. in a club or a group).	2.91 (±1.21)	3.54 (±1.12)	0.63	[0.40-0.86]	<0.001*	**6**
I am actively involved in a change project (e.g. a reorganization in a club).	3.16 (±1.23)	3.71 (±1.06)	0.55	[0.29- 0.81]	<0.001*	
I share information so that others can understand me better.	4.00 (±0.86)	4.17 (±0.89)	0.17	[-0.05-0.40]	0.134	
I am able to steer group dynamic processes (e.g. by involving quieter group participants).	3.64 (±0.99)	4.08 (±0.86)	0.44	[0.21-0.66]	<0.001*	

ᵅ Paired t-test.
* Statistically significant (p-value < 0.05)
MeLeCoS: medical students' leadership competence self-assessment scale.
SD: Standard deviation.
95% CI: 95% Confidence Interval
Scores range = 0-5

4.3 Online Leadership Training Program Impact Assessment according to Sex, Study Field, and Study Level

The mean Post/Pre difference in the MeLeCoS score was slightly lower in males compared to females; however, this difference was statistically insignificant (mean (SD) 0.30 (±0.60) out of 5 vs 0.35 (±0.51) out of 5, mean difference = -0.50; 95% CI [-0.30-0.21], p-value =0.719). The participants in the field of medicine had a slightly higher mean Post/Pre difference in the MeLeCoS score compared to the participants in the field of nursing and midwifery; however, the result was statistically insignificant (mean (SD); 0.36 (±0.56) out of 5 vs 0.24 (±0.53) out of 5, mean difference = 12; 95% CI [-

0.15-0.41], p-value =0.363). Similarly, undergraduate students had a slightly higher mean Post/Pre difference in the MeLeCoS score compared to postgraduate participants; however, the result was statistically insignificant (mean (SD) 0.36 (±0.62) out of 5 vs 0.26 (±0.39) out of 5, mean difference = 10; 95% CI [-0.17-0.37], p-value =0.452) (Table 4 and Figure 3).

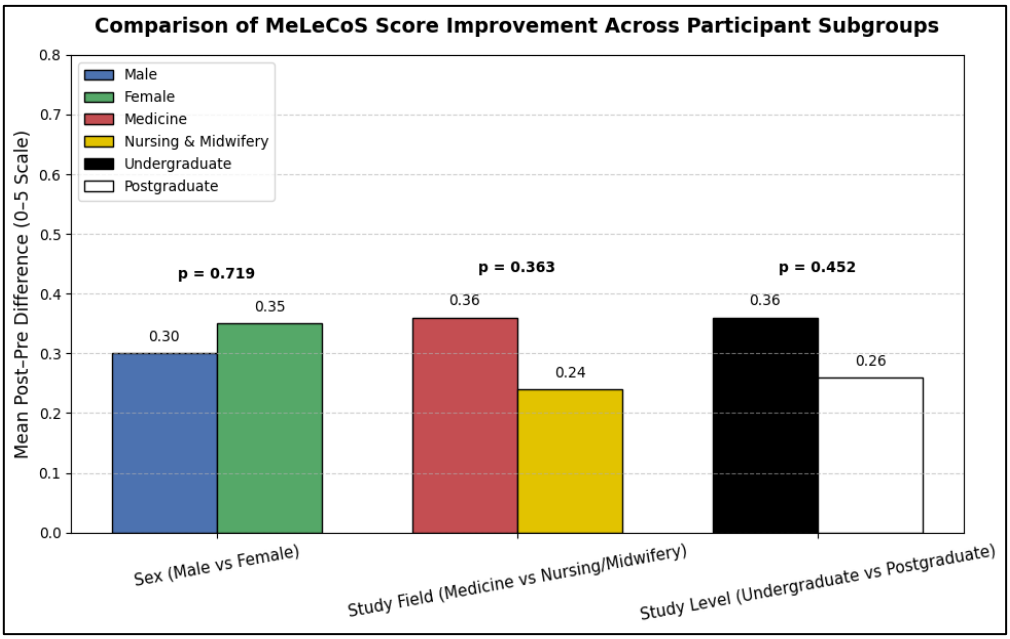

Figure 3. Comparison of MeLeCoS Score Improvement Across Participant Subgroups (n=76).

