

Developing a leadership competency model for Chinese oncologists using the Delphi method

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ABSTRACT

Background Leadership has become an essential component of medical professionalism; yet, China lacks leadership competency models grounded in physicians' clinical realities. This study aimed to develop a context-specific leadership competency model for Chinese oncologists, aligning international frameworks with local healthcare priorities.

Methods A three-round modified Delphi study was conducted between June and October 2024. The process began with a preliminary model comprising 6 domains and 30 competency items, derived from a scoping review and the National Health Service Medical Leadership Competency Framework. 40 oncology-related experts evaluated both the six proposed domains and the 30 competency items in round 1 using 9-point Likert scales and open-ended feedback. In round 2, experts screened the suggestions from round 1 through binary (yes/no) evaluations. The resulting refined list was subjected to a final rating in round 3, again using 9-point Likert scales to establish consensus. Quantitative data (mean scores, SD, percentage agreement) and thematic analysis of qualitative feedback were used to iteratively refine the model across rounds.

Results Experts reached consensus on a final leadership competency model comprising 6 domains and 40 specific competencies. The highest-rated competencies included integrity, continuous personal development, healthcare quality management, learn and apply new technologies and ensure patient safety. New competencies, not present in the initial model, also emerged—such as clear expression, empathy, influence on the public, familiarity with end-of-life care, health economics evaluation and vision building—capturing the evolving expectations of oncologists as communicators, collaborators and system improvers in a rapidly changing healthcare environment.

Conclusions The resulting competency model reflects the multidimensional nature of oncologist leadership, encompassing professionalism, teamwork, service improvement and social responsibility. It offers a practical framework for leadership development and assessment in oncology and provides methodological guidance for building physician leadership competency models in other medical fields.

INTRODUCTION

Leadership has become an essential component of modern medical practice. Regardless of whether physicians hold formal managerial positions, they are increasingly required to demonstrate leadership in clinical decision-making, multidisciplinary collaboration, communication and quality improvement.^{1,2} This form of leadership—often referred to as medical leadership or clinical

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Physician leadership has become increasingly recognised as essential to healthcare quality, safety and innovation. Existing leadership competency models such as the National Health Service Medical Leadership Competency Framework and Canadian Medical Education Directives for Specialists provide valuable international references but have been developed primarily in Western contexts. China's healthcare system has undergone major reforms prioritising public service and multidisciplinary collaboration; yet, no physician-specific leadership competency model has been systematically established that reflects this context.

WHAT THIS STUDY ADDS

⇒ This study developed the first leadership competency model tailored for Chinese oncologists through a three-round modified Delphi process involving 40 multidisciplinary experts. The final model comprises six domains and 40 competencies that reflect both universal leadership attributes and China's contextual priorities in oncology, such as patient safety, empathy, communication, healthcare quality management and health economics evaluation. The findings reveal that oncologist leadership in China is embedded in clinical practice, characterised by professionalism, teamwork, continuous improvement and social responsibility.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The model provides a structured foundation for designing leadership training, assessment and career development programmes for oncologists and other physicians in China. The methodological approach demonstrates a replicable pathway for constructing specialty-specific physician leadership models in other contexts. By articulating leadership as a clinical competency, the study supports ongoing health reforms in China that emphasise quality, efficiency and patient-centred care, bridging leadership development with system-level improvement.

leadership—emphasises the ability of physicians to influence care delivery, inspire teams and drive service improvement without relying on formal administrative authority.^{3,4} Effective medical



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leadership enhances patient outcomes, strengthens team performance and supports organisational learning across healthcare systems.^{5–7}

Medical leadership competency models provide structured guidance for developing these capabilities. They identify the knowledge, skills and behaviours required for physicians to lead effectively within clinical teams and organisational settings.^{8–10} Such frameworks have been used internationally to inform leadership education and professional development. Notable examples include the National Health Service (NHS) Medical Leadership Competency Framework (MLCF), Canadian Medical Education Directives for Specialists and the NHS Healthcare Leadership Model.^{11–13}

In China, while the importance of physician leadership has been increasingly acknowledged in recent years,^{14 15} systematic frameworks or structured leadership training programmes remain scarce. Leadership is often discussed implicitly within professional ethics or management development, rather than conceptualised as a distinct physician competency. Consequently, physicians have limited opportunities to understand, assess or enhance their leadership capacity in practice.

