Establishing Research Priorities in a Tertiary Care Hospital: A Data-Driven and Stakeholder-Informed Approach

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Abstract

Objective: Setting research priorities is essential for optimizing healthcare resource allocation and addressing critical health challenges. This study aimed to identify data-driven clinical and health service research priorities for the Royal Hospital, a tertiary care facility in Muscat, Oman. ***Methods:*** A multi-step approach combined retrospective electronic health record (EHR) analysis with structured and unstructured stakeholder consultations. Findings were validated using the Delphi method through online surveys and face-to-face discussions with ten key hospital decision-makers. ***Results:*** Analysis of EHR data from 652,567 inpatient admissions over 10 years identified pregnancy-related conditions (25%) as the leading cause of hospitalization, followed by atherosclerotic heart disease (10.4%) and cancers (8.6%), with breast and colon cancer being the most prevalent. Septicemia, pneumonia, and myocardial infarction were the leading causes of death. Stakeholder consultations highlighted patient-centered care, telemedicine, operational efficiency, and artificial intelligence (AI)-driven diagnostics as key health service research priorities. Delphi validation confirmed high relevance (scoring 4–5 on a 5-point scale), although feasibility concerns were noted, particularly regarding resource allocation and information technology (IT) infrastructure. ***Conclusion:*** This study established research priorities for the Royal Hospital by integrating clinical data analysis with stakeholder engagement to align research efforts with Oman's Health Vision 2050. Effective implementation will require a hospital-wide research steering committee to oversee execution, integrate research themes into funding strategies, and enhance data-driven decision-making through AI and EHR dashboards. Sustaining momentum necessitates annual reviews with leadership, cross-department collaboration, and capacity-building programs. For long-term sustainability, dedicated hospital funding and public-private partnerships should be explored.

Keywords: Computer-Assisted Decision Making; Health Services ; Research Priorities; Resource Allocation; Stakeholder Engagement; Tertiary Healthcare.

Introduction

Setting research priorities is critical for ensuring that healthcare resources are allocated efficiently to areas with the most significant potential to improve health outcomes. The growing complexity of healthcare challenges and constraints to research funding necessitates a structured approach to prioritize research. Systematic methods emphasize evidence-based criteria, transparency, and active stakeholder engagement to ensure research aligns with health system needs.[1–3] Key criteria—such as disease burden, potential health impact, and feasibility—help guide research toward areas with the greatest benefit.[4]

Despite these metrics, no universally accepted method for setting research priorities exists. The absence of standardization has led to inconsistent processes, often relying on subjective judgment, which may fail to address key health system needs adequately. Additionally, the limited integration of real-world data, such as electronic health records (EHR), into research prioritization frameworks reduces the applicability of findings to actual clinical and operational challenges.[5] Empirical studies suggest that context-specific adaptations and flexible, responsive approaches are necessary to address these limitations.[2] Effective stakeholder engagement—involving patients, healthcare providers, policymakers, and researchers—is also a critical factor for success.[3]

A further challenge lies in the disconnect between academic research agendas and the priorities of healthcare service institutions. While medical research often focuses on theoretical inquiries and academic impact, healthcare service institutions prioritize practical applications to patient care and system performance.[6] This misalignment can result in research that lacks direct relevance to real-world practice, creating a gap between knowledge generation and implementation. Bridging this gap requires aligning research agendas with healthcare providers' needs, ensuring that research is both innovative and directly relevant to improving healthcare outcomes and operational efficiency.

Globally, research agendas are developed to enhance healthcare delivery and address systemic inefficiencies. High-income countries prioritize health systems research to improve equitable and effective resource allocation.[7] In the Middle East, efforts focus on addressing region-specific challenges such as non-communicable diseases (NCDs), health system performance, and population health.[8] In Oman, research prioritization aims to maximize impact by directing funding toward strategically significant areas, considering factors such as disease burden, population-specific health needs, and societal impact.[9,10] The country's Health Vision 2050 for Health Research seeks to position Oman as a regional leader by setting clear priorities, strengthening research capacity, producing high-quality research, and translating findings into policy.[11]

This study aims to bridge the gap between academic research and healthcare service priorities by identifying clinical and health service research priorities for the Royal Hospital, a tertiary care facility in Muscat, Oman. This novel approach integrates real-world EHR data with stakeholder engagement, balancing immediate clinical needs with strategic health system objectives. This approach provides a roadmap for research funding and initiatives that support patients, clinicians, and policymakers, contributing to a more efficient and equitable healthcare system.

