



# Explaining a Hybrid Competency-Meritocracy Model for Selection of Hospitals Executive Managers: A Scoping Review

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## Abstract

**Background:** The successful improvement of health care system (HCS) efficiency in all countries hinges on the selection of effective leaders in the new century. Nevertheless, failing to notice the competency and meritocracy of managers still seems to be one of the major challenges drawn against Iran's HCS, mainly at hospitals, to improve global knowledge and core skills.

**Methods:** This scoping review was performed on the articles published on the Persian and English databases from June 2000 to September 2023, using the keywords "health care system, hospital executive manager, competency and meritocracy system." The 6-stage framework developed by Arksey and O'Malley was applied to collect and present the findings. Moreover, the quality of the desired articles was evaluated via the Mixed Methods Appraisal Tool (MMAT).

**Results:** In this study, there are 7 core categories—including effective leadership, comprehensive knowledge management, evidence, managerial tasks, personality traits, management intelligence, and management skills. Using a total of 105 references—including 47 articles for entry into the review and 58 articles added as other sources alongside 95 subcategories associated with the competency and meritocracy of hospital executive managers within the Management Competency Assessment Partnership (MCAP) framework—were extracted through open and deductive coding, and ultimately confirmed. Professionalism was correspondingly supplemented to the given categories based on the MCAP framework, and the final hybrid competency-meritocracy model for the selection of hospital executive managers was proposed.

**Conclusion:** The hybrid competency-meritocracy model proposed in this scoping review can be exploited in the management of new-century hospitals. As the administration of successful hospitals cannot be fulfilled individually, this hybrid model should incorporate all levels of clinical and executive management at hospitals to achieve the desired outcomes by synergizing them with each other. It is suggested to carry out further research on how to establish a competency-meritocracy system in the selection of hospital managers at senior, middle, and operational levels.

**Keywords:** Competency, Meritocracy, Health Care System, Hospital, Executive Managers

**Conflicts of Interest:** None declared

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## Introduction

The health care systems (HCS) operating in today's world are playing against loads of challenges, such as rising health care costs, population aging, inappropriate labor distribution, and low-quality health care services (1). Even

though HCS policymakers and top-level managers in all countries aspire to improve health care efficiency through optimization and decentralization (2, 3), success in this domain has been dependent for the most part on the selection

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### ↑What is "already known" in this topic:

One of the challenges that every nation's health system, particularly hospitals, faces is the inability to recognize the meritocracy and competence of administrators. This defect has cost governments and health systems a great deal.

### →What this article adds:

The present scoping review aims to conduct a hybrid competency-meritocracy model for the selection of hospital managers. The hybrid model in the administration of hospitals includes all top and middle executives and clinical managers of hospitals so that they can achieve desired outcomes within the framework and system of the management group and by synergizing them with each other.

of human resources (HRs) and managers endowed with professional competencies (4, 5). Despite this, failing to notice the competency and meritocracy of managers still seems to be one of the major challenges drawn against HCS, mainly at hospitals (6, 7).

As the leading health care facilities, hospitals are encountering many issues in reducing costs, increasing efficiency, and improving quality, so the selection of effective leaders seems to be crucial (8, 9). The managers' competencies and skills in various technical, perceptual, human-related, behavioral, political, and communicative fields are thus among the main criteria for development in any country (10, 11), and hospitals, as one of the essential elements that enable HCS to function, are no exception, because approximately 55% to 80% of Iran's health care expenditure is for budgeting hospitals to serve the general population (12, 13).

In this regard, competency and meritocracy as a general concept represent a set of activities and approaches in which people solely progress based on their talents and expertise (14). Meritocracy is a social system wherein advancement is made concerning individual capacities, abilities, and qualifications, shaped by professional ethics, and some associated factors (15). This system contains rules alongside the application of science and logic for the selection of HRs, thus, any discrimination is avoided, and systematic tools are typically utilized to evaluate their competencies (16). Accordingly, the 2 main indicators of meritocracy and competency systems are fair competition and equality of opportunity in the selection of individuals in organizations. Much emphasis has been so far laid on the second indicator to the extent that if there is no equality of opportunity to select managers, meritocracy systems miss the mark (17).

Mangolian et al using a qualitative research design and content analysis proposed 4 themes for the competency and meritocracy of managers involved in health care facilities—professional interests and motivation, new knowledge and skills, critical thinking, and self-reliance (18). Meritocratic ideals could fail the HCS, since cultural values, public policy, structural injustice, vigilance, and social awareness might merely give birth to internal idealism, in the form of customer service culture, stereotyping, rejection

of egalitarian economy, and negation of discrimination, as the negative consequences. These people could also consider meritocracy as a dominant American ideal (19).

There was a gap between the American values of meritocracy, raising success aspirations, and the structure of opportunity creation through political and socioeconomic forces, but disintegration could occur. Indeed, the American type of meritocracy is simply a dream in which individuals must work hard, enforce laws, and suffer from the consequences that they have had no role in their creation (20). As illustrations, Fattahi et al proposed global knowledge, view expansion, and main skills as 3 important components of competence and meritocracy system (21). In addition, Nadine et al suggested 4 main steps in this vein—meritorious recognition, planning for meritocracy, along selection on merit (22).

The primary research question in the 21st century is: Given the advancements in health care technology, smart hospital development, and digital health, what kinds of managers and their traits can assume responsibility for hospital administration as the most crucial aspect of health care in the 21st century?

In this regard, the authors attempt to fill the gaps in knowledge, practice, and skills required to select the right administrators for managing the modern hospital hybrid model within the framework of the proposed meritocracy competency.

### Methods

This scoping review was fulfilled to develop a hybrid competency-meritocracy model for the selection of hospital managers from June 2000 to September 2023. This type of review was the best option since it helped researchers find their answers to the questions of “what and why” within this specific subject (23). Additionally, it might provide an overview of the most recent research in this area, highlight the main ideas, highlight the generalities, and then provide a summary of the results (24, 25). This study employed the 6-step process developed by Arksey and O'Malley, which consists of determining research objectives, finding pertinent publications, choosing relevant review papers, extracting data, gathering, summarizing, and reporting findings, and, lastly, consulting with experts.

