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How physicians acquire leadership competencies: A systematic review

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Abstract

Background: Health systems around the world have their own unique challenges. Today, competence in clinical leadership is often seen as more important than clinical competence. Given the important role of physicians in health systems, how do they acquire clinical leadership competencies? In this research, valid scientific articles were reviewed for insight.

Methods: In this research, databases including Science Direct, ProQuest, PubMed, SCOPUS, and Emerald, as well as Google Scholar, the Scientific Information Database, and Magiran for Iranian articles were searched for valid evidence-based English and Persian articles published between 2010 and 2018 using combination of keywords such as “physician,” “leadership,” and “competency” singly and in combination with the terms “AND” and “OR” as research strategy. Studies that focused on “physicians leadership competency” were selected. Search results were limited to the years 2010-2018. After reviewing the papers, 18 relevant articles were selected.

Results: In the first phase, 350 articles were selected and after careful examination, 18 papers were approved at the final stage. It was found that education and leadership development courses are the most important factor for enhancing managerial competencies for physicians. It should be noted that the researchers found that in Iran research on competence in clinical leadership has also been less relevant than others.

Conclusion: It is imperative that managers and planners of medical curricula design courses to develop management skills for physicians. In the post-graduate period, for physicians’ continuing education, courses that address applied management and leadership should be identified and included in the continuing education curricula to address the real needs of the country’s health systems. Leadership development programs can also be useful as projects to be modeled with the help of the world’s top medical universities.

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Introduction

Robust performance of a society’s health system is a reliable indicator of the extent to which a society has developed. The health system’s performance has many political, social, economic, and cultural factors and implications. The foundation of any organization is human resources that make effective use of its human capital, which is a prerequisite for the success of any organization. Weakness in selecting and employing skilled, knowledgeable, and capable people contributes to the lack of effective leaders in health care organizations. Conversely, healthcare organizations are most in need of excellent managers

due to the special role of health systems and the unique circumstances in which service delivery takes place. Currently, our country’s health system suffers from problems and disadvantages that are in part due to lack of managerial and leadership competencies. Identifying these gaps and developing competencies to address them will lead to the training of successful managers and thus improving the overall quality of services.¹ The World Health Organization’s report on the performance of different countries in terms of health and health services shows that Iran ranks 58th in terms of health care services out of 191 countries and is ranked 93rd in terms of overall

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health. Research indicates a lack of knowledge and management skills in clinical graduates is a contributing factor,² since physicians are the main agents of the health system, and their services have a significant impact on health outcomes. In many parts of the world, doctors work in management posts during their career or immediately after graduation but they are rarely trained to manage their oversight responsibilities in different sectors of the health system.

The role of physicians in the overall health system is important. Physicians are the principal; decision-makers in the health system, and their knowledge, experience, and attitude determine what services, in what form and at what cost will be offered to patients. The 2012 General Medical Council provided a multilateral perspective on physicians beyond distinguished clinical professionals: five-star physicians are used as exemplars in the clinical management literature, which is in fact a combination of clinical skills and human, behavioral and managerial ability.³ The concept of competency in the field of human resource management is not a new approach. Since ancient times, the Romans had considered criteria and ratios as merit for a good soldier.⁴

Physicians themselves have different expectations: these range from practicing medicine to leading a medical organization. This range often forces doctors to make the leap from self-management to team and functional management; from managing episodic procedures to overseeing projects and processes over extended periods; from diagnosing symptoms to dealing with people and organizational issues; and from getting minute details right to creating a bigger vision.^{1,2} Taken together, modern health systems require competent leaders.

Health financing problems, insufficiency of organizational structure, human resources management challenge, poor management of health sector technology, the challenge of managing resources, weakness of knowledge management and organizational information, neglect of customer orientation and lack of employment scientific management tools are some of the most important challenges in our country's health system.^{1,5} Thus, doctors must combine leadership skills with clinical expertise. Physicians have the potential to provide new facilities, inspire personnel, break down obstacles, create a new perspective on the development of health care and turning these into reality in the health system.⁶ The question remains: how do physicians acquire leadership behavior?