Methods

This study was conducted at the Royal Hospital, a leading referral center in Oman operating independently under the Ministry of Health. The hospital offers a comprehensive range of services, including internal medicine, pediatrics, surgery, and obstetrics and gynecology, as well as specialized centers for genetics, oncology, cardiology, endocrinology, diabetes, and hyperbaric medicine. It is equipped with advanced diagnostic and therapeutic technologies, three intensive care units, and three emergency departments (adult, pediatric, and obstetric/gynecological). Paramedical services, such as physiotherapy and nutrition, are also provided.

A multi-step approach was used to establish a comprehensive list of research priorities at the Royal Hospital, integrating retrospective EHR analysis with stakeholder consultations. This method combined historical data and expert input to ensure robust, data-driven outcomes.

Inpatient EHR data from 2013 to 2023 were extracted and analyzed to identify clinical priorities based on diagnostic trends and mortality outcomes. The dataset included diagnostic information and discharge outcomes. Data cleaning involved removing duplicates and outliers to ensure accuracy. The analysis highlighted emerging health issues and areas of increasing demand, forming a preliminary list of potential clinical research priorities.

Leading causes of hospitalization were grouped using primary International Classification of Diseases, 10th Revision (ICD-10) category codes, to calculate the percentage representation of each category, with those accounting for less than 2% grouped under 'Others'. The most prevalent ICD-10 codes within each category were also identified, along with their respective percentages, to determine the five most common specific diagnoses each year. Mortality trends were examined by identifying the most frequent diagnoses associated with death. Data were initially received in an Excel spreadsheet before being transferred to the R program for analysis.

Findings from the EHR analysis were validated through discussions with 10 key stakeholders, including members of the quality department and the hospital's strategy committee. They were selected for their knowledge of system challenges and their roles in quality improvement, strategic planning, research, and operational oversight. Semi-structured interviews ensured alignment between identified priorities and day-to-day clinical challenges. All departments reviewed the EHR findings to verify consistency with other hospital data sources. In addition, the clinical priorities were presented to the hospital's director general and deputies to ensure congruity at all organizational levels.

To determine health system priorities, key domains were developed by integrating the hospital's strategic goals, the health system's building blocks, and the Institute of Medicine's 1995 framework, ensuring relevance at the hospital's operational level.[12,13] These domains were introduced during a seminar with department directors and hospital administrators, with practical examples provided for clarity. Directors then facilitated brainstorming sessions within their departments, engaging researchers and decision-makers to identify specific research needs. A structured template, validated through expert review, was used to systematically collect input during this process.

Subsequently, individual unstructured interviews were conducted with hospital's quality director and strategy committee chairperson to refine and expand the identified priorities. This iterative process ensured that research priorities reflected both immediate clinical challenges and broader mortality and morbidity trends. The final list of priorities was reviewed by department directors for confirmation and resolution of any remaining concerns.

A two-round Delphi method was employed to refine and validate the research priorities, involving 10 key decision-makers and subject matter experts. Participants included three senior researchers, the hospital's strategy chairperson, the heads of the quality department and performance improvement unit, the hospital's director general and deputies, and two experts from the Ministry of Health specializing in healthcare policy, clinical practice, and operational management.

The list of the main ICD categories, along with the top three conditions under each, as well as a compiled list of 30 health service priorities during the first round of the Delphi process, is shared.

In the first round, participants completed an online survey in which they rated each preliminary research priority on a 5-point Likert scale ranging from 1 (irrelevant) to 5 (highly relevant). They also provided open-ended feedback on feasibility, completeness, prioritization, and overall alignment (see Appendix). To ensure content validity, the questionnaire underwent expert review.

In the second round, a revised list incorporating feedback from the first round was shared with participants for re-evaluation. Consensus was defined as ≥80% agreement on a rating of 4 or 5. Any divergent views were addressed through face-to-face interviews involving the research team and the hospital's strategy committee chairperson.

The study was approved by the Royal Hospital's Scientific Research Committee (#MOH/CSR/21/24494) and adhered to ethical standards, including the Declaration of Helsinki and institutional policies. All EMR data were anonymized to protect patient confidentiality, and no identifiable patient information was included in the study.

Results

The EHR analysis examined 652,567 admissions over a 14-year period. The top 10 most frequent ICD-10 codes highlighted key clinical priorities (Table 1). Among these, pregnancy and childbirth-related conditions accounted for 25% of cases, with spontaneous vertex delivery and perineal laceration being the most common. Circulatory system diseases represented 10.4%, with atherosclerotic heart disease as the leading diagnosis. Neoplasms constituted 8.6% of all diagnoses, with breast cancer being the most prevalent within this category (22.6%). Diseases of the genitourinary system accounted for 7.3%. Mortality was recorded in 1.8% of admitted cases, with the most common underlying causes including septicemia, pneumonia, cardiogenic shock, myocardial infarction, and respiratory failure.