Although international frameworks provide valuable references, there are constraints to directly applying them in China's healthcare system. Differences in hospital governance, professional hierarchy and team culture influence how leadership is enacted in practice. Such contextual factors shape how physicians exercise influence, share decision-making and engage in collaborative leadership within healthcare organisations.^{1 2 16 17} Therefore, there is a need to establish a contextually adapted leadership competency model that aligns with China's healthcare reform priorities and public service orientation.^{18 19}

Given the limited empirical research in this area, the present study focuses on oncology as a starting point for model development. Oncology is a suitable discipline for such exploration because it embodies multidisciplinary collaboration and shared decision-making as central aspects to care delivery.^{20–24} Moreover, as cancer represents a leading cause of morbidity and mortality in China,²⁵ strengthening oncologists' leadership capabilities has both clinical and public health significance.

Building on existing research and widely adopted model development methodologies, this study employed a three-round modified Delphi method to identify and refine leadership competencies for Chinese oncologists. This study specifically targeted clinical leadership, focusing on leadership competencies relevant to oncologists' everyday practice. The Delphi technique was chosen to synthesise expert consensus through iterative rounds of feedback while integrating both global frameworks and local healthcare perspectives.²⁶ The ultimate goal was to construct a context-specific leadership competency model for oncologists and provide a methodological reference for future studies developing physician leadership frameworks in China.

METHODS

Study design

We used the modified Delphi method to develop a consensus on the medical leadership competencies needed for Chinese oncologists by gathering data from relevant experts in China through multiple rounds of survey responses. Three iterative Delphi rounds were conducted between June and October 2024. Questionnaires were designed using Survey Star (问卷星), a widely used online platform in China, and distributed to participants via WeChat (微信). Questionnaires and results were translated into

Chinese and back-translated into English by bilingual researchers to ensure conceptual and linguistic equivalence.

Participant selection

A total of 59 experts were invited using a combination of purposive and snowball sampling to ensure representation across relevant professions. Experts were drawn from three groups: (1) oncologists in diverse career stages; (2) healthcare managers familiar with oncology service operations and (3) researchers specialising in healthcare leadership from universities, government institutes, industry and the media.

Participants were recruited based on the following inclusion criteria: (1) working in mainland China; (2) belonging to one of the three professional groups. An invitation and screening questionnaire, which described the study purpose and procedures, was sent to potential experts. Only those who confirmed willingness to participate were invited to complete the round 1 Delphi questionnaire.

To ensure methodological rigour, an expert authority coefficient was calculated to evaluate the representativeness and reliability of the panel. Three dimensions were considered: familiarity with the research content, influence of judgement criteria (theoretical knowledge, experience, intuition) and confidence in judgement. Each dimension was rated on a 5-point scale by the participants. The overall coefficient was obtained by averaging these three dimensions, with higher values indicating the stronger authority and greater credibility of expert opinions.

Item development

A preceding scoping review of medical leadership competency models for physicians²⁷ informed the development of the preliminary model for the round 1 Delphi questionnaire (see online supplemental appendix 1), which comprised 6 domains and 30 competency items. The review systematically analysed 16 generalised frameworks and 13 context-specific studies, identifying the most frequently cited leadership competency models and the emerging competencies across global contexts.

The MLCF¹¹ was chosen as the structural foundation because it is one of the most extensively validated and internationally adopted frameworks, linking clinical professionalism with leadership behaviours across healthcare contexts. The MLCF's five-domain structure aligns with both the UK and Chinese public healthcare systems, making it an appropriate starting point for contextual adaptation to Chinese oncology.

Building on the MLCF framework, we incorporated emerging competencies identified in the scoping review—such as cultural sensitivity, crisis management, business acumen and digital literacy—to ensure relevance to contemporary oncology practice. The resulting 6 domains and 30 competencies thus represented a synthesis of established international evidence and recent developments in physician leadership research.

Delphi surveys

The Delphi study consisted of three rounds, each designed to refine and validate the leadership competency model for Chinese oncologists (figure 1). Data from each round were analysed to determine consensus levels, incorporating both quantitative ratings and qualitative feedback.