Table 1. Search Strategies/Syntax in Databases

1	("meritocracy" OR "competency") AND ("healthcare" OR "hospital" OR "healthcare system") AND ("administrator")
2	("meritocracy" OR "competency") AND ("healthcare" OR "hospital" OR "healthcare system") AND ("manager")
3	("meritocracy" OR "competency") AND ("healthcare" OR "hospital" OR "healthcare system") AND ("administrator" OR "manager")
4	("meritocracy" OR "competency") AND ("healthcare" OR "hospital" OR "healthcare system") AND ("administrator" OR "manager" OR "hospital administrator")
5	("meritocracy" OR "competency") AND ("healthcare" OR "hospital" OR "healthcare system") AND ("administrator" OR "manager" OR "hospital manager")
6	("meritocracy" OR "competency") AND ("healthcare" OR "hospital" OR "healthcare system") AND ("administrator" OR "manager" OR "hospital administrator" OR "hospital manager")
7	("meritocracy" OR "competency") AND ("healthcare" OR "hospital" OR "healthcare system") AND ("administrator" OR "manager" OR "hospital administrator" OR "hospital manager" OR "chief executive officer")
8	("meritocracy" OR "competency") AND ("healthcare" OR "hospital" OR "healthcare system") AND ("administrator" OR "manager" OR "hospital administrator" OR "hospital manager" OR "chief executive officer" OR "board of trustees" OR "board of managers")

For this purpose, the articles investigating the competency and meritocracy of hospital managers in the HCS of Iran and other countries, published on the English databases of MEDLINE, Embase, ProQuest, Scopus, Web of Science (WoS), Google Scholar, and PubMed alongside the Persian databases, including Magiran, IranDoc, and the Scientific Information Database (SID), during June 2000 to September 2023 were retrieved using the keywords of meritocracy, competency, healthcare, hospital, healthcare system, administrator, manager, hospital administrator, hospital manager, chief executive officer (CEO), Board of Trustees, and Board of Managers. The search strategy was based on the MeSH terms with "OR" and "AND" operators. The search strategy/syntax in terms of the selected keywords is provided in Table 1.

A total of 47 published scoping reviews were included, totaling relevant articles identified in our database search, while 54 included references had been retrieved by other search methods. Also, 60% of the included references that had been retrieved were only found in a single database,

including Google Scholar. The combination of Embase, Scopus, and Google Scholar performed best, achieving 86% in this review. The inclusion and exclusion criteria in this study are presented in Table 2. The process of identification, screening, and selection of studies included in the research is shown in Figure 1.

The 6-stage framework as study design developed by Arksey and O'Malley (2005) was then applied to collect and present the findings descriptively in tables. Accordingly, the scoping review consisted of (i) specifying and addressing the research questions (RQs); (ii) identifying the relevant literature using valid databases, reviewing gray sources, and studying existing review articles in this field; (iii) selecting the studies in primary research; (iv) extracting the data; (v) analyzing the data, summarizing, and reporting the findings; and (vi) including expert consultation (26). All results were reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-SCR) checklist.

Table 2. The Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Time	Studies in the time range from June 2000 to September 2023	Studies outside the specified time frame
Language	Articles published in Persian and English	Articles published in languages other than Persian and English
Type of Article	Original article, review, letter, editorial, conference paper	Duplications or having no full-text availability, grey literature, and summaries of articles published in conferences
Content of article	Article that presents the core categories, subcategories, and dimensions of competency and meritocracy of hospital managers in HCS regarding the mentioned keywords	Articles that are unrelated to the mentioned keywords and core categories, subcategories, and dimensions of competency and meritocracy of hospital managers.

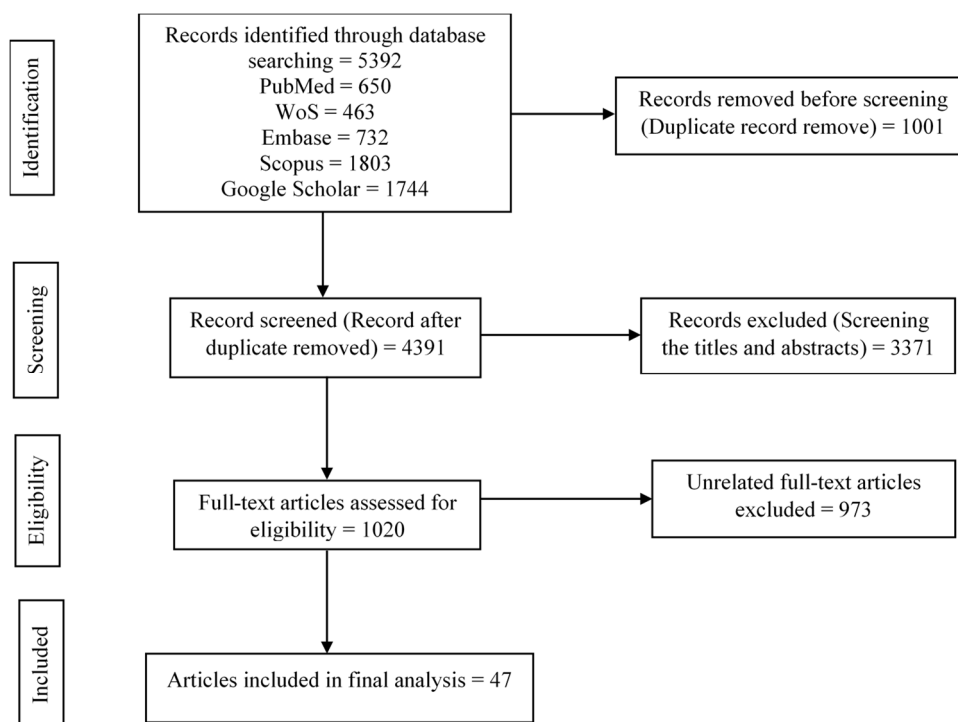


Figure 1. Process of identification, screening, and selection of articles in the scoping review (Prisma Diagram)

### **Specifying and Addressing the RQs**

The following RQs were raised in this scoping review:

1. What are the geographic regions and periods in the extracted articles?
2. What articles are available?
3. What has been highlighted in the identified articles?
4. What methods have been implemented?
5. What conclusions have been made?

### **Identifying the Relevant Literature**

To identify the relevant literature using valid databases, reviewing gray sources, and studying existing review articles in this field, the steps below were taken:

1. Searching 6 databases in English and 4 in Persian
2. Combining keywords, including competency, meritocracy, and hospitals manager or administrators
3. Reflecting on the period of article extraction from 2000 to 2023
4. Searching and retrieving articles in July 2023

### **Selecting the Articles**

There were 3 steps to select the articles in primary research in this scoping review:

1. Selecting the articles based on screening their abstracts and evaluating their full-texts
2. Determining the inclusion criteria, such as articles focused on competency and meritocracy with theoretical foundations and models
3. Establishing the exclusion criteria, that is, the articles that did not call attention to the competency and meritocracy of the managers of hospitals and other health care facilities, senior nurse managers, medical and healthcare services managers, as well as those involved in comprehensive community health centers and primary health care centers, alongside books, letters to the editor, summaries of articles in conferences, and full-texts of articles not published in Persian and English, studies on the influence of managers in the care for patients or health care programs, and articles on waste disposal management in hospitals. In this step, the retrieved articles were imported into EndNote X8, and then 2 researchers cooperated during the inclusion and exclusion phases, comparing and selecting the articles and evaluating their degree of compliance. Once the researchers did not agree on the criteria for selecting the articles, a third researcher was asked to help reach a consensus.