Baradaran and colleagues found interesting results in interviews with 13 physicians about the need for management skills training for medical students. Most physicians reported their belief that those who are successful in the health system are those who themselves had non-academic studies in management books because of their interest in managing. Doctors also reported that because of their confidence in their clinical skills and

knowledge, they often think they "know everything" and thus welcome management posts. From their first day of practice, doctors often experience a management post alongside their main work, and their belief that management is not a complex subject and requires no prior training is reinforced by the current system: no one monitors their management and their mistakes are accepted by the system. In short, in this study, doctors expressed that management skills training is needed for physicians, given that the medical profession is inherently blended with the management of the health system in Iran, and physicians are essentially leaders, which is not unusual.²

In addition, an optimal approach to a need's assessment and training of successful leadership in physicians has not been identified. For this purpose, deeper studies to identify the behaviors of successful doctors and personality traits in health care could be valuable in creating and providing leadership training.⁴ For instance, clinical competency and leadership styles of clinical leaders have been investigated. But to date there is still a lack of research on how leadership is acquired.

Considering the afore-mentioned issues, the aim of this study is to evaluate evidence-based articles to learn how physicians might acquire clinical leadership competency.

Materials and Methods

Databases including Science Direct, ProQuest, PubMed, SCOPUS, and Emerald, as well as Google Scholar, the Scientific Information Database, and Magiran for Iranian articles were searched for valid evidence-based English and Persian articles published between 2010 and 2018 using combination of keywords such as "physician," "leadership," and "competency" singly and in combination with the terms "AND" and "OR" as research strategy. Studies that focused on "physicians leadership competency" were selected. Search results were limited to the years 2010-2018. This period was chosen because rapid changes have occurred in advanced technologies such as computers and IT and virtual systems, which highlights the importance of managing healthcare organizations.⁷

The inclusion criteria of the articles, in addition to the period 2010-2018, consisted of a focus of study in clinical and physician leadership competency, access to full-text articles, and papers written in either English or Persian languages.

This review was undertaken in agreement with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P), a guide for authors in improving the presentation of systematic reviews. The Critical Skills Appraisal Program (CASAP) checklists were used to appraise the quality of the papers.

The search was performed by two researchers. First, the title and abstract of the

articles were studied and irrelevant papers were identified. Then, full-text papers focusing on clinical

leadership competency were retrieved and analyzed. All conflicts were resolved by a discussion between the two authors and, if necessary, by referring to the third author. In order to ensure the quality of the articles, and to prevent the bias, the reviews were checked manually. Resource management software - Endnote X5 - was used to organize the study and identify duplicate cases. Information quality management included three stages: collecting, processing, and providing data and information. Therefore, in this research, the study of literature was carried out taking into account all three stages.

Results

Throughout the first step of the "screening" phase, from among 350 articles searched in databases, 332 papers were removed since the titles, keywords, and/or abstracts did not reflect the desired themes. Eighteen papers were included in the final analysis (Figure 1 and Table 1). Most studies were conducted in the United States and the most frequently used research method was survey. Furthermore, the educational format of leadership development

programs was identified as the most important tool for learning leadership skills among doctors. An interesting point in this study is the study of leadership competence in published dissertations, as such theses have a special research and strategic value. The lack of attention to this issue is also evident in our country's theses.

Discussion

This systematic review was aimed at searching, analyzing, and synthesizing papers on physicians' competency leadership from 2010 to 2018. To the best of the authors' knowledge, this study is the first work of this nature in Iran. Of the 350 articles in the first phase, 18 articles were included for review and assessment. The results showed that education and leadership development projects are among the most important learning tools for clinical leadership competence for physicians.

Educational activities of any country can be considered as an investment of one generation for the next, where the purpose is the development of human capital. In other words, the purpose of educational activities is to develop