Round 1: Experts rated the importance of each domain and competency item in the preliminary model, using a 9-point Likert scale (1–3=low, 4–6=moderate, 7–9=high importance). Consensus for each item was defined as $\geq 75\%$ of experts rating between 7 and 9, indicating high importance. Descriptive statistics

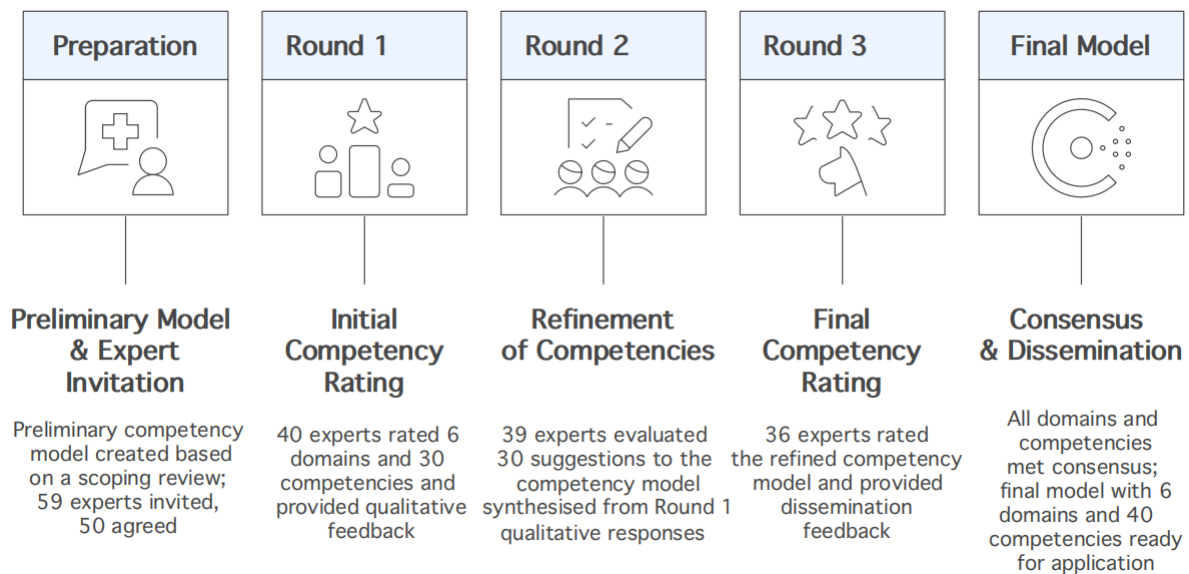


Figure 1 Delphi survey flow chart.

(mean and SD) were calculated for each item to assess central tendency and dispersion. Open-ended responses were analysed using an inductive thematic approach to identify suggestions for adding, merging or refining competency statements. The first author conducted the initial coding and categorisation, which was reviewed collaboratively by the coauthors. These findings informed the construction of the round 2 questionnaire.

Round 2: Based on the round 1 results and qualitative feedback, modifications were summarised and presented for expert validation. To facilitate clear decisions, each suggested change was evaluated using a binary (Yes/No) response format. Suggestions with $\geq 70\%$ affirmative responses agreement in round 2 were adopted to update the original model. The updated domain and competency set was then used as the basis for round 3 evaluation.

Round 3: In the third round, the refined domains and competencies were re-evaluated using the same 9-point Likert scale and consensus criterion ($\geq 75\%$ of experts rating 7–9). Final items meeting the consensus threshold were retained in the leadership competency model.

RESULTS

Summary of the Delphi process

Of the 59 experts contacted, 50 responded, and 47 were deemed eligible after the brief invitation and screening questionnaire. (Three were excluded because they did not provide contact information). The final Delphi panel consisted of 40 experts who completed the first round, with seven excluded because they did not respond to the first round survey after two reminders. Panel participation rates remained high with 97.5% (39 experts) and 92.3% (36 experts) completing the second and third rounds, respectively (with 1 and 3 experts failing to respond to the round 2 and round 3 surveys, respectively, after two reminders). Overall, 90% of the original panel completed all three rounds, indicating strong expert engagement and panel stability.

The panel was diverse in terms of geographic distribution, professional experience, age and professional background. As shown in figure 2, most participants were male (67.5%), aged between 41–50 years (37.5%), and held associate senior or senior professional titles (77.5%). The majority worked in public

hospitals (72.5%). Detailed information is provided in online supplemental appendix 2.

The resulting overall authority coefficient was $Cr=4.16$, indicating a high level of expertise and authority among the participating experts, confirming the reliability of the Delphi panel. Detailed information on the calculation of the authority coefficient is provided in online supplemental appendix 3.