### **Extracting the Data**

To extract the data in this scoping review, the following steps were met:

1. Developing the extracted data tables containing the main features of the articles as well as the core categories and subcategories of competency and meritocracy of hospital managers
2. Matching the extracted data with the RQs
3. Extracting the data independently by 2 researchers comparing them with each other, and finalizing

### **Analyzing the Data, Summarizing, and Reporting the Findings**

There were 3 phases involved in analyzing the data, summarizing the results, and reporting them:

1. Analyzing the data using thematic analysis
2. Grouping the data based on the defined core categories and subcategories of competency and meritocracy of hospital managers
3. Establishing the relationship between the competency and meritocracy of hospital managers and hospital efficiency

### **Including Expert Consultation**

To consult experts in this scoping review to complete the study, the following steps were taken by forming a focus group:

Using content analysis method with qualitative approach. At this stage, the obtained information was coded using MAXQDA 10 software, and core and subcategories related to each article were identified the relationship between the core and subcategories and the main meaning was adopted as follows:

1. Presenting the initial findings in the defense session of the Master's and PhD thesis in health care management
2. Acquiring the comments provided by the referees and making the corrections if required
3. Validating the findings by experts and experienced referees

### **Article Quality Appraisal**

The quality of the selected articles was evaluated using the Mixed Methods Appraisal Tool (MMAT), as an effective tool in the critical evaluation of various types of studies, including scoping reviews (27, 28). Each article meeting the inclusion criteria was accordingly rated using the classification of Yes, No, and Can't Tell, and its quality was then confirmed. According to the Management Competency Assessment Partnership (MCAP) framework, the goal or results of a quality appraisal of each article in studies conducted according to designed and validated in the studies by Liang et al, in Australia, the competency and meritocracy of hospital managers during 2011-2015 (29-31). Therefore, the core categories and subcategories of competency and meritocracy of hospital managers were delineated in this scoping review.

### **Results**

In this scoping review, 47 articles were examined (Table 3). Also, 60% of the articles were written in English and 40% in Persian, which were published between 2013 and 2023. The greatest number of articles were published between 2019 and 2023. Also, the core categories and subcategories of competency and meritocracy of hospital managers were further outlined in Table 4 which showed the prevalence of 7 core categories across the selected studies.

Seven core categories and 95 subcategories were created to group the competency and meritocracy aspects of hospital managers. These included as follows: effective leadership, with 18 subcategories; comprehensive knowledge management, with 37 subcategories; evidence, with 5 subcategories; managerial tasks, with 7 subcategories; hospital managers' personality traits, with 15 subcategories; managerial intelligence, with 5 subcategories; and managerial skills, with 8 subcategories.

Table 3. Information on the Reviewed Articles

No.	Article title	Author(s)	Publication date	Country of origin	Methods	Database	Core categories and subcategories
1	A Qualitative Study to Identify Skills and Competency Required for Hospital Managers	Barati et al. (32)	2016	Iran	Qualitative	PubMed	<ul style="list-style-type: none"> <li>• Communication skills</li> <li>• Work experience</li> <li>• Knowledge management</li> <li>• Hospital infrastructure knowledge</li> <li>• Personality traits of managers</li> <li>• Systems thinking</li> <li>• Problem-solving skills</li> <li>• Enthusiasm and motivation for management and leadership</li> <li>• Compliance with ethical standards</li> </ul>
2	Alignment of Perceived Competencies and Perceived Job Tasks among Primary Care Managers	Dikic et al. (33)	2019	Serbia	Quantitative	PubMed	<ul style="list-style-type: none"> <li>• Communication skills</li> <li>• Team-building activities</li> <li>• Planning and prioritizing problems</li> <li>• Performance evaluation</li> <li>• Problem-solving skills</li> <li>• Effective leadership</li> </ul>
3	Leadership and Management Competencies Required for Bhutanese Primary Healthcare Managers in Reforming the District Health System	Dorji et al. (34)	2019	Bhutan	Quantitative	PubMed	<ul style="list-style-type: none"> <li>• Communication skills</li> <li>• Executive functioning</li> <li>• Acceptance skills</li> </ul>
4	Development and Use of the Leadership Competencies for Healthcare Services Managers Assessment	Hahn & Lapetra (35)	2019	United States	Review	PubMed	<ul style="list-style-type: none"> <li>• Communication skills</li> <li>• Professional social responsibility</li> <li>• Effective leadership</li> <li>• Knowledge of healthcare environment</li> <li>• Business knowledge (or business intelligence)</li> </ul>
5	Hospital Managers' Skills Required and Onward Challenges: A Qualitative Study	Moradi et al. (36)	2020	Iran	Qualitative	PubMed	<ul style="list-style-type: none"> <li>• Strategic skills</li> <li>• Cognitive skills</li> <li>• Communication skills</li> <li>• Work experience</li> <li>• Personality traits of managers</li> </ul>
6	Validation of a Management Competency Assessment Tool for Health Service Managers	Howard et al. (37)	2018	Australia	Quantitative	PubMed	<ul style="list-style-type: none"> <li>• Evidence-based decision-making</li> <li>• Operational, administrative, and HR management</li> <li>• Knowledge of healthcare organizations and the environment</li> <li>• Communication skills</li> <li>• Effective leadership</li> <li>• Change management</li> </ul>

A primary inferential model and implicit analysis could be used to select hospital managers based on comprehensive knowledge, effective leadership, and behaviors and skills beyond the MCAP framework. This could be done by using the best-fit method to map the core categories and subcategories of competency and meritocracy that resulted from the review of the articles.