Table 4. Results of the Online Leadership Training Program Impact Assessment according to Sex, Study Field, and Study Level, using the Post-Pre Difference in the MeLeCoS (n=76).

MeLeCoS-Questionnaire Factors	Mean of Post/Pre Difference in MeLeCoS By Sex (±SD)				Mean of Post/Pre Difference in MeLeCoS By Study Field (±SD)				Mean of Post/Pre Difference in MeLeCoS By Study Level (±SD)			
	Male	Female	MD [95% CI]	p-value ᵅ	Medicine	Nursing and Midwifery	MD [95% CI]	p-value ᵅ	Undergraduate	Postgraduate	MD [95% CI]	p-value ᵅ
[1] Achieving learning and reflecting on performance.	0.28 (±0.86)	0.33 (±0.50)	-0.05 [-0.40-0.29]	0.760	0.34 (±0.75)	0.23 (±0.42)	0.11 [-0.16-0.28]	0.425	0.30 (±0.69)	0.31 (±0.65)	-0.01 [-0.33-0.32]	0.982
[2] Demonstrating responsible behaviour and shaping relations.	0.11 (±0.56)	0.12 (±0.65)	-0.01 [-0.30-0.28]	0.944	0.11 (±0.58)	0.14 (±0.68)	-0.03 [-0.35-0.28]	0.823	0.14 (±0.67)	0.07 (±0.48)	0.07 [-0.23-0.37]	0.645
[3] Fostering personal development and promoting quality improvement.	0.32 (±0.66)	0.31 (±0.72)	0.01 [-0.31-0.33]	0.955	0.35 (±0.68)	0.22 (±0.72)	0.13 [-0.22-0.48]	0.467	0.34 (±0.77)	0.28 (±0.51)	0.06 [-0.28-0.39]	0.753

[4] Developing self-management and supporting management in healthcare.	0.32 (±0.81)	0.34 (±0.69)	-0.02 [-0.36-0.33]	0.913	0.38 (±0.74)	0.22 (±0.72)	0.16 [-0.21-0.54]	0.376	0.42 (±0.84)	0.17 (±0.45)	0.25 [-0.11-0.60]	0.101
[5] Promoting improvement and innovation in undergraduate medical education.	0.24 (±0.74)	0.60 (±0.80)	-0.36 [-0.72-0.00]	0.053	0.47 (±0.77)	0.39 (±0.86)	0.08 [-0.32-0.49]	0.682	0.48 (±0.88)	0.38 (±0.61)	0.10 [-0.29-0.48]	0.608
[6] Introducing systemic perspectives into organisations.	0.53 (±0.91)	0.38 (±0.57)	0.15 [-0.20-0.49]	0.434	0.54 (±0.79)	0.22 (±0.51)	0.31 [-0.06-0.68]	0.096	0.49 (±0.80)	0.35 (±0.60)	0.14 [-0.22-0.49]	0.437
Total MeLeCoS	0.30 (±0.60)	0.35 (±0.51)	-0.50 [-0.30-0.21]	0.719	0.36 (±0.56)	0.24 (±0.53)	0.12 [-0.15-0.41]	0.363	0.36 (±0.62)	0.26 (±0.39)	0.10 [-0.17-0.37]	0.452

ᵅ Independent Samples t-test.
** Statistically significant (p-value < 0.05)*
MeLeCoS: medical students' leadership competence self-assessment scale.
SD: Standard deviation.
MD: Mean difference
95% CI: 95% Confidence Interval
Scores range = 0-5

4.4 Participants' Evaluation of the Online Leadership Training Program

Data from the participants' evaluation of the online leadership training program showed a perceived potential benefit from the training session. Overall, on a scale from 0 to 5, the participants rated the session as effective to highly effective in developing their leadership and communication skills, with a mean of 4.14 (± 0.72) out of 5. Additionally, on a scale from 0 to 5, where 5 indicated highly likely, they reported that they are likely to apply the learned skills and information into their practice, with a mean of 4.27 (± 0.66) out of 5. Moreover, on a scale from 0 to 5, where 5 indicated highly likely, they reported that they would likely recommend this session to a colleague, with a mean of 4.45 (± 0.79) out of 5 (Figure 4).