Round 1 results

Quantitative findings

In the first round, 6 domains and 30 competency items were evaluated by the expert panel. Using the predefined consensus threshold of $\geq 75\%$ of experts rating each item between 7 and 9 on the importance scale, consensus was achieved for nearly all domains and competencies. The only domain that did not meet the threshold was business skills, although all of its competency subitems were rated as ‘high importance’. This pattern suggested that while the underlying competencies were valued, the domain label itself required conceptual refinement (see online supplemental appendix 4 for more detail on the item scores).

The mean scores of all items ranged from 6.95 to 8.65 (out of 9), with most items scoring above 8. The highest-rated competency, integrity (mean=8.65, SD=0.57), exhibited minimal variability, reflecting strong consensus among experts. By contrast, the domain of business skills showed the lowest mean score (6.95) and the highest variability (SD=1.64), indicating divergent interpretations among experts.

Qualitative findings

The open-ended section of the round 1 questionnaire yielded 280 text responses from 40 experts, of which 88 contained substantive content beyond general remarks (eg, ‘appropriate’, ‘good’ or ‘no opinion’). These were further consolidated into 115 independent statements, which were synthesised into 30 actionable suggestions and then refined into 19 targeted questions for the round 2 survey.

The qualitative feedback underscored business skills as the most debated domain, with 13 distinct comments. Several experts questioned the suitability of the term ‘business’ in the context of China’s predominantly public healthcare system, describing it