Table1: Distribution of Main ICD-10 Categories and Subcategories by Percentage.

1	Pregnancy, childbirth and the puerperium (O00–O99) (25%)	O80.0: Spontaneous vertex delivery (27%) O70.9: Perineal laceration during delivery, unspecified (15.6%) O70.0: First-degree perineal laceration during delivery (10.2%)
2	Diseases of the circulatory system (I00–I99) (10.4%)	I25.1: Atherosclerotic heart disease (34%) I50.9: Heart failure, unspecified (5.1%) I21.9: Acute myocardial infarction, unspecified (4%)
3	Neoplasms (C00–D48) (8.6%)	C50.9: Breast, unspecified (22.6%) C18.9: Colon, unspecified (6.9%) C67.9: Bladder, unspecified (4.3%)
4	Diseases of the genitourinary system (N00–N99) (7.25%)	N39.0: Urinary tract infection, site not specified (11%) N18.0: Chronic kidney disease (10%) N20.0: Calculus of kidney (8.2%)
5	Diseases of the digestive system (K00–K93) (6.46%)	K35.9: Acute appendicitis (15.7%) K40.9: Unilateral or unspecified inguinal hernia, without obstruction or gangrene (8.25%) K80.2: Calculus of gallbladder without cholecystitis (4.9%)
6	Diseases of the respiratory system (J00–J99) (4.44%)	J18.9: Pneumonia, unspecified (17%) J21.9: Acute bronchiolitis, unspecified (11.9%) J45.9: Asthma, unspecified (9.2%)
7	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50–D89) (4.33%)	D57.0: Sickle-cell anaemia with crisis (39.9%) D56.1: Beta thalassaemia (15%) D50.9: Iron deficiency anaemia, unspecified (9%)
8	Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99) (3.74%)	Q53.1: Undescended testicle, unilateral (9.3%) Q21.1: Congenital malformations of cardiac septa (6.8%) Q21.0: Congenital malformations of cardiac septa (6.7%)
9	Endocrine, nutritional and metabolic diseases (E00–E90) (3.31%)	E10.1: Diabetes mellitus with ketoacidosis (7.2%) E87.1: Hypo-osmolality and hyponatraemia (6.8%) E30.1: Precocious puberty (5.2%)
10	Certain conditions originating in the perinatal period (P00–P96) (2.26%)	P59.9: Neonatal jaundice, unspecified (25.6%) P07.1: Disorders related to short gestation and low birth weight, not elsewhere classified (11.3%) P22.1: Transient tachypnoea of newborn (6.5%)
11	Certain infectious and parasitic diseases (A00–B99) (2.01%)	A09: Other gastroenteritis and colitis of infectious and unspecified origin (40%) A41.9: Sepsis, unspecified (10.8%)
12	Others (22.2 %)	

Table 2: Yearly Trends in Prevalence of Top disease (ICD-10).

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1	D57.0(564)	I25.1(531)	I25.1(751)	I25.1(1005)	I25.1(1210)	I25.1(1853)	I25.1(1683)	I25.1(2148)	I25.1(2148)	I25.1(2569)	I25.1(2220)	C50.9(3068)	C50.9(3713)	C50.9(3107)
2	I25.1(458)	K35.9(496)	K35.9(507)	D57.0(486)	K35.9(532)	D57.0(779)	D57.0(1237)	D57.0(1361)	D57.0(1432)	D57.0(1262)	U07.1(1016)	I25.1(2084)	I25.1(2171)	I25.1(2093)
3	K35.9(453)	D57.0(425)	D57.0(402)	K35.9(427)	D57.0(522)	C50.9(477)	A09 (572)	A09 (586)	A09 (628)	A09 (590)	D57.0(851)	U07.1(1175)	D56.1(1183)	D56.1(1229)
4	K40.9(305)	K40.9(316)	K40.9(308)	N39.0(281)	C50.9(325)	K35.9(474)	N39.0(482)	N39.0(489)	J18.9(503)	J18.9(539)	C50.9(419)	D56.1(1117)	C18.9(948)	N18.0(893)
5	I20.0(284)	N39.0(277)	N39.0(262)	K40.9(263)	N39.0(321)	N39.0(440)	K35.9(481)	K35.9(478)	K35.9(501)	N39.0(519)	I50.9(387)	N18.0(1004)	N18.0(940)	C18.9(869)
6	A09 (237)	I20.0(261)	I21.9(251)	A09 (257)	K40.9(285)	A09 (416)	C50.9(474)	J18.9(401)	J21.9(447)	K35.9(494)	K35.9(361)	C18.9(976)	D57.0(592)	D50.9(692)
7	N40 (208)	J18.9(242)	N20.0(241)	N20.0(257)	N20.0(283)	N20.0(416)	I21.9(375)	C50.9(382)	N39.0(441)	J21.9(490)	N39.0(325)	D57.0(666)	D50.9(589)	D57.0(644)
8	T82.4(207)	T82.4(231)	T82.4(234)	J18.9(244)	N20.1(271)	J18.9(332)	J18.9(368)	N20.0(351)	G47.3(368)	I50.9(481)	N39.0(300)	I50.9(541)	J18.9(543)	J18.9(626)
9	J18.9(202)	N20.0(227)	A09 (203)	J21.9(213)	A09 (269)	N18.0(329)	I50.0(317)	J21.9(346)	N20.1(355)	C50.9(481)	A09 (241)	K35.9(447)	I50.9(528)	I50.9(558)
10	N39.0(201)	I21.9(214)	N40 (201)	T82.4(201)	J18.9(237)	N20.1(280)	N18.0(299)	N20.1(326)	J45.9(319)	J45.9(314)	C73 (234)	D50.9(438)	K35.9(483)	N20.1(498)
Total Number	**17312**	**17805**	**18271**	**19460**	**22032**	**27369**	**29262**	**30384**	**29941**	**31203**	**23142**	**37760**	**42445**	**42388**