All the core categories of competency and meritocracy for the selection of hospital managers that were not within the MCAP framework were extracted through open and inferential coding of the most recently published articles in this field, thus, the latest findings associated with leadership and management in the given studies were utilized in



Table 3. Continued

No.	Article title	Author(s)	Publication date	Country of origin	Methods	Database	Core categories and subcategories
7	Perceived Hospital Managerial Competency in Tehran, Iran: Is There a Difference between Public and Private Hospitals?	Kalhor et al. (38)	2016	Iran	Quantitative	PubMed	<ul style="list-style-type: none"> <li>• Communication skills</li> <li>• Self-management</li> <li>• Task management skills</li> <li>• Strategic planning</li> </ul>
8	Leadership and Management Competencies for Hospital Managers: A Systematic Review and Best-Fit Framework Synthesis	Kakemam et al. (39)	2020	Iran	Review	PubMed	<ul style="list-style-type: none"> <li>• Communication management</li> <li>• Change management</li> <li>• Professionalism</li> <li>• Evidence-based management</li> <li>• Resource management</li> <li>• Knowledge management</li> <li>• Effective leadership</li> </ul>
9	Future Competencies for Hospital Management in Developing Countries: Systematic Review	Malmoon et al. (40)	2020	Iran	Review	PubMed	<ul style="list-style-type: none"> <li>• Key management skills</li> <li>• Global knowledge</li> <li>• Main criteria for competency and meritocracy</li> <li>• Multidimensional attitudes</li> </ul>
10	A Leadership and Managerial Competency Framework for Public Hospital Managers in Vietnam	Van Tuong & Thanh (41)	2017	Vietnam	Mixed methods	PubMed	<ul style="list-style-type: none"> <li>• Policy development and implementation</li> <li>• Development of strategic planning activities</li> <li>• Planning</li> <li>• Human resources management (HRM)</li> <li>• Financial management</li> <li>• Infrastructure and equipment management</li> <li>• Management of accidents and unplanned events</li> <li>• Quality management</li> <li>• Inspection</li> <li>• Monitoring</li> <li>• Evaluation</li> <li>• Moral knowledge</li> <li>• Data management</li> <li>• Self-care</li> </ul>
11	Management Skill and Leadership: A Case Study from Hospital Managers of Charity Business in Health	Aini (42)	2018	Indonesia	Mixed methods	Scopus	<ul style="list-style-type: none"> <li>• Public management</li> <li>• Financial management</li> <li>• HRM</li> <li>• Quality management</li> <li>• Management of equipment and medicines</li> <li>• Data management</li> </ul>
12	Competency Status and Desire for Training in Core Public Health Domains: An Analysis by Job Level	Cunningham (43)	2022	United States	Quantitative	Scopus	<ul style="list-style-type: none"> <li>• Cultural competency</li> <li>• Communication skills</li> <li>• Systems thinking</li> <li>• Stakeholder engagement</li> <li>• Policy planning and development</li> <li>• Analysis and evaluation</li> <li>• Financial management</li> <li>• Public health knowledge</li> <li>• Effective leadership</li> </ul>

determining the competency and meritocracy of hospital managers. The core categories and subcategories developed here were further confirmed and cross-checked with regard to their correctness and stability and led to the for-

mation of a new framework of the hybrid competency-meritocracy model for the selection of hospital managers (Figure 2). This figure demonstrates that in order to manage hospitals as effectively as possible, a number of factors

Table 3. Continued

No.	Article title	Author(s)	Publication date	Country of origin	Methods	Database	Core categories and subcategories
13	Evidence-Based Management Competency Model for Managers in Hospital Settings	Daouk-Öyry et al. (44)	2021	Lebanon	Quantitative	Scopus	<ul style="list-style-type: none"> <li>• Technical skills</li> <li>• Cognitive skills</li> <li>• Interpersonal skills</li> </ul>
14	Managerial Competences in Public Organizations: The Healthcare Professionals' Perspective	Fanelli et al. (45)	2020	Italy	Mixed methods	Scopus	<ul style="list-style-type: none"> <li>• Evidence quality assessment</li> <li>• Development and maintenance of professional competence</li> <li>• Management process planning</li> <li>• Cost assessment</li> <li>• Management of informal relationships</li> <li>• Collaborative leadership</li> </ul>
15	What Qualities are Required for Globally-Relevant Health Service Managers? An Exploratory Analysis of Health Systems Internationally	Harrison et al. (46)	2019	Seven countries (Australia, China, Indonesia, Oman, New Guinea, United Kingdom, and United States)	Qualitative	Scopus	<ul style="list-style-type: none"> <li>• Change management</li> <li>• Participatory management</li> <li>• Continuous learning and teaching management (learning organizations)</li> <li>• Theory-application balance in management</li> <li>• Compassionate leadership</li> </ul>
16	Health Care Managers' Competence in Knowledge Management: A Scoping Review	Karsikas et al. (47)	2022	Finland	Review	Scopus	<ul style="list-style-type: none"> <li>• Systems management</li> <li>• Professional development</li> <li>• Effective leadership</li> </ul>
17	Developing Senior Hospital Managers: Does One Size Fit All?: Evidence from the Evolving Chinese Health System	Liang et al. (48)	2020	China	Quantitative	Scopus	<ul style="list-style-type: none"> <li>• Evidence-based management</li> <li>• Resource management</li> <li>• Knowledge management</li> <li>• Communication and information management</li> <li>• Effective leadership</li> <li>• Change management</li> </ul>
18	Managerial Competencies: A Survey of Healthcare Managers in a Tertiary Hospital in Calabar, South-South Nigeria	Okonkwo (49)	2020	Nigeria	Quantitative	Scopus	<ul style="list-style-type: none"> <li>• Knowledge of healthcare environment</li> <li>• Communication skills</li> <li>• Professionalism</li> <li>• Effective leadership</li> <li>• Business knowledge</li> <li>• Financial management</li> </ul>

should be taken into account, including evidence, skills, intelligence, knowledge, tasks, and personality traits. Additionally, it is crucial that hospital managers possess the skills and competencies required for organizational leadership and management.

The present study's core competency and meritocracy categories outside of the MCAP framework were contrasted with the findings of earlier studies, as explained in the Discussion section. Professionalism was added because, according to the MCAP framework, it was a unique competency for managers of health care services, especially those at hospitals, to perform effectively and take on

responsibilities, even though the core categories of competency and meritocracy were crucial.

As a result, professionalism was defined as the capacity to practice professional roles and responsibilities, adhere to ethical standards, and demonstrate dedication and organizational loyalty in order to hold hospital managers and HCS more responsible for providing patient services, reflecting on patient orientation, becoming familiar with the delivery of professional services, and continuously seeking learning and improvement (36).