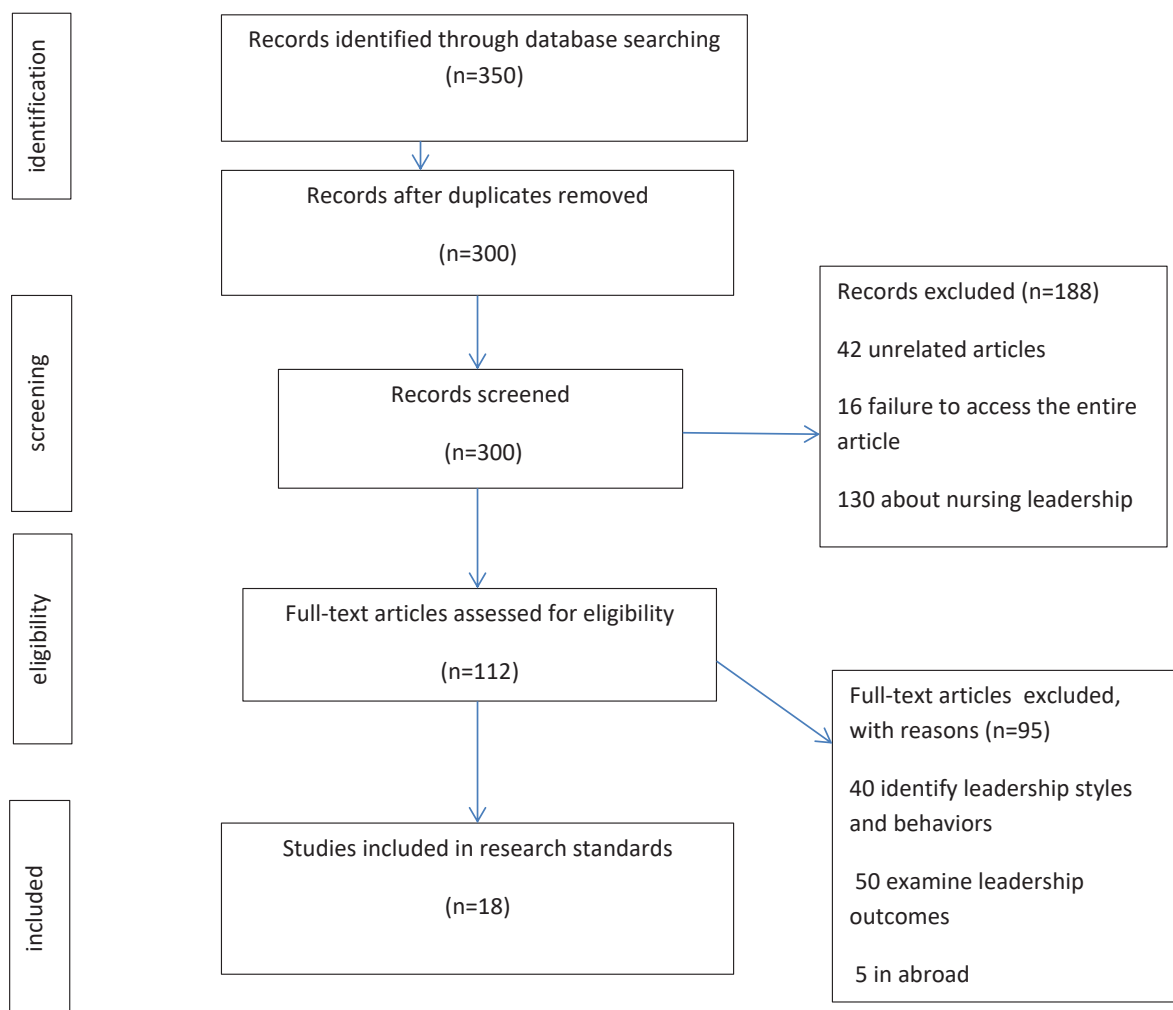


Figure 1. PRISMA flow diagram of database search.