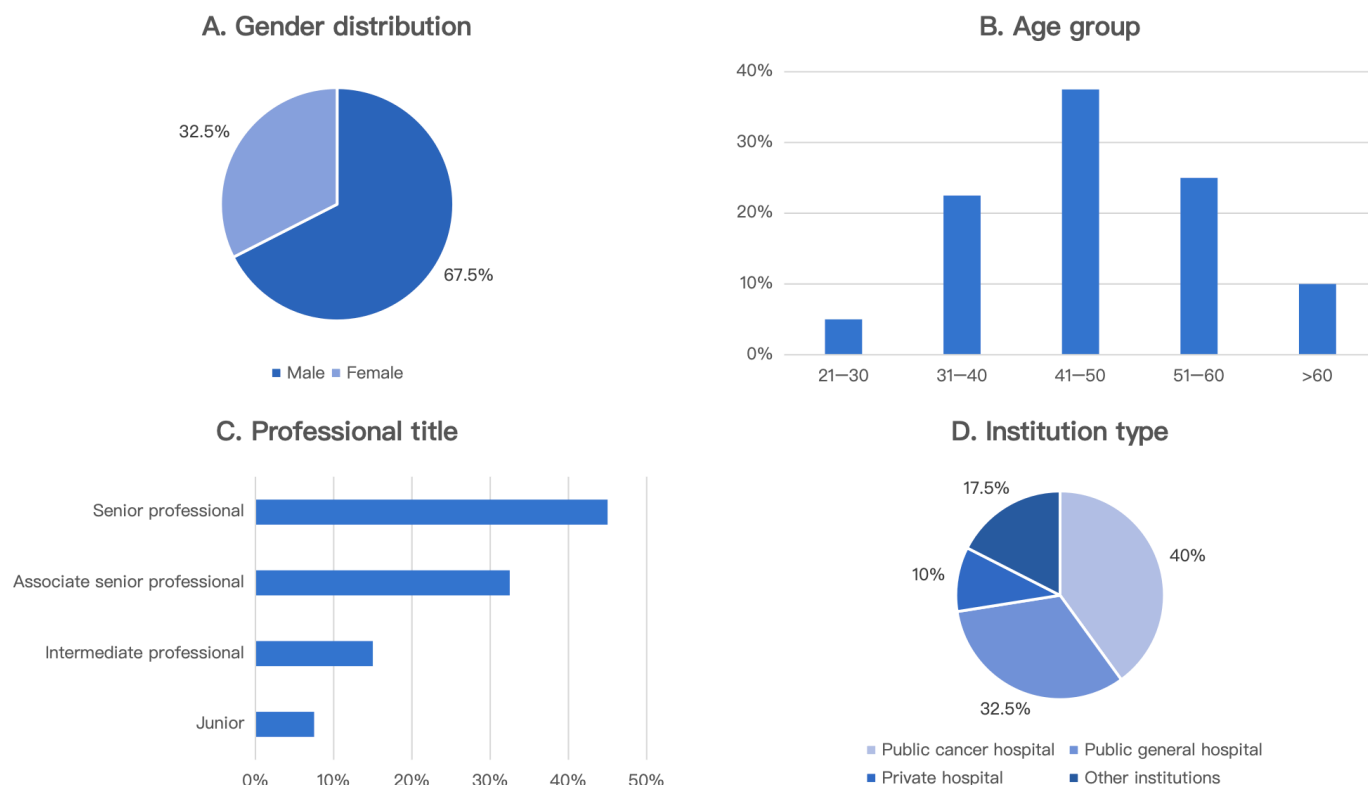


Figure 2 Characteristics of the Delphi expert panel (n=40).

as ‘emotionally off-putting’ or ‘misleading’. Suggested alternatives included ‘operational management skills’ or ‘understanding the operational characteristics of public medical institutions’. Conversely, other experts emphasised that Chinese physicians urgently need stronger management literacy, noting that ‘doctors lack management knowledge and should strengthen learning in this area’. Together, these contrasting perspectives indicated that this domain required clearer conceptual framing in the following rounds.

Round 2 results

The round 2 survey consisted of 19 targeted questions derived from 30 actionable suggestions generated in round 1. Results indicated strong consensus on most of the proposed modifications (23 out of 30 suggestions, see online supplemental appendix 5). These included 5 competency name changes, 10 additions of new subcompetencies, 7 definition revisions and 1 position adjustment.

A particularly strong consensus was reached regarding the redefinition of the domain ‘business skills’ as ‘operational management skills’, supported by 37 of 39 experts (94.9%). This change reflected experts’ preference for terminology that better aligns with the context of China’s public healthcare system.

Seven proposed revisions did not reach the 70% agreement threshold and were therefore excluded from the model. These included five suggestions to add competencies related to positive thinking, upward management, personal image shaping, transformation of scientific and technological achievements and coping with complex environments. Additionally, two suggested wording changes were not adopted due to limited agreement.

Round 3 results

The third round of the Delphi study confirmed a strong and stable consensus among experts regarding the refined leadership

competency model developed in round 2. All items met or exceeded the predefined 75% agreement threshold, with every domain and competency rated as highly important (scores of 7–9 on a 9-point scale), marking the completion of the Delphi process (see online supplemental appendix 4).

The mean scores across domains and competencies ranged from 7.47 to 8.75, with the majority exceeding 8.00. Three competencies—integrity (8.75), continuous personal development (8.53) and healthcare quality management (8.53)—achieved the highest levels of consensus, reflecting their perceived centrality to oncologist leadership. By contrast, the domain of operational management skills received the lowest average rating (7.47) and showed the greatest variability among experts (SD=1.3). However, these ratings reflected an improvement in both the average (higher mean rating) and variability (lower SD) of this domain relative to round 1. Overall, SD across all items ranged from 0.55 to 1.3, indicating a high degree of convergence in expert judgement.

Final competency model

The final leadership competency model tailored for Chinese oncologists comprises 6 domains (figure 3) and 40 competencies (table 1). The model integrates both competencies adapted from the NHS MLCF and newly developed competencies emerging from expert consensus across rounds.

A comparison of mean scores between these two groups of competencies revealed only a slight difference—8.15 for competencies originating from the MLCF and 8.02 for those newly developed—indicating that both were valued as highly important by the expert panel. This alignment suggests that the adapted and newly proposed competencies together form a coherent and contextually relevant leadership framework for oncologists in China’s healthcare system.

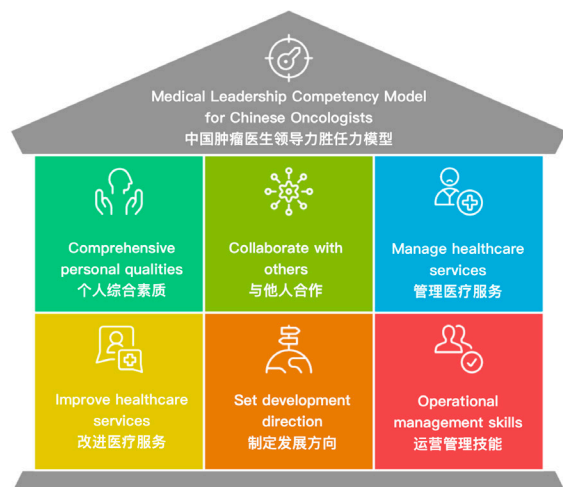


Figure 3 Conceptual framework of the leadership competency model for Chinese oncologists.