A09 - Infectious gastroenteritis and colitis, unspecified
C18.9 - Malignant neoplasm of colon, unspecified
C50.9 - Malignant neoplasm of breast, unspecified
D50.9 - Iron deficiency anemia, unspecified
D56.1 - Beta thalassemia
D57.0 - Sickle-cell anemia (with crisis)
G47.3 - Sleep apnea, unspecified
I25.1 - Atherosclerotic heart disease of native coronary artery
I50.9 - Heart failure, unspecified
J18.9 - Pneumonia, unspecified organism
J45.9 - Asthma, unspecified
K35.9 - Acute appendicitis, unspecified
N18.0 - End-stage renal disease
N20.0 / N20.1 - Calculus of kidney/ureter
N39.0 - Urinary tract infection, site not specified
T82.4 - Mechanical complication of vascular grafts

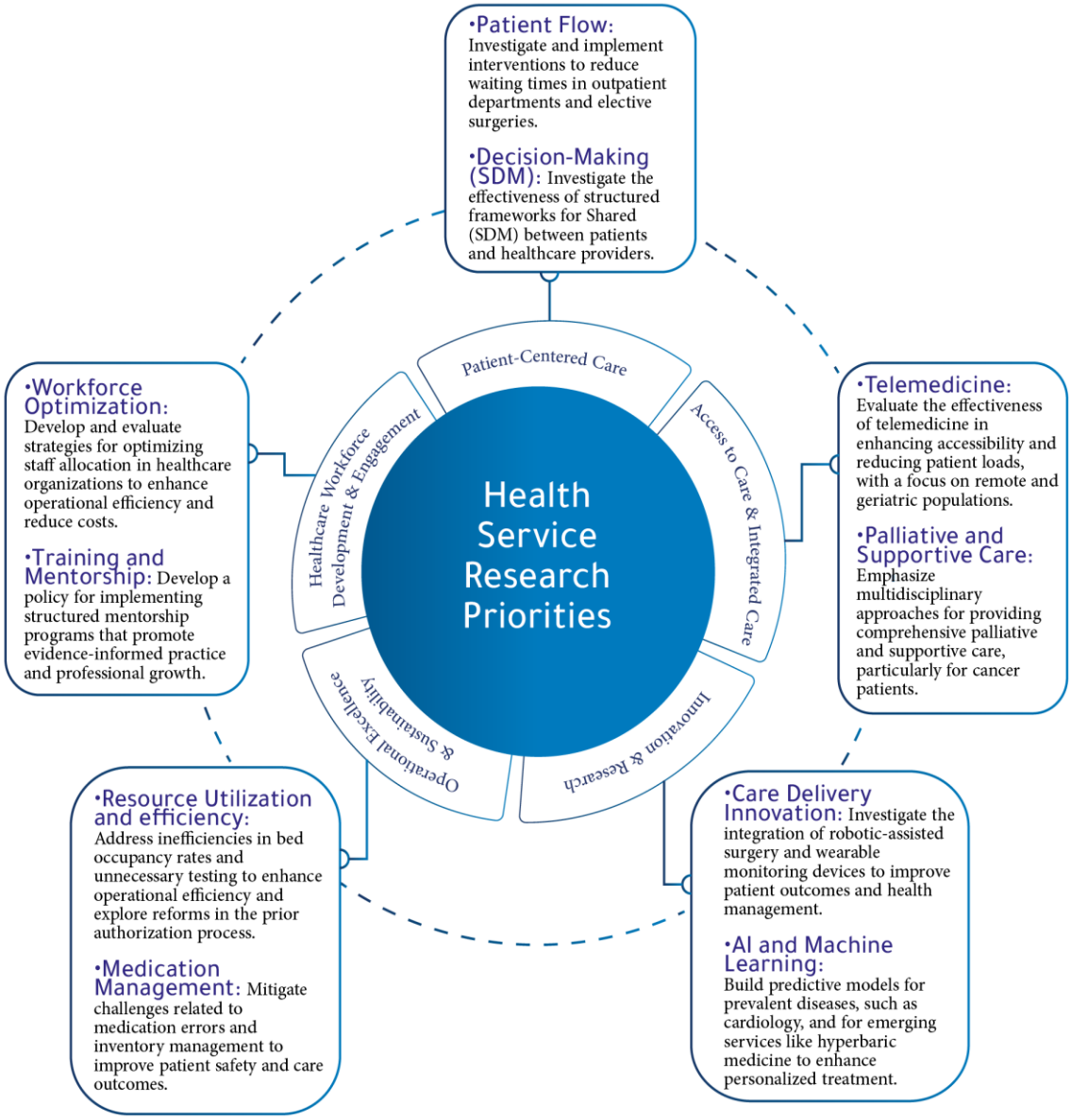

Figure 1: Health Service Priorities: Themes and Topics Identified.

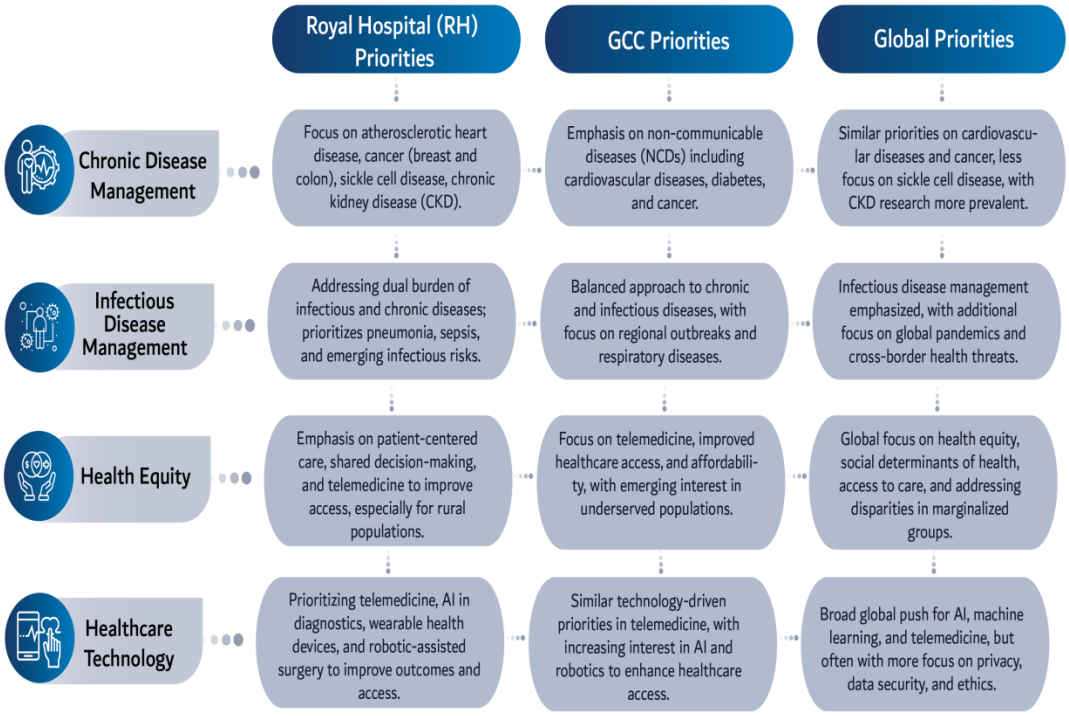

Figure 2: Comparative Analysis of Research Priorities: Hospital vs. National, GCC, and Global Perspectives.