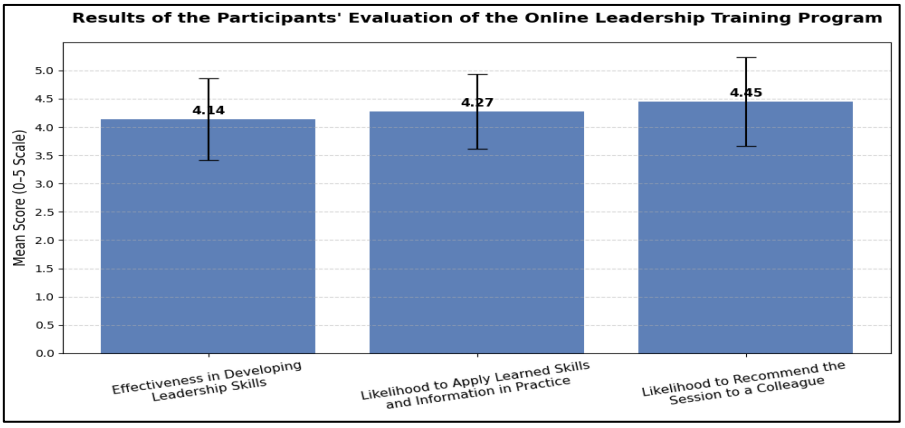

Figure 4. Results of the Participants' Evaluation of the Online Leadership Training Program.

5. Discussion

In this study, the researchers evaluated the impact of an online MLCF-based leadership training program on the self-reported leadership competencies of medical and nursing students, as well as postgraduate junior practitioners, using the MeLeCoS model, which encompasses six key leadership domains. The researchers found that this online training program effectively enhanced the self-reported leadership competencies of the participants, regardless of their sex, study field, or level of training highlighting the effectiveness of such training in developing the leadership competencies in future healthcare practitioners. The researchers also demonstrated that the MeLeCoS Self-Assessment tool could be used to assess the leadership competencies of the nursing students and the postgraduate junior practitioners, not just for undergraduate medical students.

The training program improved the participants' leadership competencies across most domains of the MeLeCoS score indicating its promising role in developing the leadership competencies of the future healthcare practitioners. Similar improvements were reported in previous studies, where structured leadership development programs led to enhanced self-assessed knowledge and expertise among participants [15]. While the debate on whether leaders are born or made is still ongoing, these findings supported the role of leadership development programs in developing the leadership competencies of the future healthcare practitioners [26,27]. Generally, effective clinical leadership could be developed through systematic leadership training programs, leading to enhanced clinical outcomes and greater satisfaction for both the patients and the providers [28].

The improvement in leadership competencies' score was consistent across different groups, regardless of their sex, study field, or level of training. This finding indicated the effectiveness of the online training program in developing the leadership competencies of future healthcare practitioners. This is particularly important because healthcare program graduates are expected to take on leadership roles, yet they often lack adequate preparation during their undergraduate education. While a graduate leadership curriculum is missing in the Palestinian context, a systematic review of leadership training curricula in graduate medical education programs worldwide revealed that these programs were inconsistent and had limited effectiveness [29]. In contrast, the suggested online leadership training program effectively enhanced the perceived leadership competencies of postgraduate, junior healthcare practitioners. Moreover, the induced improvement in leadership competencies in both disciplines, medicine and nursing, makes this training program a suitable option for institutions with limited resources and those prioritizing interprofessional education.

Improvements were observed across most of the MeLeCoS factors, with factor 5 (promoting innovation in undergraduate medical education) and factor 6 (introducing systemic perspectives into organizations) showing the greatest improvement. This reflects the training impact on the participants' motivation and willingness to contribute to the development of their institutions as leaders. Similarly, improvements were also observed in specific domains, such as 'achieving learning and reflecting on performance', 'fostering personal development and promoting quality improvement', and 'developing self-management and supporting management in healthcare'. This highlights the effectiveness of such a training program in developing the leadership competencies of the participants across multiple factors of the MLCF. On the other hand, no significant improvement was observed in factor 2 (demonstrating responsible behaviour and shaping relations). The minimal change likely reflects students' prior high levels of self-perceived competence in professional responsibility and teamwork, leaving a limited room for further measurable improvement in this domain. Overall, the online training program demonstrated its effectiveness in developing the participants' leadership competencies, providing foundational evidence

for policy-makers in health professions education in Palestine to integrate similar MLCF-based leadership development programs into formal curricula.