DISCUSSION

This Delphi study involved the development of a stable, 6-domain, 40-competency leadership model for Chinese oncologists, representing a consensus among multidisciplinary experts on the leadership qualities required in oncology practice. The model demonstrates that leadership is an integral dimension of oncologists' professional competence, expressed through communication, collaboration, service improvement and ethical practice.

Leadership priorities in oncology practice

The highest-rated competencies across all three Delphi rounds—integrity (1.4), continuous personal development (1.3), healthcare quality management (3.4), learn and apply new technologies (4.5), ensure patient safety (4.1), self-awareness (1.1), clear expression (1.5), active communication (2.5), teamwork (2.4) and project management (6.2)—highlight the multidimensional nature of leadership in oncology. Experts consistently emphasised that effective leadership begins with strong personal and interpersonal foundations. The high consensus on integrity and self-awareness underscores the importance of moral responsibility and reflective practice in clinical decision-making. Similarly, continuous personal development and project management reflect the need for lifelong learning and organisational competence in leading multidisciplinary initiatives.

Beyond individual professionalism, experts prioritised system-oriented and safety-oriented competencies. Healthcare quality management, ensuring patient safety, and learning and applying new technologies represent a collective awareness that oncologist leadership must balance clinical excellence with innovation and risk control. The inclusion of teamwork, active communication and clear expression further demonstrates a shared belief that leadership is enacted through effective collaboration and transparent communication within and across teams. Together, these findings indicate that Chinese oncologists view leadership not as formal authority but as the ability to influence, coordinate and improve care processes within complex clinical systems.

Emerging competencies in a changing healthcare context

In addition to confirming the importance of traditional leadership qualities, experts identified ten newly developed or refined competencies that reflect evolving expectations for oncologists

in a transforming healthcare environment. These include clear expression (1.5), empathy (1.6), influence the public (2.6), healthcare quality management (3.4), familiarity with end-of-life care (4.6), health economics evaluation (4.7), vision building (5.2), strategic thinking (5.3), international perspective (5.8) and risk management (6.4).

Collectively, these additions illustrate how oncologist leadership in China is expanding to encompass communication, social responsibility and system-level awareness. The inclusion of empathy and clear expression reflects increasing recognition of the emotional and communicative demands of oncology practice. Influence on the public signifies a new dimension of advocacy—emphasising oncologists' role in shaping public understanding of cancer prevention, treatment and policy. Similarly, vision building, strategic thinking and international perspective highlight the need for strategic and globally informed leadership amid rapid scientific and technological change.

Experts also underscored the growing importance of health economics evaluation and familiarity with end-of-life care, suggesting that effective leadership now involves not only clinical decision-making but also resource stewardship and compassion in patient care. Risk management represents an emerging competency that bridges operational safety with organisational accountability. Together, these competencies extend the scope of medical leadership from individual expertise to collective influence, aligning oncologist leadership with the broader goals of innovation, sustainability and humane care in China's evolving healthcare system.

Operational management as a contextual competency

Although the domain of operational management skills (6) received relatively lower ratings, experts' qualitative feedback emphasised its practical importance in daily oncology work. Many oncologists in China take on implicit management responsibilities—such as coordinating multidisciplinary teams, managing patient pathways and optimising resource use—without holding formal administrative titles. The need to rename this domain from business skills to operational management skills was emphasised by nearly all experts, reflecting a shift toward terminology consistent with the mission of public healthcare institutions. This adjustment illustrates how the Chinese healthcare context shapes the conceptualisation of leadership, balancing clinical commitment with operational accountability.

Practical implications

The resulting competency model offers a structured framework to guide leadership development among oncologists. It can inform the design of medical curricula, continuing professional education and leadership assessment tools tailored to China's healthcare reform goals. Beyond oncology, the methodological process—combining evidence synthesis, cross-cultural adaptation and expert consensus—provides a transferable model for developing leadership frameworks in other medical specialties.

Strengths, limitations and future directions

A key strength of this study lies in its systematic integration of an established international framework with locally derived expert consensus. The Delphi approach enabled a systematic, iterative refinement of competencies, ensuring both conceptual relevance and contextual specificity. However, several limitations should be acknowledged.