Table 3. Continued

No.	Article title	Author(s)	Publication date	Country of origin	Methods	Database	Core categories and subcategories
19	Managers' Views on Professional Competencies for Primary Health Care	da Silva et al. (50)	2022	Brazil	Qualitative	Scopus	<ul style="list-style-type: none"> <li>• Learning and development</li> <li>• Effective communication with stakeholders</li> <li>• Process management</li> <li>• Emotional readiness</li> <li>• Effective leadership</li> <li>• Active and multidimensional attitudes</li> <li>• Empathy and compassion</li> <li>• Professional self-awareness</li> </ul>
20	Elements of Management and Strengthening in Health Systems: A Qualitative Study from Iran	Bahreini et al. (51)	2021	Iran	Qualitative	Scopus	<ul style="list-style-type: none"> <li>• General and specialized management knowledge and skills</li> <li>• Comprehensive knowledge and perceptions of organizational environment</li> <li>• Management and leadership attitudes</li> <li>• Academic experience and professional abilities</li> </ul>
21	Competencies Gap in Hospital Management in Tehran, Iran: A Cross-Sectional Survey	Kakemam et al. (52)	2019	Iran	Qualitative	Scopus	<ul style="list-style-type: none"> <li>• Leadership and strategic management</li> <li>• Planning</li> <li>• Financial management</li> <li>• Change management</li> <li>• Knowledge management</li> <li>• Problem-solving skills</li> <li>• HRM</li> <li>• Customer orientation</li> <li>• Communication skills</li> <li>• Knowledge and awareness of ethical and legal issues</li> </ul>
22	Senior Managers' and Recent Graduates' Perceptions of Employability Skills for Health Services Management	Messum et al. (53)	2016	Australia	Quantitative	Scopus	<ul style="list-style-type: none"> <li>• Interpersonal skills</li> <li>• Self-management skills</li> <li>• Critical thinking</li> <li>• General and specialized management skills</li> </ul>
23	Selection Criteria of Public Hospital Managers in Iran Health System	Mahfoozpour et al. (54)	2019	Iran	Mixed methods	Scopus	<ul style="list-style-type: none"> <li>• Personality traits of management</li> <li>• Basic and general management knowledge</li> <li>• Hospital management skills</li> <li>• Planning skills</li> <li>• Resource organization and allocation</li> <li>• Effective leadership</li> <li>• Monitoring and supervision</li> </ul>

## Discussion

Over recent years, there have been countless changes in the HCS concepts and meanings, and the need for high-quality hospitals has been on the rise. All hospitals operating in the 21st century have their own frameworks, principles, and leadership practices that are one-of-a-kind. It is

thus essential for hospital managers to have access to numerous processes and resources to provide optimal health care services. Building a committed team, formulating and complying with the standards of the delivery of health care services at hospitals, reducing costs, exploiting modern



Table 3. Continued

No.	Article title	Author(s)	Publication date	Country of origin	Methods	Database	Core categories and subcategories
24	Development of the Competency Assessment Scale for Clinical Nursing Teachers: Results of a Delphi Study and Validation	Hongyan et al. (55)	2015	Thailand	Qualitative	WoS	<ul style="list-style-type: none"> <li>• Effective leadership</li> <li>• Communication skills</li> <li>• Partnership</li> <li>• Systems thinking and strategic decision-making</li> <li>• Organization development and professionalism</li> <li>• Emotional intelligence</li> <li>• Proactive approach</li> <li>• Financial planning</li> <li>• Data management</li> </ul>
25	A Health Management Competency Framework for Australia	Liang et al. (56)	2020	Australia	Quantitative	WoS	<ul style="list-style-type: none"> <li>• Effective leadership</li> <li>• Professionalism</li> <li>• Political skills and intelligence</li> <li>• Leadership and change management</li> <li>• Self-management</li> <li>• Evidence-based decision-making</li> <li>• Networking and public relations skills</li> <li>• Resource, administrative, and operational management</li> <li>• Knowledge of healthcare environment</li> <li>• Interpersonal communication</li> <li>• Communication skills</li> </ul>
26	The Competency Movement in Public Hospitals: Analyzing the Competencies of Hospital Executive Managers	Barsbay & Öktem (57)	2021	Turkey	Mixed methods	WoS	<ul style="list-style-type: none"> <li>• Knowledge of business management</li> <li>• Professional healthcare knowledge</li> <li>• Receiving criticisms</li> <li>• Financial skills</li> <li>• Knowledge of self-management</li> <li>• Information technology (IT) knowledge</li> </ul>
27	Managerial Capacity of Health Care Managers in Primary Health Care Centers in Ekiti State, Nigeria	Adeniran et al. (58)	2022	Nigeria	Quantitative	Google Scholar	<ul style="list-style-type: none"> <li>• HRM and organizational behavior</li> <li>• Supervision and coordination</li> <li>• Encouraging community participation</li> <li>• Data management</li> <li>• Financial management</li> <li>• Resource management</li> </ul>
28	Application of Fuzzy Multi-Criteria Decision-Making Model in Selecting Pandemic Hospital Site	Al Mohamed et al. (59)	2021	Iran	Systematic review	Google Scholar	<ul style="list-style-type: none"> <li>• Conflict management</li> <li>• Discipline</li> <li>• Communication skills</li> <li>• Sobriety</li> </ul>

technologies, developing innovative skills, meeting the criteria for professionalism and policy-making in the field of health care services, as well as establishing an effective communication system inside and outside hospitals are thus among the major factors contributing to the transformations of health care facilities in the new century (79). Moreover,

environmental conditions, organizational structure, effective leadership styles, flexible organizational culture, information technology systems, staff training, and financial incentives are all among the desirable features for managing hospitals efficiently (80). For this purpose, the administration of new hospitals requires managers with comprehen-

Table 3. Continued

No.	Article title	Author(s)	Publication date	Country of origin	Methods	Database	Core categories and subcategories
29	Professional Development and Qualification of Health Care Managers in the Conditions of the COVID-19 Epidemiological Situation	Bogdanova & Chaneva (60)	2021	Bulgaria	Review	Google Scholar	<ul style="list-style-type: none"> <li>• Conflict management</li> <li>• Ability to motivate staff</li> <li>• Problem-solving skills</li> <li>• Information analysis</li> <li>• Control</li> <li>• Organization</li> <li>• Coordination</li> </ul>
30	The Management of Hospital Units: Objectives, Competences, and Strategies	Grigore (61)	2019	Moldavia	Qualitative	Google Scholar	<ul style="list-style-type: none"> <li>• Design and analysis of hospital strategies</li> <li>• Business intelligence</li> <li>• Financial skills</li> <li>• Communication skills</li> <li>• Evaluative skills</li> <li>• Reviewing and monitoring skills</li> <li>• Executive skills</li> <li>• Talent management</li> <li>• Conflict management</li> </ul>
31	The Study of Various Models of Hospital Manager's Competency	Hayati et al. (62)	2014	Iran	Systematic review	Google Scholar	<ul style="list-style-type: none"> <li>• Communication skills</li> <li>• Team-building activities</li> <li>• Perceptual skills</li> <li>• Financial skills</li> <li>• Quality management</li> <li>• Strategic planning</li> <li>• Customer orientation</li> <li>• Healthcare management skills</li> <li>• Compliance with ethical standards</li> <li>• Conflict management</li> <li>• Risk management</li> <li>• IT skills</li> <li>• Negotiation skills</li> <li>• Change management</li> <li>• Staff management</li> <li>• Resource management</li> <li>• Effective leadership</li> </ul>
32	Managerial Competencies: A Survey of Hospital Managers' Working in Kathmandu Valley, Nepal	Khadka et al. (63)	2014	Nepal	Qualitative	Google Scholar	<ul style="list-style-type: none"> <li>• Strategic capability</li> <li>• Project management</li> <li>• Financial management</li> <li>• Change management</li> <li>• Knowledge management</li> <li>• Innovation</li> <li>• Problem-solving skills</li> <li>• HRM</li> <li>• Customer orientation</li> <li>• Information and communication skills</li> <li>• Honesty</li> <li>• Effective leadership</li> </ul>
33	Education and Hospital Manager's Administrative Competency: What Impact is of a Higher Degree?	Ochonma et al. (64)	2018	Nigeria	Quantitative	Google Scholar	<ul style="list-style-type: none"> <li>• Development of abilities</li> <li>• Planning skills</li> <li>• Effective leadership</li> <li>• Control and monitoring</li> <li>• Organization</li> <li>• Self-assessment</li> </ul>