The participants' evaluation of the training program generally yielded promising perspectives (Level 1: Reaction). They perceived potential benefits from the training, and the majority indicated their willingness to apply the learned concepts in their practice. This finding corresponds to an early indicator of level 3 (Behavior change) suggesting that the program promoted readiness for behavioral change even though long-term follow-up was not conducted. Additionally, they were willing to recommend this online training program to their colleagues. The consistent high scores in these areas highlight the utility of the program and support its acceptance as an effective method for developing foundational leadership competencies for future healthcare practitioners.

6. Implications

Based on these findings, this proposed online leadership training program is affordable, short, and easy to deliver; it is an impactful tool for developing leadership competencies not only among the medical and nursing students but also among the graduate professionals. Therefore, the researchers confidently propose this course as an adjunct to the formal curricula for the undergraduate health professions education programs in Palestine and similar contexts. Moreover, the findings might lay, for the first time, foundational evidence that supports the integration of leadership development training into the formal curriculum. Such integration is pivotal because leadership skills are not only essential for productive clinical practice but also for creating positive workplace cultures and improving the patient's outcomes [5,30]. To optimize the impact of leadership training programs, educational institutions should integrate a competency-based framework for leadership development into the core curriculum. Moreover, they should ensure that leadership training, both theoretical and practical, is introduced early and reinforced throughout the educational journey [5,6]. By implementing a combination of training strategies, such as direct teaching, experiential learning, mentorship, and opportunities for students to experience real-life leadership responsibilities, the institutions can prepare future healthcare leaders to assume their roles in the healthcare system [31,32]. Future research may focus on the long-term impact of the leadership training and identify the potential barriers to integrating effective leadership training programs into the formal curriculum.

7. Strengths and Limitations

The pre-post design of this study enabled us to measure the direct impact of the online leadership training program. By establishing baseline measures, this design facilitated the understanding of the added value of the online leadership training program. Moreover, all participants received the same intervention from the same instructor, further enhancing the internal validity of this study in demonstrating the connection between the training program and the improved self-perceived leadership competencies. Furthermore, the use of the MeLeCoS, a valid and reliable self-assessment tool for a comprehensive set of leadership competency domains, adds to the strengths of this study. Additionally, including a diverse and representative sample of undergraduate healthcare students and junior postgraduate practitioners enhances the external validity of the study's findings, allowing for more generalizable results.

On the other hand, this study has some limitations. The short duration of the training program, combined with the lack of practical and situation-based learning strategies, such as role-playing, limits the competency development to the lower levels of Miller's pyramid model for competency development. This is particularly important because when participants

successfully execute the learned leadership behaviors through role-playing and simulations, they contribute to strengthening their beliefs in leadership capabilities [33]. Additionally, the online modality of the training limits interpersonal interaction, leading to reduced engagement, diminished motivation, and communication barriers [34–36]. Moreover, while the MeLeCoS is a valid and reliable leadership self-assessment tool, assessing leadership competencies through practical tools, such as peer evaluation during role plays, would further strengthen the objectivity of the leadership competencies assessment. Furthermore, the voluntary registration in the training program and participation in the study might have attracted individuals with an interest in developing leadership skills, thereby introducing a selection bias. The inclusion of a sufficient and representative sample may have compensated for this potential bias.

8. Recommendations

Based on the findings of this study, several recommendations can be made to improve leadership development in health professions education. Firstly, leadership training should be integrated early and longitudinally within curricula, using a competency-based approach that is reviewed and strengthened at multiple stages of training [5,6,31]. Secondly, educational strategies should include a combination of didactic lectures, experiential learning, interprofessional education, and opportunities for students to adopt leadership skills in both academic and clinical settings [31,32]. Thirdly, faculty development initiatives to equip the educators with the skills necessary to teach effective leadership behaviors would strengthen the impact of such leadership training programs [32]. Fourthly, the assessment of leadership competency domains should utilize multiple formats, integrating self-assessment, peer review, and faculty feedback to capture a thorough, comprehensive picture of student progress [5,31]. Finally, future studies should focus on multi-organizational research with longer follow-up to assess the long-term impact of leadership training and to identify the most effective approaches for program implementation and assessment.