Original research

Table 1 Final domains and competencies

Domains/competency	Definition	Mean	Ranking
1. Comprehensive personal qualities	Rely on one's inherent values, strengths and abilities to provide high standards of medical care.	8.33	
1.1 Self-awareness	Understand one's own values, principles and positions and be able to learn from experience.	8.33	6
1.2 Self-management	Organise and manage oneself effectively while taking into account the needs of others.	8.22	11
1.3 Continuous personal development	Engage in lifelong learning, persistent improvement of clinical professional skills and constant tracking of the latest developments.	8.53	2
1.4 Integrity	Act in an open, honest and ethical manner.	8.75	1
1.5 Clear expression	Be able to convey thoughts, feelings and information clearly and effectively, either orally or in writing.	8.33	7
1.6 Empathy	Be able to understand and empathise with other people's feelings.	8.14	14
1.7 Manage stress	Be able to manage stress appropriately.	7.94	30
2. Collaborate with others	Deliver and improve services by working with others in teams and networks.	8.14	
2.1 Build a network	Collaborate with patients, staff, clients and their representatives, and colleagues within and outside the system to deliver and improve services.	8.17	13
2.2 Build and maintain relationships	Listen, support others, earn trust and be empathetic.	8.14	15
2.3 Encourage contribution	Create an environment where others have the opportunity to contribute and where the team improves together.	8.11	17
2.4 Teamwork	Work in a team to deliver and improve services.	8.31	9
2.5 Active communication	Actively communicate interpersonally, intradepartmentally and across departments with various stakeholders, including patients and colleagues.	8.33	8
2.6 Influence the public	Pay attention to public health and quality of life through medical activities.	7.78	38
3. Manage healthcare services	Efficiently manage medical services to ensure the high quality and continuous improvement of healthcare services.	7.97	
3.1 Planning	Proactively develop and execute plans to achieve service goals.	8.11	18
3.2 Resource management	Understand available resources and use influence to ensure they are used efficiently and safely and reflect diverse needs.	8.08	21
3.3 Personnel management	Provide direction, evaluate performance, motivate others, and promote equality and diversity.	8.14	16
3.4 Healthcare quality management	Focus on quality control and management processes in the healthcare service process.	8.53	3
3.5 Performance management	Hold yourself and others accountable for service results.	8	26
3.6 Medical insurance management	Have a good understanding of the medical insurance system and insurance policies and be able to apply them in practical work.	7.78	39
4. Improve healthcare services	Provide high-quality healthcare services and promote service improvements that can truly enhance people's health.	8.17	
4.1 Ensure patient safety	Assess and manage patient risks associated with healthcare services, balancing economic concerns with patient safety needs.	8.36	5
4.2 Critical evaluation	Possess analytical and conceptual thinking to identify opportunities for service improvement.	7.97	28
4.3 Encourage improvement and innovation	Create an atmosphere of continuous service improvement and encourage improvement and innovation of service models.	8.11	19
4.4 Drive change	Actively participate in the change process to promote improvements in healthcare services.	7.97	29
4.5 Learn and apply new technologies	Be open to new technologies and be able to learn and apply them.	8.39	4
4.6 Familiarity with end-of-life care	Have a deep understanding of compassionate care, palliative care, hospice care and death education to support the needs of terminally ill patients and their families.	7.83	36
4.7 Health economics evaluation	Focus on the effective benefits of patients' quality of life and the affordability of medical insurance funds.	7.86	35
4.8 Advocate for patients	Provide services to patients and their support persons to help them navigate the complexities of healthcare.	7.81	37
5. Set development direction	Set goals, respond to change and contribute to the organisation's strategy and vision.	7.92	
5.1 Identify the context of change	Identify the context of change and be aware of the range of factors involved.	7.92	33
5.2 Vision building	Set clear and inspiring goals.	8.06	22
5.3 Strategic thinking	Strategically analyse current status, assess available resources and plan a path to achieve long-term goals.	8.03	25
5.4 Apply knowledge and evidence	Gather information and make evidence-based recommendations for improvements to service systems and processes.	7.89	34
5.5 Decision-making	Conduct thorough research, listen to opinions from all parties and make good decisions.	8.11	20
5.6 Assess impact	Measure and evaluate results, take corrective action when necessary and be accountable for decisions.	8.06	23
5.7 Policy adaptability	Monitor and adapt to changes in healthcare policies and regulations.	8	27
5.8 International perspective	Have an international perspective and actively integrate with international tumour diagnosis and treatment services.	7.94	31
6. Operational management skills	Be able to apply relevant skills in the areas of operations and management.	7.47	
6.1 Financial management	Understand the healthcare industry from a financial perspective, manage budgets and advocate for cost-effective patient treatments.	7.72	40
6.2 Project management	Manage a clinical or scientific research project and lead the team to achieve project goals under given conditions.	8.25	10
6.3 Conflict management	Find creative and respectful ways to manage disagreements and disputes.	7.94	32
6.4 Risk management	Identify, assess and mitigate potential risks in healthcare procedures to protect patients and healthcare facilities.	8.19	12
6.5 Crisis response	Manage crisis events in a manner that minimises damage and enables rapid recovery of the organisation.	8.06	24