sive characteristics, illustrated as adopting effective leadership styles, managing change, making decisions based on evidence, having comprehensive knowledge of hospital management, and being endowed with managerial skills, including communication skills, so a pyramid relationship

can be formed between comprehensive knowledge, skills, intelligence, effective leadership, and managerial tasks (29). Furthermore, a hospital manager nowadays must have soft skills like communication, problem-solving, and nego-

Table 3. Continued

No.	Article title	Author(s)	Publication date	Country of origin	Methods	Database	Core categories and subcategories
34	Review of Hospital Manager's Competencies in Astana	Umbetzhanova et al. (65)	2014	Kazakhstan	Quantitative	Google Scholar	<ul style="list-style-type: none"> <li>• Self-management</li> <li>• Planning and evaluation</li> <li>• HRM</li> <li>• Communication and information skills</li> <li>• Financial management</li> <li>• Materials and equipment management</li> <li>• Quality management</li> </ul>
35	Developing Competence Modeling of Hospital Managers	Kermani et al. (66)	2017	Iran	Mixed methods	Google Scholar	<ul style="list-style-type: none"> <li>• Evidence-based decision-making</li> <li>• Resource management</li> <li>• Knowledge management</li> <li>• Information and communication skills</li> <li>• Effective leadership</li> <li>• Change management</li> </ul>
36	Competencies of Hospital Managers: A Systematic Scoping Review	Ndayishimiye et al. (67)	2023	Poland	Scoping review	Google Scholar	<ul style="list-style-type: none"> <li>• Coordination of macropolicies</li> <li>• Specialized healthcare knowledge</li> <li>• Planning skills</li> <li>• Crisis management</li> <li>• Individual and organizational commitment</li> <li>• Decision-making skills</li> <li>• Policy-making skills</li> <li>• Social and political views</li> <li>• Systems and analytical thinking</li> <li>• Innovation management</li> <li>• Foresight skills</li> <li>• Effective leadership</li> <li>• Networking skills</li> <li>• Time management</li> <li>• Conflict management</li> <li>• Negotiation skills</li> <li>• Technological skills</li> <li>• Responsiveness</li> <li>• Financial management</li> <li>• Health financing and budgeting</li> <li>• Resource management</li> <li>• Performance management</li> <li>• Asset management</li> </ul>

tiation abilities in addition to efficient and effective resource management and departmental networking (81).

In the hybrid competency-meritocracy model developed in the present study, effective leadership was right at the center, and personality traits, comprehensive knowledge management, evidence, intelligence, tasks, and management skills are other main components of the model. In this line, Waugprasis also stated that effective leadership could be one of the key factors in determining the competency and meritocracy of hospital managers, as it was associated with other categories, such as comprehensive knowledge management, in addition to individual characteristics such as intelligence and skills (82). Alloubani et al reported that

effective leadership characteristics among hospital managers in this century would make hospitals respond appropriately to new technologies, organizational goals, and emerging challenges, and increase their dynamics by developing individual skills. Therefore, effective leadership was one of the leading factors in steering hospitals toward success (83). In a qualitative study by interviewing 20 top-level, middle, and operational managers of public, private, and social security hospitals in Tehran, Iran, Sarabi-Asiabar et al further concluded that the effective leadership of hospital managers along with their personality traits, skills, and comprehensive knowledge could play roles in providing high-quality health care services (84).

Table 3. Continued

No.	Article title	Author(s)	Publication date	Country of origin	Methods	Database	Core categories and subcategories
37	A Knowledge Implementation Model in Health System Management based on the PARIHS Model	Roohi et al. (68)	2022	Iran	Qualitative	Google Scholar	<ul style="list-style-type: none"> <li>• Conflict management</li> <li>• Negotiation skills</li> <li>• Technological skills</li> <li>• Responsiveness</li> <li>• Financial management</li> <li>• Health financing and budgeting</li> <li>• Resource management</li> <li>• Performance management</li> <li>• Asset management</li> <li>• Networking skills</li> <li>• Social and political views</li> <li>• Systems and analytical thinking</li> <li>• Coordination of macropolicies</li> <li>• Specialized healthcare knowledge</li> <li>• Planning skills</li> <li>• Crisis management</li> <li>• Individual and organizational commitment</li> <li>• Decision-making skills</li> <li>• Policy-making skills</li> <li>• Time management</li> <li>• Effective leadership</li> <li>• Innovation management</li> </ul>
38	A Conceptual Model of Succession Management at Medical Universities: Experience of Iranian Higher Education Based on Grounded Theory	Pourmirza Kalhori et al. (69)	2020	Iran	Mixed methods	Google Scholar	<ul style="list-style-type: none"> <li>• Professional knowledge and information</li> <li>• Behavioral and intellectual skills</li> <li>• Credit</li> <li>• Serving</li> <li>• Multidimensional attitudes</li> <li>• Personality traits of managers</li> <li>• Responsibility</li> <li>• Attention to moral and religious values</li> <li>• Individual skills</li> <li>• Technical skills</li> <li>• Communication skills</li> </ul>
39	Validity and Reliability of American College of Healthcare Executive Competencies Assessment Tool for the Managers of Healthcare Networks in Zanjan Province	Mohammadi et al. (70)	2014	Iran	Quantitative	Google Scholar	<ul style="list-style-type: none"> <li>• Conflict management</li> <li>• Time management</li> <li>• Decision-making skills</li> <li>• Problem-solving skills</li> <li>• Negotiation skills</li> </ul>

The present research demonstrated that one of the key elements of hospital administration is management intelligence, which encompasses business, politics, emotions, mathematics, and cultures. According to Dargahi and Vaisi's research on management intelligence, also known as hybrid intelligence, which combines political, emo-

tional, and mathematical intelligence with multicultural intelligence, management intelligence was one of the elements that increased organizational commitment among Tehran University of Medical Sciences employees in Tehran, Iran (85).