Table 1. A summary of results extracted from the reviewed articles

First author and year	Country	Participants	Aim of the study	Main findings
Fernandez 2016 ⁸	USA	37 physicians	Measuring the impact of intensive leadership development on the ability of physicians	The leadership training course, in a compact and short term, is an effective approach to developing leadership skills in physicians
Nabili 2016 ⁹	USA	Review study	Examines a leadership program at the David Jeff's School of Medicine, which develops leadership skills and techniques for raising awareness as a physician leader	Responding physicians have identified weaknesses in leadership skills training and demanded leadership skills education for success.
Cabrera-Pivaral 2016 ¹⁰	Mexico	78 physicians from five primary healthcare units	Measure clinical competence	Clinical competence in primary care physicians is very low. Educational interventions were essential for empowerment.
Pradarelli 2016 ¹¹	USA	21 surgical faculty members	Assessing and designing and identifying the strengths and weaknesses of leadership development programs for surgical physicians-2016	New curriculum design of leadership development for surgeons based on 4 items (individual development for leadership, self-awareness, team formation skills, and knowledge in business and leadership) and emphasizing its positive impact
Adib 2018 ¹²	Iran	19 = (8 medical education specialists, 6 social medicine specialists and 5 general practitioners)	Clarification of clinical competencies required to train general practitioners to implement social responses	Medical faculties should educate graduates who are active in the community and are committed to ethics and professional behavior, effective communication, teamwork, primary care and health promotion, and prevention of illnesses throughout the community.
Davoudi Monfared 2018 ¹³	Iran	Editorial	Emphasize the design of a competency-based education model for physicians	The need to design competency-based courses for doctors
Goodall 2011 ¹⁴	USA	300 chief executive officers	Compare the physician management and professional managers; in American hospitals	Findings show that doctors have better performance than professional executives. Though best hospitals" ranking are led disproportionately by physicians.
Baradaran 2018 ²	Iran	32 (13 physicians and group discussions with 19 students)	This study aims to identify the managerial skills are needed by medical students.	Positive attitude toward training of managerial skills requirement to medical students + need for technical skills, human resource management, communication skills, negotiation and contracting, team building and teamwork, planning and leadership +practical training Non-theoretical
Daouk-Öyry 2016 ¹⁵	Middle East	36 registered nurses (emergency department)	Designing a Competency Model for Emergency Physicians from Nurses' Perspectives	From the perspective of nurses 8 core competencies were emotional intelligence; problem solving and decision-making skills; clinical operations management; commitment to the patient; patient care; psychological skills and having specialized knowledge; professionalism; communication skill; leadership of clinical teams recognized important for doctors
Hariss 2016 ¹⁶	USA	10 Healthcare junior leaders	Clarify senior leaders integration of the National Center for Healthcare Leadership (NCHL) competency model from the perspective and assessment of their employees.	According to the model designed for senior managers, changes in the competence of the new leader, leadership training, and performance evaluation tools have to be made.

Table 1. Continued

First author and year	Country	Participants	Aim of the study	Main findings
Otobo 2015 ¹⁷	USA	25 Studies were reviewed	Comparison of health system organizations with the leadership of doctors and non-medical professionals	There was no difference between the two groups of leaders.
Pregitzer 2014 ¹⁸	USA	Qualified physician leaders	Assess the performance of physician leaders in compliance by Kouzes and Posner's (2012) framework	The design of a training program for leadership concepts, including executive coaching and change training, was recommended
Mkandawire 2017 ¹⁹	USA	60 Hospital managers (30 physicians and 30 non-physicians)	Hospital outcomes based on physician versus non-physician leadership	Physician and non-physician CEOs may produce similar outcomes in the hospitals they lead
Jackson 2017- ²⁰	USA	12 Physician leaders from hospitals, hospital-employed medical groups, and physician hospital associations	The factors influencing the leadership of clinical physicians were examined.	The findings show that: (a) cheer by coaches, (b) career progression towards the leadership of the organization, (c) the desire to change, (d) previous training in management, (e) The importance of change in management, (f) carry out healthcare reform, (g) the belief in physician leaders in health care, (h) enjoyment in conducting the duties of leadership, (i) Importance of influence in decision making.
Schmidtman 2017 ²¹	USA	21 participants (clinical staff)	Investigating different leadership styles and employee satisfaction	Physicians are in fact leaders based on the concept of power distance theory - Need for leadership development courses for doctors
Ilse 2015 ²²	USA		Identify the factors that influence doctors' perceptions of leadership effectiveness	In the hospital management, doctors who had good communication skills, conflict management and were focused on patient care had better organization effectiveness
Arsenault 2017 ²³	USA	15 physician leaders	The purpose of this phenomenological study was to examine the experiences of leading physicians who participated in leadership development programs.	Study findings concluded that completion of a leadership development program designed specifically for physicians can assist in their career advancement and success.
Berkenbosch 2011 ²⁴	The Netherlands	127 medical specialists	How do medical professionals understand the merits of leadership for themselves?	Medical specialists are qualified to master their management skills, but they were interested in having training programs in the form of management workshops.

knowledge and realize the potential of human skills.²⁵ Therefore, it is necessary to design new educational programs to create competencies that are required to perform management tasks in a medical program of study. Thus medical students, after completing their medical education, will earn merits beyond the clinical skills that involve communication skills, collaboration, ethics in medicine, and management.²⁶

The importance of physicians' familiarity with management skills has been so well recognized that in countries that have had success in managing their health systems, there have been managerial skills included in the medical students' education period and curriculum. Unfortunately, our country still does not have formal educational programs in medical schools that address management skills, and other clinical fields, such as nursing, also lack these formal programs.²⁷

As the medical field changes, the old-fashioned relationship model, with the focus on the physician and the disease, has changed to a new human-centered patient-oriented model.