Although bilingual translation and expert review were conducted, subtle semantic nuances may persist due to the translation and back-translation process. Because the initial items were derived from a Western framework, their meaning may have shifted during cultural adaptation. Future studies could employ a classical Delphi approach—beginning with open-ended expert interviews or focus groups—to generate competencies entirely from within the local context.

Finally, while this study focused on oncology as a pilot field, its process demonstrates a replicable pathway for developing physician leadership models suited to China's evolving healthcare landscape. The high level of consensus achieved across all three rounds supports the methodological robustness of this study and provides a credible foundation for leadership development, training and evaluation; clinical practice; and healthcare improvement in China.

CONCLUSIONS

This study developed a leadership competency model for Chinese oncologists through a three-round modified Delphi process. The final model comprises 6 domains and 40 competencies that together define the multidimensional nature of oncologist leadership in China's evolving healthcare system.

The highest-rated competencies—such as integrity, continuous personal development, healthcare quality management and communication—reflect a strong consensus that leadership is an integral part of oncologists' clinical practice, encompassing professionalism, collaboration and continuous improvement. The inclusion of new competencies such as empathy, influence on the public, end-of-life care and health economics evaluation highlights the expanding scope of oncologist leadership in addressing complex clinical, ethical and societal challenges.

The model not only provides a structured foundation for leadership development and assessment in oncology but also demonstrates a methodological pathway for constructing physician leadership models in other specialties. Future studies could further enhance cultural contextualisation by employing classical Delphi techniques and exploring the implementation and impact of leadership training in clinical settings.

Contributors All authors (LD, SF, JJ and CGM) contributed substantially to this work. All authors were actively involved in the design, execution and iterative refinement of the Delphi study, as well as the drafting, critical revision and final approval of the manuscript. Specific contributions are detailed below. LD, SF and JJ led the conceptualisation and design of the research, developed each round of the Delphi questionnaire and performed data analysis across all iterations. CGM provided critical intellectual input during the study design phase, contributed to refining the questionnaire structure and content for each Delphi round, and participated in interpreting interim results to guide subsequent iterations. LD and JJ additionally coordinated the dissemination, follow-up and collection of questionnaires to ensure high response rates. LD drafted the initial manuscript. SF provided structured guidance and revisions to enhance methodological clarity and theoretical coherence. CGM and JJ contributed to subsequent revisions by refining arguments, validating interpretations and ensuring alignment with empirical findings. All authors collaboratively engaged in synthesising results, finalising the manuscript and approving the published version. LD acted as guarantor. Since English is not LD's first language, certain sentences of the manuscript were polished using ChatGPT 4, an AI language model, to enhance the clarity and fluency of the text. Specific sentences polished using AI are not distinctly identifiable due to multiple revisions. The authors maintained oversight and control over the final content to ensure its accuracy and integrity.

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Patient consent for publication Not applicable.

Ethics approval According to the IRB Determination Notice of Johns Hopkins Bloomberg School of Public Health sent on 21 September 2023 (FWA #00000287), this study 'does not qualify as human subjects research as defined by DHHS regulations 45 CFR 46.102, and therefore does not require IRB oversight'. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information. The data that support the findings of this study are available from the corresponding author on reasonable request. Study participants did not agree for their data to be shared publicly, and as such, anonymised data can only be made available with appropriate ethical approvals and agreements. Any request for data must align with the terms of use as approved by the ethics committee and must be used for research purposes only.

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