9. Conclusion

Leadership training can contribute to the development of the leadership competencies of healthcare students and practitioners. This brief online leadership training program demonstrated an acceptable efficacy in developing the leadership competencies of the participants. The findings support its role as an adjunct to the formal curriculum, supporting the efforts of faculties in building the leadership competencies of their students. Integrating leadership training into the formal undergraduate curriculum, at early stages and in a longitudinal fashion, may ensure that future healthcare practitioners are well-equipped to assume leadership roles and enhance the quality of healthcare. It is necessary to design and implement leadership development training programs for junior healthcare practitioners to prepare them for real-life situations where leadership competencies may be life-saving.

10. Declarations

Acknowledgments

Not applicable.

Ethical consideration

This study adhered to the principles of the Declaration of Helsinki. Ethical approval to conduct this study was obtained from the Institutional Review Board (IRB) at An-Najah National University (Reference number: Nurs.

Sep.2025/36). A study information sheet was shared with the participants, and those who voluntarily agreed to participate signed an electronic informed consent form. Participation was entirely voluntary, and participants were informed that they could withdraw from the study or exit the survey at any time without any repercussions. To maintain confidentiality, no personally identifiable information was collected at any stage of the study.

Consent to participate

All participants enrolled in this study received an information sheet that explained the study's purpose and details about their involvement. The first page of the Google Form contained the written consent form. Participants electronically consented to this study by answering a multiple-choice question that confirmed their understanding of the information sheet and their voluntary agreement to participate. This method was deemed valid by the Institutional Review Board (IRB).

Conflicts of interest

The author (Prof. Malik Zaben) is a member of the Editorial Board for the AAUP Journal of STEM and Health Sciences. To maintain a transparent and unbiased peer-review process, Prof. Malik was not involved in the selection of reviewers or any editorial decisions regarding this manuscript. The peer-review process was handled independently by other editors of the journal. Otherwise, the authors have no conflicts of interest to declare that are relevant to the content of this article.

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Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Authors Contributions

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References

[1] Fattah L, Bloom L, Ventura C Della, Gabrilove J. Building leadership capacity among junior faculty: Evaluating multi-level outcomes of a leadership program. J Clin Transl Sci. 2023;7[1].

[2] Smith KA, Morassaei S, Ruco A, Bola R, Currie KL, Cooper N, et al. An evaluation of the impact for healthcare professionals after a leadership innovation fellowship program. J Med Imaging Radiat Sci. 2022;53[4].

[3] Ogurek B, Harendza S. Development of medical leadership competence during undergraduate medical students' final year – a cross-sectional cohort study. BMC Med Educ. 2025;25[1].

[4] Vo A, Torti J, Haddara W, Sultan N. Exploring medical students' perspectives of physician leadership. BMC Med Educ. 2023;23[1].

[5] Costa P, Sousa JP, Nascimento T, Cruchinho P, Nunes E, Gaspar F, et al. Leadership Development in Undergraduate Nursing Students: A Scoping Review. Nursing Reports. 2025;15.

[6] Scammell JME, Apostolo JLA, Bianchi M, Costa RDP, Jack K, Luiking ML, et al. Learning to lead: A scoping review of undergraduate nurse education. J Nurs Manag. 2020;28[3].

[7] Aldersley K, Gibb J, Grainger C, Abou-el-Ela-Bourquin B, Badhrinarayanan S, Bhanot R, et al. Medical leadership training varies substantially between UK medical schools: Report of the leadership in undergraduate medical education national survey (LUMENS). Med Teach. 2023;45[1].

[8] Ochsmann EB, Zier U, Drexler H, Schmid K. Well prepared for work? Junior doctors' self-assessment after medical education. BMC Med Educ. 2011;11[1].

[9] Curry LA, Ayedun AA, Cherlin EJ, Allen NH, Linnander EL. Leadership development in complex health systems: a qualitative study. BMJ Open. 2020;10[4].

[10] Johnson O, Begg K, Kelly AH, Sevdalis N. Interventions to strengthen the leadership capabilities of health professionals in Sub-Saharan Africa: A scoping review. Health Policy Plan. 2021;36[1].

[11] Omar A, Shrestha A, Fernandes R, Shah A. Perceived barriers to medical leadership training and methods to mitigate them in the undergraduate medical curriculum: A mixed-methods study of final-year medical students at two medical schools. Future Healthc J. 2020;7[3].

[12] Medical leadership competency framework: enhancing engagement in medical leadership. Coventry: NHS Institute for Innovation and Improvement; 2010.