Specific ICD-10 codes were examined each year to identify recurring and emerging conditions, excluding pregnancy and childbirth-related cases (Table 2). Cardiovascular diseases, particularly atherosclerotic heart disease, were consistently reported annually. Genetic disorders, such as sickle-cell anemia, appeared regularly, while beta-thalassemia emerged from 2022 onwards. Oncology-related conditions, including breast cancer, showed increasing prevalence, particularly in 2023, while colorectal cancer was noted in 2022 and 2023. Respiratory and infectious diseases, including pneumonia and acute bronchiolitis, remained common, as did acute appendicitis and urinary tract infections. Emerging conditions included iron deficiency anemia and sleep apnea, both noted in later years. Chronic conditions such as heart failure and kidney disease also showed a steady presence in recent years.

Research priorities identified through stakeholder consultations were categorized into five key domains based on the hospital's strategic goals, the health system's building blocks, and the Institute of Medicine's 1995 framework: *Patient-Centered Care*, *Access to Care & Integrated Care*, *Innovation & Research*, *Operational Excellence & Sustainability*, and *Healthcare Workforce Development & Engagement* (Figure 1).

Within *Patient-Centered Care*, priorities included improving patient flow by reducing waiting times in outpatient departments and elective surgeries, alongside implementing structured frameworks for shared decision-making between patients and healthcare providers. The *Access to Care & Integrated Care* domain emphasized evaluation of the effectiveness of telemedicine in improving accessibility, especially for remote and geriatric populations, and adopting multidisciplinary approaches to palliative and supportive cancer care. Under *Operational Excellence & Sustainability*, key areas included optimizing bed occupancy rates, minimizing unnecessary testing, reducing medication errors, and inventory management to improve patient safety.

The *Innovation & Research* domain prioritized investigating robotic-assisted surgery and wearable monitoring devices, along with developing predictive models using artificial intelligence (AI) and machine learning for prevalent diseases such as cardiovascular conditions and emerging services like hyperbaric medicine. Lastly,

Healthcare Workforce Development & Engagement focused on optimizing staff allocation to enhance operational efficiency and reduce costs, as well as implementing structured mentorship programs to foster evidence-based practice and professional growth. The final list of priorities was validated through two Delphi rounds and refined following a final workshop with key stakeholders.

Participants evaluated the clinical and health service research priorities using a 5-point Likert scale. Overall, 80% of respondents rated the priorities as relevant (scores of ≥4). However, feedback highlighted two key areas for improvement: the need for broader inclusion of preventive measures for NCDs and the integration of patient experience metrics for a more patient-centered approach. These recommendations were incorporated before proceeding to the second round.

In the second round, nine respondents reassessed the revised priorities. All priorities received ratings of 4 or 5, confirming strong consensus that the final priorities were aligned with the hospital's strategic objectives and national healthcare goals. While relevance was widely agreed upon, feasibility concerns emerged, particularly regarding IT infrastructure, financial constraints, and workforce capacity. Resource allocation was emphasized, especially for research focusing on high-burden conditions.

Participants agreed on the comprehensiveness of the research priorities but suggested further integration of patient experience research and cost-effectiveness analyses. The most critical research areas identified were improving access to care, particularly for underserved populations, addressing healthcare disparities, and advancing telemedicine to enhance remote healthcare access. A phased implementation strategy was recommended, prioritizing the top three research areas within the first few years. The final list of priorities was presented as clinical priorities and health service priorities.

Discussion

Systematic reviews on research priority setting underscores the importance of evidence-based criteria, flexible processes, and stakeholder engagement. Evidence-informed frameworks, such as those proposed by Viergever *et al*., emphasize disease burden, potential health impact, and feasibility.[4] Empirical studies further highlight the need for context-specific adaptations to balance technical and ethical considerations and achieve equitable health outcomes.[2] The REPRISE guideline reinforces the necessity of inclusive stakeholder participation to align research priorities with community needs.[3] Additionally, the World Health Organization (WHO) stresses the value of a systematic, replicable, and transparent approach to maintain integrity and accountability in priority setting.[1]

Findings from our study highlight the intersection of clinical needs and health service research. Despite a global emphasis on patient-centered care and operational efficiency, research prioritization in the Gulf Cooperation Council (GCC) region remains underexplored, with limited frameworks integrating robust data analytics and stakeholder consensus. Addressing this gap, our study presents a replicable model for aligning research priorities with real-world health needs, ensuring clinical relevance and operational feasibility.