This kind of modern community-based approach requires different medical training for physicians.^{12,13,28} However, in several studies, no differences were elicited in the leadership of doctors and non-medical professional directors. While this indicates a lack of bias in the use of doctors as administrators, managers and doctors have a different language and approach clinical management from different perspectives. Clinically trained leaders can better understand complex clinical challenges, communicate with clinical staff in a common language and enjoy credibility as a clinical director, since professional non-medical directors in the clinical setting might lack this credibility.

In today's medicine, collaboration with the health team to promote health is another vital issue in physicians' clinical competence. In fact, medical students should be given the opportunity not only to recognize clinical problems and illnesses, but also to recognize and identify community problems.²⁹ In most studies, leadership training and leadership development plans for doctors is designed to enhance their clinical skills and medical knowledge. In our country, however, there is no formal training in the medical education curriculum and even after graduation for recognizing the collaboration aspect of modern health teams. Many excellent physicians have been rewarded for delivering outstanding clinical outcomes. However, because many possess a reputation or expertise that brings in business, some organizations are reluctant to hold physicians accountable for their lack of team-oriented behavior.^{18,22,29,30} Given that training is the most important approach to equip doctors with leadership skills, the discussion will be continued below in two parts: (1) medical education at the university level and (2) post-graduation/continuing education.

Medical education curriculum

Although medical students are study physiology, anatomy and biochemistry during their formal education, basic leadership skills, such as directing a team, resolving employee conflicts, and educating and developing others are not a part of most medical education curricula.

Physicians are not trained for responsibilities such as administrators in different parts of the health system.³¹ Studies of medical education in Iran have shown that medical education programs are often not coordinated with the professional needs of physicians, and often the theoretical and practical lessons offered to students are not appropriate to their future career needs in a modern, patient-oriented, collaborative health system.³² Leadership has become an essential competency for medical students. As described by the Association of American Medical Colleges, medical graduates are expected to increase their leadership skills to strengthen the team's performance, organizational learning, and reform of the health care system.

The beginning of the third wave of medical education reforms can be seen between 1990 and 2000, where more than 80 countries at the 1988 world conference agreed to adopt these reforms. In the world's top medical schools, due to changes in health and treatment needs, there have been major changes in medical education curricula. Integrated and competency based curricula have become the focus since the goal of these medical education systems is to deliver 5-star doctors as medical graduates. Iran's curriculum of medical education, as compared to other countries, has gaps that can be addressed to move towards a leadership competency model. The Iranian medical curriculum could combine specialized clinical education with leadership skills. By empowering students with leadership skills, the health system will have strong leaders for tomorrow's challenges. Management courses that teach applied skills with an emphasis on organizational behavior and human resource management should be the primary focus. Much research has shown that many medical students would prefer that they be trained in leadership skills, communication, teamwork and quality improvement processes during their medical education.^{33,34}

Continuing education

A major issue that is often neglected in the content of continuing education programs is a lack of managerial training and clinical leadership competency training for doctors. Although the philosophy of continuing education is to develop, sustain, and promote comprehensive professional skills for physicians, including clinical, managerial, social and ethical skills, most continuing education is aimed at addressing clinical problems.³⁵

Most medical students and physicians in various studies have reported that management skills over time are not easily achieved solely through experience; specific and

specialized training is needed. Iranian medical education curricula lack educational content in management competency training. To add to the problem, following graduation, where continuing education takes over, the lack of well-trained physicians in managerial issues is evident, and the continuing education process is single-dimensional and clinically-centered.³⁶

Effective continuing education should be a results-driven rather than process-oriented. Some scientists point to the challenge of management as the most fundamental challenge of the 21st century, particularly in health care organizations. Peter Drucker says, "If you educate the managers, everything will be right." He believes that there is a consensus in the management world that leaders are made, not born. Therefore, the concept of competency-based training was created.³⁷ In the post-graduate period, the main training of physicians is through continuing education; where there is no option for leadership training, this causes a huge gap.^{3,35} Continuing education programs for leadership competency can be successful if they engage doctors in strategic planning from the perspective of hospitals. If the process-centered approach is altered to a result-oriented approach, continuing education becomes a strategic asset.