[13] Nicol. Improving clinical leadership and management in the NHS. J Healthc Leadersh. 2012.

[14] Ogurek B, Harendza S. Medical students' leadership competence in health care: development of a self-assessment scale. BMC Med Educ. 2024;24[1].

[15] Frich JC, Brewster AL, Cherlin EJ, Bradley EH. Leadership Development Programs for Physicians: A Systematic Review. J Gen Intern Med. 2015;30[5].

[16] Do V, Maniate JM, Sultan N, Sonnenberg L. The 4C's of influence framework: fostering leadership development through character, competence, connection and culture. Leadership in Health Services. 2023;36[4].

[17] Lyons O, Su'a B, Locke M, Hill A. A systematic review of leadership training for medical students. New Zealand Medical Journal. 2018;131.

[18] Cheney AM, Baltrushes N, Gehlbach D, Navarro A. Becoming a leader for underserved patients—the importance of student run free clinics. Frontiers in Health Services. 2024;4.

[19] Webb AMB, Tsipis NE, McClellan TR, McNeil MJ, Xu MM, Doty JP, et al. A First Step Toward Understanding Best Practices in Leadership Training in Undergraduate Medical Education: A Systematic Review. Academic Medicine. 2014;89.

[20] Katoue MG, Cerda AA, García LY, Jakovljevic M. Healthcare system development in the Middle East and North Africa region: Challenges, endeavors and prospective opportunities. Front Public Health. 2022;10.

[21] Chavan AK, Bendriss R. Leadership Curriculum in Medical Education: Exploring Student and Faculty Perceptions in a US Medical School in Qatar. J Healthc Leadersh. 2022;14.

[22] Blanco M, Prunuske J, Dicorcia M, Learman LA, Mutcheson B, Huang GC. The DoCTRINE Guidelines: Defined Criteria to Report INnovations in Education. Academic Medicine. 2022;97[5].

[23] Upsher R, Dommett E, Carlisle S, Conner S, Codina G, Nobili A, et al. Improving reporting standards in quantitative educational intervention research: introducing the CLOSER and CIDER checklists. J New Approaches Educ Res. 2025;14[1].

[24] Thomas PA, Kern DE. Curriculum development for medical education: a six-step approach. John Hopkins University Press. 2022.

[25] Kirkpatrick DL. Evaluating training programs: The four levels. 1998.

[26] Warren OJ, Carnall R. Medical leadership: Why it's important, what is required, and how we develop it. Postgrad Med J. 2011;87.

[27] Sonnino RE. Health care leadership development and training: Progress and pitfalls. J Healthc Leadersh. 2016;8.

[28] Blumenthal DM, Bernard K, Bohnen J, Bohmer R. Addressing the leadership gap in medicine: Residents' need for systematic leadership development training. Academic Medicine. 2012;87[4].

[29] Sadowski B, Cantrell S, Barelski A, O'Malley PG, Hartzell JD. Leadership Training in Graduate Medical Education: A Systematic Review. J Grad Med Educ. 2018;10.

[30] van Diggele C, Burgess A, Roberts C, Mellis C. Leadership in healthcare education. BMC Med Educ. 2020;20.

[31] Evans MA, James EJ, Misa Mi. Leadership Training in Undergraduate Medical Education: A Systematic Review. Int J Med Students. 2023;11[1]:58–66.

[32] Ekayani NWD, Findyartini A, Anugrapaksi E, Nadarajah VDV. Integration of leadership training in the medical and health profession education curricula. Jurnal Pendidikan Kedokteran Indonesia. 2023;12[1].

[33] Lawrance L, McLeroy KR. Self-efficacy and Health Education. J Sch Health. 1986;56[8].

[34] Sawant NS, Vinchurkar P, Kolwankar S, Patil T, Rathi K, Urkude J. Online teaching, learning, and health outcomes: Impact on medical undergraduate students. Ind Psychiatry J. 2023;32[1].

[35] Forde C, OBrien A. A Literature Review of Barriers and Opportunities Presented by Digitally Enhanced Practical Skill Teaching and Learning in Health Science Education. Med Educ Online. 2022;27.

[36] Naciri A, Radid M, Kharbach A, Chemsi G. E-learning in health professions education during the COVID-19 pandemic: A systematic review. J Educ Eval Health Prof. 2021;18.