The high percentage related to pregnancy and childbirth-related conditions is attributed to the absence of a designated delivery center in Muscat region. As a result, the Royal Hospital and Khoula Hospital, both under the Ministry of Health, handle the majority of maternity cases in the region. In contrast, when it comes to other morbidities, analysis of EHR data revealed that atherosclerotic heart disease, cancers (notably breast and colon), and chronic conditions such as sickle cell disease and chronic kidney disease are prevalent in the Omani population. These findings align with broader trends in the GCC region, where NCDs are leading health concerns.[14,15] The WHO reports that NCDs account for a significant proportion of morbidity and mortality in the Middle East, with cardiovascular diseases and cancers being the primary causes of death.[16]

It should be noted that NCDs are increasingly linked to chronic inflammatory or infectious processes, challenging traditional distinctions between infectious and non-infectious diseases.[17] This evolving understanding necessitates an integrated research agenda that addresses NCDs while exploring their multifactorial etiologies, including infectious origins. Given the region's rapid urbanization and lifestyle changes, a focused research agenda is essential to address the burden of NCDs in Oman.[18]

Furthermore, the persistence of infectious diseases despite advancements in healthcare infrastructure, particularly pneumonia and septicemia, underscores the need for ongoing research and intervention strategies.[19,20] 21. Kuate Defo critiques the epidemiological transition theory for inadequately addressing such dual burdens, advocating for revised frameworks that recognize the coexistence of non-communicable and infectious diseases in transitional health systems.[21] Research initiatives should integrate strategies for managing both disease types, ensuring a comprehensive approach that reflects the population's diverse needs.

Beyond clinical priorities, our study identified key health service research priorities, including improving patient flow, enhancing shared decision-making, and leveraging telemedicine technologies to ensure better healthcare access. These priorities align with global trends emphasizing patient-centered care and technology integration. The WHO has advocated adopting telehealth solutions, particularly in response to the COVID-19 pandemic, which accelerated innovative approaches to healthcare delivery.[22,23] Other GCC countries have also recognized the potential of telemedicine to enhance healthcare accessibility, particularly for remote and underserved populations.[24]

Operational inefficiencies in resource utilization and medication management emerged as another critical research area. Studies highlight the importance of operational excellence in enhancing patient safety and care outcomes.[25,26] Mercer suggests that integrating socio-ecological approaches into healthcare operations can address broader determinants of health, enhancing the impact of these priorities.[17] Similarly, AI and machine learning offer promising avenues for improving healthcare efficiency and patient outcomes.[27] Mackenbach further emphasizes that understanding transitions in healthcare priorities requires examining systemic adaptations, including the adoption of advanced technologies.[28] Our study reflects this shift, highlighting the potential of digital innovations to transform healthcare delivery in the region.

Comparing our findings with regional and global research priorities reveals both similarities and distinctions (Figure 3). Cancer research is a common priority in high-income countries, where breast and colon cancers are also emphasized.[29,30] However, the high prevalence of sickle cell disease in the GCC necessitates tailored research initiatives addressing region-specific health concerns.[31,32] Defo and Mercer caution against universalizing frameworks that overlook regional disease profiles, advocating for localized models that incorporate unique epidemiological and socio-ecological dynamics.[17,21] Additionally, integrating health service research into priority setting reflects a growing recognition of the need for balanced approaches that encompass both clinical and health systems research.[33,34] Our study contributes to this discourse by emphasizing the interconnectedness of clinical and operational priorities, advocating for a holistic approach to health research and service delivery.

The research priorities identified in this study provide a framework for guiding future research initiatives at the Royal Hospital and within the broader GCC context. Aligning research efforts with clinical realities and health service challenges enhances relevance and impact. Stakeholder engagement further underscores the importance of collaborative approaches in shaping research agendas responsive to the needs of patients and healthcare providers alike. Moving forward, prioritizing these identified areas will facilitate the transplantation of research findings into actionable strategies, ultimately contributing to improved health outcomes and a more efficient healthcare system.

Conducting research in hospital settings presents unique challenges, particularly concerning resource allocation. Hospitals primarily focus on patient care, often limiting the availability of financial resources, infrastructure, and time for research activities.[9,10] These constraints may also lead to resistance, as staff may perceive competing demand on already limited resources.[9] Nonetheless, research in hospital settings is crucial for enhancing healthcare quality, patient outcomes, and operational efficiency.