Findings from several studies suggest that teaching leadership skills to students during their university education is practical and cost effective. Otherwise, training management skills on the job in the workplace can be much more costly with resulting errors and mistakes. The results of a study by Baradaran et al proposed that management training should be transitioned from a purely theoretical perspective to operational and practical applications.² Management training should be added to the internship portion of the curriculum, when students take on managerial duties, communicate with leadership and teams, and learn teamwork in the hospital; thus they could simultaneously apply their learning skills.^{32,34,38} Managheb and Mosalanejad discovered that in medical universities, much attention was paid to clinical decision making but less attention was paid to organizational decision making techniques and planning. It is important to note that clinicians' clinical skills are not the only way to improve the patient health or outcomes. A team-based approach, with a healthy relationship with the patient, can make a doctor more successful in treating the disease and result in better patient outcomes. Research shows that education programs often do not adequately familiarize medical students with managerial and managerial skills and designing effective teams, targeting and creating a shared vision for team members, all of which are key management skills that unfortunately physicians often lack. For example, physicians have stated that nurses teach the physicians many principles of teamwork and collaborative work in the hospital and with other people in the departments, and if they have questions about how to treat patients or staff, they will refer to nurses because

they are more available than professors.³⁹

There are no formal courses or conditions for non-formal education to train leadership skills for doctors. Physicians have a significant impact on their colleagues due to their scientific excellence, and they need clinical skills and experience, but it is also believed that doctors are often not willing to listen to others and they are not good followers.⁴⁰

Abdollahzadeh Estakhry and colleagues, in a study of the world's premier medical schools, concluded that their curriculum has changed to a basis of pivotal competencies. These medical schools have turned to active learning and diverse educational methods due to changes in the health system and the patient-centered, collaborative approach. They use compound- and merit-based curriculum. For example, at the Harvard Medical School at Harvard University, integrated education from clinical, behavioral and social sciences is offered to students. At the University of Washington, a general review was done of the curriculum, and leadership development techniques, mentoring, and team learning were added.³²

The University of Kentucky presents a certificate of medical management, which consists of 12 courses in full-day sessions and includes topics such as health care systems and introductory accounting. This approach can lead to the development of physician leaders.

The University of California at Irvine was a pioneering medical school in offering a joint MD/Masters of Business Administration (MBA) program. Now more than half of medical schools offer such a joint degree.

The University of Tennessee offers a professional management course in cooperation with their business school resulting in the addition of an MBA degree. The Medical College of Wisconsin, in partnership with Sharp HealthCare, a not-for-profit organization, designs and presents leadership development courses with an applied approach, consisting of intensive short-term (five and eight months) courses for clinicians.^{41,42}

Conclusion

Considering the importance of training clinical leadership skills for physicians and the gap that currently exists in Iranian medical curricula, changes are needed in medical education and continuing education in Iran. Benchmarking of successful universities around the world can contribute to an optimized, more efficient result to fill this gap. Teaching effective methods of innovation management, managing globalization and multiculturalization, problem solving, crisis management, managerial skills in human resources, business management, financial and economic topics, strategic planning, understanding operational planning, and other management topics could be very effective in fostering and improving the performance of healthcare organizations and the health system and lead to better outcomes for the society overall. Schools of medicine can play an important role by holding

practical management workshops and defining leadership development projects in their thesis requirements.

It is also suggested that researchers investigate the following in future investigations:

- Research on native models of clinical leadership competence among doctors, nurses, and other clinical professionals
- Research on the academic competency of leadership education
- Research on the effectiveness of different methods of leadership development education
- Investigating the design of clinical education curriculum units within the academic years of medical education

Ethical approval

This research is part of a PhD thesis which was approved by the Ethics Committee of Lorestan University. Ethical aspects were considered in all steps of the study and texts belonging to other authors that have been used in any part of this study have been fully referenced and cited.

Competing interests

The authors declare that there is no conflict of interest.

Authors' Contributions

SAH and MH searched articles. SAH and MH extracted the data and summarized it. MH reviewed the quality of the articles. SAH translated and MH supervised; HV verified and checked articles and AN designed and completed the final review process.