Table 3. Continued

No.	Article title	Author(s)	Publication date	Country of origin	Methods	Database	Core categories and subcategories
40	Relationship between Iranian-Islamic Management and Resource Management Development Mediated by Meritocracy and Accountability: A Case Study in Public Hospitals and Medical Centers of West Azerbaijan Province	Ghahramani & Osmanzadeh (71)	2019	Iran	Quantitative	Google Scholar	<ul style="list-style-type: none"> <li>• Responsibility</li> <li>• HRM</li> <li>• Iranian-Islamic management</li> </ul>
41	Managers' Views Regarding the Implementation of the Succession System Using a Competency Approach among the Managers of Hospitals Affiliated to Isfahan University of Medical Sciences, Isfahan, Iran	Rashidpour et al. (72)	2020	Iran	Quantitative	Google Scholar	<ul style="list-style-type: none"> <li>• Compensation and performance appraisal</li> <li>• Recruitment method</li> <li>• Welfare services</li> <li>• Maintenance</li> </ul>
42	Effective Factors for Development of Gerontological Nursing Competence: A Qualitative Study	Purfarzad et al. (73)	2019	Iran	Quantitative	PubMed	<ul style="list-style-type: none"> <li>• Education system</li> <li>• Quality of work life</li> <li>• Performance management</li> <li>• Organizational learning</li> <li>• Organizational support</li> </ul>
43	The Relationship between Succession and intellectual Capital with Entrepreneurship in Hospitals	Rafiei et al. (74)	2023	Iran	Quantitative	PubMed	<ul style="list-style-type: none"> <li>• Culture-building skills</li> <li>• Career path development</li> <li>• Entrepreneurship</li> <li>• Organizational creativity</li> </ul>
44	Results-Oriented Hospital Administration: Barriers and Perspectives of Synergies in a Public Hospital in Peru	Bonilla-Asalde et al. (75)	2020	Peru	Mixed methods	Scopus	<ul style="list-style-type: none"> <li>• Budget management</li> <li>• HRM</li> <li>• Organizational culture</li> <li>• Political context</li> <li>• Data management</li> <li>• Monitoring and control</li> </ul>
45	Knowledge Management in Health Care: An Integrative and Result-Driven Clinical Staff Management Model	de Souza et al. (76)	2020	Brazil	Qualitative	Emerald	<ul style="list-style-type: none"> <li>• Knowledge management</li> <li>• Knowledge creation</li> <li>• Decision-making process</li> <li>• IT management</li> </ul>
46	Competence Management for Improving Performance in Health Organizations: The Niguarda Hospital in Milan	Fanelli et al. (77)	2018	Italy	Quantitative	Emerald	<ul style="list-style-type: none"> <li>• Professionalism</li> <li>• Professional development</li> <li>• Professional role-play</li> <li>• Professional collaboration</li> </ul>
47	Identification and Ranking of Comprehensive Manager Selection Criteria: A Case Study in Tehran University of Medical Sciences	Dargahi & Motazedi (78)	2019	Iran	Mixed methods	Google Scholar	<ul style="list-style-type: none"> <li>• Management skills</li> <li>• Managerial tasks</li> <li>• Effective leadership</li> <li>• Management intelligence</li> <li>• Personality traits</li> </ul>

Furthermore, Dargahi et al found a significant relationship between management intelligence and effective leadership (86, 87).

Terzic-Supic et al., analyzing the types of management skills of top-level managers of hospitals in Serbia, correspondingly declared communication skills as one of the

most important management skills among hospital managers (88). Khadka et al, in a study of 51 senior hospital managers in Kathmandu, Nepal, additionally confirmed a correlation between effective leadership and management skills and comprehensive knowledge of management (63).

Table 4. Core Categories and Subcategories of Competency and Meritocracy of Hospital Managers

Core Categories	Subcategories
Effective leadership	<ul style="list-style-type: none"> <li>• Enthusiasm and motivation for leadership and management</li> <li>• High team-building skills and compassionate engagement in clinical, medical, and non-medical fields</li> <li>• Professional social responsibility and accountability</li> <li>• Active, authentic, and deep multidimensional sociopolitical attitudes</li> <li>• Cultural competency development and attention to moral and religious values</li> <li>• Involving stakeholders and society in decision-making</li> <li>• Emotional readiness and empathy alongside sobriety and honesty</li> <li>• Proactive approach</li> <li>• Ability to encourage others, get them involved, and develop and manage informal relationships</li> <li>• Leadership quality and orientation</li> <li>• Change management</li> <li>• Visions and strategic and systems thinking</li> <li>• Staff empowerment</li> <li>• Developing challenging organizational goals</li> <li>• Institutionalization of organizational norms and values</li> <li>• Foresight</li> <li>• Acceptance of new ideas</li> <li>• Protecting one's interests and those of the organization</li> </ul>
Comprehensive knowledge management	<ul style="list-style-type: none"> <li>• Specialized healthcare environment management at hospitals</li> <li>• Professionalism</li> <li>• Business management</li> <li>• Professional self-awareness</li> <li>• Legal issues and contracts</li> <li>• Partnership and business management</li> <li>• Organizational and customer-oriented development</li> <li>• Self-management</li> <li>• Resource, administrative, operational, and executive management</li> <li>• HRM, organizational behavior, and discipline</li> <li>• Crisis management</li> <li>• Time management</li> <li>• Conflict management and negotiation skills</li> <li>• Asset management</li> <li>• Learning and teaching management (learning organizations)</li> <li>• Performance management</li> <li>• Research management</li> <li>• Quality management and clinical and non-clinical auditing</li> <li>• Cultural management</li> <li>• Health marketing management</li> <li>• Stress management</li> <li>• Systems management</li> <li>• Change management</li> <li>• Reward system development</li> <li>• Financial management</li> <li>• Hospital infrastructure perception</li> <li>• Knowledge management</li> <li>• Global knowledge</li> <li>• Management of materials, equipment, and medicines</li> <li>• Innovation management</li> <li>• Risk management</li> <li>• Talent management</li> <li>• Management of accidents and unplanned events</li> <li>• Ethical knowledge and respect for patient rights</li> <li>• Public health knowledge</li> <li>• Process management</li> </ul>

Van Tuong and Thanh in a survey in Vietnam similarly reported that among 4 core categories, 14 components, and 81 subcomponents, effective leadership and management skills were vital for the administration of public hospitals in this country, and thus management training needed to be provided to prepare hospitals managers before being appointed (89). Kirkpatrick et al believed that effective leadership in executive and clinical managers of hospitals could be strengthened along with time professionalism,

representing hyperprofessionalism (90). Baker and Denis also found that improving the performance of health care organizations, including hospitals, entailed effective executive and clinical leadership and professionalism, which could result in the unity and integrity of executive and clinical managers by changing the organizational structure of hospitals (91). The results of the above studies are in line with the results of the present study.