Government financial support, particularly in resource-limited regions, is essential for supporting public health research initiatives.[35] Additionally, fostering a research-driven culture within hospitals can significantly impact healthcare quality.[36] Translational research, which bridges the gap between research and practice, ensures that findings provide practical guidance for hospital practitioners and policymakers. Public-academic collaborations further enhance research capabilities, supporting operational efficiency and enabling the development of evidence-based interventions.[37] Incentivizing research through benchmarking and incorporating research productivity into hospital performance metrics can also promote research activities. A comprehensive approach that combines shared economic indicators, activity metrics, and quality measures facilitates trend analysis and benchmarking at national and international levels.[38]

A key strength of this study was the robust stakeholder engagement process, which played a critical role in validating and refining research priorities. By incorporating input from clinicians, researchers, and policymakers, the identified priorities were grounded in both evidence-based practices and the real-world needs of healthcare stakeholders. This inclusive approach aligns with global best practices emphasizing inclusivity and transparency in research priority setting, ensuring the findings are both relevant and actionable.

Despite these strengths, the study had some limitations. While the Delphi method effectively facilitated consensus, the relatively small participant group may have constrained the diversity of perspectives and introduced bias. Participants were purposively selected based on their roles in research and strategy; however, the lack of representation from frontline staff and patients may have limited inclusiveness. Broader feedback was sought through consultations with the hospital director and section heads, and discrepancies were addressed in a live workshop, but a larger panel could have provided additional insights. Another limitation was the reliance on inpatient EHR data, which excluded outpatient. This may have limited the study's ability to capture healthcare needs beyond inpatient settings.

Additionally, using ICD-10 codes, while systematic, may have overlooked emerging clinical trends or nuanced diagnoses. Future research could address these limitations by involving a broader range of stakeholders and integrating outpatient data, patient-reported outcomes, and complementary methodologies to further refine the Royal Hospital's research agenda.

Conclusions and Recommendations

This study established research priorities for the Royal Hospital by integrating real-world clinical data with stakeholder engagement. Using EHR analysis alongside a Delphi consensus approach, the study identified critical clinical and health service research priorities aligned with institutional needs and Oman's Health Vision 2050. These priorities help bridge the gap between academic research and practical healthcare challenges, ensuring that research efforts are targeted, impactful, and aligned with national and global health objectives.

Key clinical priorities include cardiovascular disease, oncology, and chronic kidney disease, while health service research priorities focus on patient-centered care, telemedicine, operational efficiency, and AI-driven innovation. To facilitate implementation, a hospital-wide research steering committee should oversee the execution of identified priorities and integrate them into grant funding strategies. Strengthening data-driven decision-making through real-time EHR dashboards and AI applications will enhance predictive healthcare modeling and resource allocation.

Sustaining momentum will require ongoing stakeholder engagement. Conducting annual reviews of research priorities with hospital leadership and policymakers, alongside fostering cross-department collaborations, will ensure alignment with evolving healthcare needs. Capacity-building initiatives should also be expanded to include specialized training in evidence-based research and innovation methodologies, complemented by structured mentorship programs for early-career researchers. For long-term sustainability, securing dedicated hospital funding and exploring public-private partnerships will be essential. By continuously refining research priorities and fostering interdisciplinary collaboration, the Royal Hospital can solidify its position as a leader in evidence-based healthcare innovation in Oman.

Disclosure

The authors declare no competing interests.

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Appendix 1: Combined list of Health Service Research Priorities.

1. Access to Care

- Enhance early detection and referral systems
- Implement lifestyle-based prevention programs
- Expand telemedicine and outreach for remote/geriatric populations
- Improve insurance coverage and financial accessibility

- Promote community awareness and first aid training

2. Patient-Centered Care

- Investigate shared decision-making (SDM) frameworks
- Improve patient flow and reduce outpatient wait times
- Evaluate patient experiences and satisfaction
- Focus on quality of life, functional outcomes, and treatment adherence

3. Workforce Development

- Optimize staff allocation to improve efficiency and reduce cost
- Establish structured training and mentorship programs
- Promote multidisciplinary team-based care

4. Operational Efficiency & Sustainability

- Address bed occupancy and test overuse
- Reform prior authorization processes
- Improve medication safety, inventory, and error prevention
- Develop sustainable models for hyperbaric and other specialty services

5. Health Technology & Innovation

- Integrate AI for prediction and personalized care
- Implement EHRs and mobile health solutions
- Use robotics and wearables in care delivery
- Develop cardiology-specific data systems

6. Cost & Financing

- Evaluate cost-effectiveness of therapies (e.g., HBOT, diagnostics)
- Conduct health economic evaluations
- Explore public-private partnerships for sustainable healthcare financing

7. Disease-Specific Outcomes

- Research wound healing, acute cardiac events, and chronic disease outcomes
- Conduct comparative effectiveness research for therapy options
- Advance screening and treatment strategies for congenital and genetic diseases
- Reduce long-term toxicity in pediatric oncology treatments

8. Policy & Governance

- Strengthen emergency response and referral protocols
- Align with international standards
- Promote digital health policies for system improvement