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References

1. Mosadeghrad AM, Esfahani P, Nikafshar M. Hospitals' efficiency in Iran: A systematic review and meta-analysis of two decades of research. *Payavard Salamat*. 2017;11(3):318-31. [Persian].
2. Baradaran HR, Kuhpayehzadeh J, Ramezani-Givi S, Dehnavieh R, Noori Hekmat S. Managerial skills requirement of medical students from the perspective of students and physicians: a case study of Iran University of Medical Sciences. *Res Med Educ*. 2013;5(1):1-12. doi: 10.18869/acadpub.rme.5.1.1.
3. Pillay R. Defining competencies for hospital management: A comparative analysis of the public and private sectors. *Leadersh Health Serv*. 2008;21(2):99-110. doi: 10.1108/17511870810870547.
4. Ford R. Complex leadership competency in health care: towards framing a theory of practice. *Health Serv Manage Res*. 2009;22(3):101-14. doi: 10.1258/hsmr.2008.008016.
5. Hakkak M, Hozni SA, Shahsiah N, Akhlaghi T. Design of hospital accreditation model: A qualitative study. *Manage Strat Health Syst*. 2017;2(3):201-14.
6. Bhanot R. Improving leadership and management education in medical school. *Adv Med Educ Pract*. 2018;9:305-6. doi: 10.2147/amep.s166968.
7. Kermani B, Darvish H, Sarlak MA, Kolivand PH. Developing competence modeling of hospital managers. *Journal of Health Promotion Management*. 2017;6(4):59-65. doi: 10.21859/jhpm-07028.
8. Fernandez CSP, Noble CC, Jensen ET, Chapin J. Improving leadership skills in physicians: A 6-month retrospective study. *J Leadersh stud*. 2016;9(4):6-19. doi: 10.1002/jls.21420.
9. Nabili V. Physician as a conscious leader. *AORN J*. 2016;104(5):434.e1-.e6. doi: 10.1016/j.aorn.2016.09.004.
10. Cabrera-Pivaral CE, Zavala-Gonzalez MA, Covarrubias-Bermudez M. Clinical competencies for primary health care of climacteric in a group of Mexican physicians. *Reprod Clim*. 2017;32(1):15-8. doi: 10.1016/j.recli.2016.10.002.
11. Pradarelli JC, Jaffe GA, Lemak CH, Mulholland MW, Dimick JB. A leadership development program for surgeons: First-year participant evaluation. *Surgery*. 2016;160(2):255-63. doi: 10.1016/j.surg.2016.03.011.
12. Adib Y, Fathiazar E, Alizadeh M, Dehghani G. Exploration of the required clinical competencies for training general practitioners to acquire social accountability: a qualitative study. *J Med Educ Dev*. 2018;10(28):3-17.
13. Davoudi Monfared E, Sajjadi F. Competency-based medical education and meta-competencies in general physician. *Education Strategies in Medical Sciences*. 2017;9(6):471-4. [Persian].
14. Goodall AH. Physician-leaders and hospital performance: is there an association? *Soc Sci Med*. 2011;73(4):535-9. doi: 10.1016/j.socscimed.2011.06.025.
15. Daouk-Öyry L, Mufarrij A, Khalil M, Sahakian T, Saliba M, Jabbour R, et al. Nurse-led competency model for emergency physicians: a qualitative study. *Ann Emerg Med*. 2017;70(3):357-62.e5. doi: 10.1016/j.annemergmed.2016.11.023.
16. Hariss J. National Center for Healthcare Leadership Competency Model Use in a Midwestern Healthcare Organization [dissertation]. Minnesota: Walden University; 2016.
17. Otober E. Comparison between physician managers and non-physician managers in Healthcare Organizations: A systematic review of literature [dissertation]. New York City: Icahn School of Medicine At Mount Sinai; 2015
18. Pregitzer LM. The future of physician leaders: a study of physician leadership practices [dissertation]. Malibu, California: Pepperdine University; 2014.
19. Mkandawire C. Hospital outcomes based on physician versus non-physician leadership [dissertation]. Minnesota: Walden University; 2017.
20. Jackson JL. Factors that Influence Physicians to Assume Leadership Roles: A Focus on Clinical Integration [dissertation]. Kentucky: Western Kentucky University; 2017.
21. Schmidtman JB. Employee's Experiences and Interpretations of Physician Leadership Style in an Acute Care Setting: A Phenomenological Study [dissertation]. San Diego, California: Northcentral University; 2017.
22. Ilse RG. Physician perception of leadership of front-line managers in hospitals [dissertation]. Minneapolis, Minnesota: Capella University; 2015.
23. Arsenault RL. Characteristics of a health system-sponsored