Moreover, Dargahi et al defined professionalism in the



Table 4. Continued

Core Categories	Subcategories
Evidence	<ul style="list-style-type: none"> <li>• Evidence-based management</li> <li>• Evidence-based decision-making</li> <li>• Information and communication management</li> <li>• Evidence quality assessment and information analysis</li> <li>• Evidence-based practice</li> </ul>
Managerial tasks	<ul style="list-style-type: none"> <li>• Strategic and operational planning, prioritizing problems, and developing and implementing policies</li> <li>• Organization</li> <li>• Monitoring and control</li> <li>• Coordination</li> <li>• Review</li> <li>• Performance appraisal</li> <li>• Resource budgeting and allocation</li> </ul>
Personality traits of hospital managers	<ul style="list-style-type: none"> <li>• Analytical abilities</li> <li>• Team spirit</li> <li>• Flexibility</li> <li>• Independence</li> <li>• Creativity</li> <li>• Firmness</li> <li>• Fair-mindedness</li> <li>• Discipline</li> <li>• Internal control</li> <li>• Patience</li> <li>• Compatibility with environmental factors</li> <li>• Self-confidence</li> <li>• Risk tolerance</li> <li>• Self-esteem</li> <li>• Quick decision-making in critical situations</li> </ul>
Management intelligence	<ul style="list-style-type: none"> <li>• Mathematics</li> <li>• Emotions</li> <li>• Politics</li> <li>• Culture (multicultural intelligence)</li> <li>• Business</li> </ul>
Management skills	<ul style="list-style-type: none"> <li>• Communication (interpersonal and intrapersonal) skills</li> <li>• Perceptual and problem-solving skills</li> <li>• Cognitive skills</li> <li>• Human-related skills</li> <li>• Political skills</li> <li>• Networking</li> <li>• Technical skills</li> <li>• Critical thinking</li> </ul>



Figure 2. Final Model for Competency and Meritocracy of Hospital Managers

form of specialization, work ethics, and personal ethics, concluding that the presence of professional managers in

health care organizations could lead to organizational excellence, which was associated with effective leadership

through the components of work ethics and organizational commitment (92, 93).

Hamlin and Patel identified a relationship between effective leadership and comprehensive management knowledge if determined through behavioral and evidence-based indicators, which could help in the growth and development of hospital managers in these countries (94). In Finland, Pihlainen et al who interviewed 33 experts, found that effective management and leadership were the main components in the management of hospitals, which could transform management and leadership training among hospital managers in this country (95). Hospital executive directors were another example of a manager with operational, professional, and management expertise. While the new management structures at Kenya's hospitals were unsupportive in this regard, Nzinga et al's case study, which involved interviews with executive and clinical managers of public hospitals, revealed that these managers were not yet ready to handle managerial responsibilities. As a result, it was necessary to assist them in acquiring comprehensive management knowledge, preparing for hybrid management, and even developing effective leadership and management skills (96).

Janati et al found scientific and research-based evidence through semi-structured interviews with 45 hospital administrations. The subcategories of evidence-based management included events and related information, political-economic development programs, professionalism, stakeholder values and expectations, operational behaviors, personality traits, and environmental conditions. These subcategories could be effective tools for managers to use when making decisions (97).

Effective leadership, management, and competitive intelligence, as well as evidence-based management and decision-making, were identified by Caccia-Baya et al as essential components of hospital innovation success (98). The present study's findings align with those of the previous research.

One of the main concerns in human resources management in the 21st century is the creation of hybrid competency models in HCS. According to Cumberland et al and Khosravi et al, personality traits, comprehensive knowledge, skills, intelligence, and decision-making were the elements of such hybrid models for hospital management (99, 100).

EL ASame and Wakrim declared competency model in the field of health care organizations depends on managers' comprehensive knowledge and e-learning systems, suggesting training and education based on their specifications (101). The model designed by Chouhan and Srivastava focused on 5 types of competency modeling characteristics for health care managers—including knowledge, skills, self-concepts, traits, and motives—leading to critical behavior and good performance (102). According to the findings of the study by Giacomelli et al, clinical directors in Italy employ a hybrid competency model that combines managerialism and knowledge performance information (103). In contrast to community health care managers, the other study by Ling et al identified 6 elements for hospital chief executive officers: evidence, operations, knowledge,

communications, leadership, and change (31).

Based on the findings of this study and a comparison with previous studies, it was determined that the trait of effective leadership is what first leads to the development of a competency-meritocracy system among hospital executive managers, which is then hybridized with other elements of this model.

Additionally, a comparison of the suggested model with other models that were provided in related studies revealed that the current model was remarkably complete for choosing capable executive hospital administrators.

### Conclusion

The administration of health care facilities in the 21st century requires the creation of innovative models, especially for the selection of executive managers based on competency and meritocracy system, as this scoping review found that the construction, organization, and smartization of new hospitals have undergone significant changes.

Therefore, the use of these updated criteria was proposed here based on thematic analysis within 5 core categories and 85 subcategories, which led to the creation of a hybrid competency-meritocracy model for the selection of hospital executive managers in the new century. The management of successful hospitals in terms of delivering high-quality and effective health care services cannot be accomplished separately, thus, this hybrid model should integrate all clinical and executive hospital management levels to accomplish the intended results within a single framework by collaborating.

### Authors' Contributions

H.D., M.H.K., and M.K. performed study design, data collection, data interpretation, analyses, and manuscript writing. All authors read and approved the final manuscript.

### Ethical Considerations

This scoping review was part of a Master's thesis in Healthcare Management fulfilled at the School of Public Health, Tehran University of Medical Sciences, Tehran, Iran, with the ethics code: IR.TUMS.SPH.REC.1399.291, supported by the Vice-Chancellor for Research and Technology of Tehran University of Medical Sciences. All authors demonstrate that they have adhered to the accepted ethical standards of a genuine research study and that all study is conducted with integrity, fidelity, and honesty.

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### Conflict of Interests

The authors declare that they have no competing interests.

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