- leadership development program as they relate to the career advancement of physician leaders [dissertation]. Minneapolis, Minnesota: Capella University; 2017.
24. Berkenbosch L, Brouns JW, Heyligers I, Busari JO. How Dutch medical residents perceive their competency as manager in the revised postgraduate medical curriculum. *Postgrad Med J*. 2011;87(1032):680-7. doi: 10.1136/pgmj.2010.110254.
 25. Olakunle OS, Oladimeji O, Olalekan AW, Olugbenga-Bello A, Akinleye C, Oluwatoyin OA. Knowledge of tuberculosis management using directly observed treatment short course therapy among final year medical students in South Western Nigeria. *Pan Afr Med J*. 2014;18:32. doi: 10.11604/pamj.2014.18.32.3553.
 26. Jaffe GA, Pradarelli JC, Lemak CH, Mulholland MW, Dimick JB. Designing a leadership development program for surgeons. *J Surg Res*. 2016;200(1):53-8. doi: 10.1016/j.jss.2015.08.002.
 27. Van Tuong P, Duc Thanh N. A Leadership and Managerial Competency Framework for Public Hospital Managers in Vietnam. *AIMS Public Health*. 2017;4(4):418-29. doi: 10.3934/publichealth.2017.4.418.
 28. Calhoun JG, Dollett L, Siniotis ME, Wainio JA, Butler PW, Griffith JR, et al. Development of an interprofessional competency model for healthcare leadership. *J Healthc Manag*. 2008;53(6):375-89; discussion 90-1.
 29. Shewchuk RM, O'Connor SJ, Fine DJ. Building an understanding of the competencies needed for health administration practice. *J Healthc Manag*. 2005;50(1):32-47.
 30. Fang CH, Chang ST, Chen GL. Competency development among Taiwanese healthcare middle manager: A test of the AHP approach. *Afr J Bus Manage*. 2010;4(13):2845-55.
 31. Parand A, Dopson S, Renz A, Vincent C. The role of hospital managers in quality and patient safety: a systematic review. *BMJ Open*. 2014;4(9):e005055. doi: 10.1136/bmjopen-2014-005055.
 32. Abdollahzadeh Estakhry GH, Heidarzadeh A, Yazdani HS, Taheri Ezbarami Z. Identification of top medical school's educational structure in the world. *Res Med Educ*. 2014;6(2):19-27.
 33. Modi JN, Gupta P, Singh T. Competency-based medical education, entrustment and assessment. *Indian Pediatr*. 2015;52(5):413-20.
 34. Bhanot R. Improving leadership and management education in medical school. *Adv Med Educ Pract*. 2018;9:305-6. doi: 10.2147/amep.s166968.
 35. Mehraram M, Bahadorani M, Baghersad Z. Evaluation of knowledge, attitude, ability and preparedness for E-learning among continuing medical education learners. *Iran J Med Educ*. 2015;15(80):630-8. [Persian].
 36. Hakak SH, Allami A, Derakhshan F, Abbasi M. Problems of continuing medical education programs and their Solutions from the viewpoint of faculty members. *Strides Dev Med Educ*. 2017;13(6):539-52.
 37. Soheili A, Hemmati Maslakkpak M, Mohamadpour Y, Khalkhali HR, Rahmani A. The effect of implementing competency based education model on nursing students' communication skills. *Journal of Urmia Nursing and Midwifery Faculty*. 2015;13(4):328-37. [Persian].
 38. Ehsani A, Moshabaki A, Hadizadeh M. Identification of key capabilities for effective implementation of knowledge management in hospitals with structural equation modeling approach. *Journal of Health Administration*. 2012;15(49):58-68. [Persian].
 39. Managheb E, Mosalanejad F. Self-Assessment of family physicians and interns of Jahrom university of medical sciences about minimum capabilities of general practitioner. *Development Strategies in Medical Education*. 2017;4(1):27-39. [Persian].
 40. Changiz T, Fakhari M, Jamshidian S, Zare S, Asgari F. Systematic review of studies in the field of competencies of new or soon to-be- graduate general physicians in Iran. *Strides Dev Med Educ*. 2015;12(2):325-43.
 41. Dodds J, Vann W, Lee J, Rosenberg A, Rounds K, Roth M, et al. The UNC-CH MCH Leadership Training Consortium: building the capacity to develop interdisciplinary MCH leaders. *Matern Child Health J*. 2010;14(4):642-8. doi: 10.1007/s10995-009-0483-0.
 42. Stephen C, Stemshorn B. Leadership, governance and partnerships are essential One Health competencies. *One Health*. 2016;2:161-3. doi: 10.1016/j.onehlt.2016.10.002.