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BRIDGING THE GAP FROM CLINICAL PRACTICE TO ACADEMIC OUTPUT: A MIXED-METHODS SYSTEMIC ANALYSIS OF HEALTH RESEARCH CAPACITY IN A TRANSITIONAL LOWER-MIDDLE-INCOME COUNTRY SETTING

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ABSTRACT

Objective: To provide an expanded institutional analysis of hospital-based research capacity and propose governance-oriented strategies for strengthening scientific research systems in a transitional lower-middle-income country (LMIC) setting, utilizing a public general hospital in Vietnam as a case study (2019–2024).

Methods: A convergent parallel mixed-methods design was employed for this secondary institutional analysis, adhering to the Good Reporting of a Mixed Methods Study (GRAMMS) guidelines. Quantitative information included institutional scientific research records from 2019 to 2024 and a survey among 316 healthcare workers. Qualitative findings were derived from eight in-depth interviews and four focus group discussions. Analysis focused on institutional research capacity using the World Health Organization's six health system building blocks framework, augmented by the systemic capacity strengthening framework for health policy and systems research (Mirzoev et al., 2022) to capture complex organizational dynamics. Data integration occurred at the interpretation level utilizing a joint display methodology.

Results: Scientific research activities at Trung Vuong Hospital demonstrated sustained institutional engagement but modest productivity and limited sustainability. During 2019–2024, the hospital implemented 55 scientific research projects and 147 quality improvement initiatives. Institutional-level projects predominated, while higher-level research projects and international publications remained limited (publication-to-project ratio of 25.5%). Research participation was concentrated among physicians, senior staff, and healthcare workers with postgraduate education. Major institutional barriers included heavy clinical workload, fragmented governance, limited methodological and statistical support, insufficient funding mechanisms, fragmented digital systems, and limited translation of research findings into clinical practice. The absence of a dedicated institutional research support structure emerged as a major organizational weakness, exacerbated by a lack of protected research time and structural inequities in academic power distribution among diverse clinical disciplines. Qualitative narratives highlighted the contradictory environment where frontline staff recognize the value of research but are deterred by complex administrative labyrinths and the necessity to self-fund small-scale projects.

Conclusion: Strengthening hospital-based research capacity requires coordinated institutional reform rather than isolated encouragement of individual participation. Public hospitals should establish dedicated research governance structures, develop centralized digital research databases, strengthen methodological and publication support, integrate research into quality improvement systems, and create sustainable academic incentive mechanisms. Transitioning from a focus on individual capacity building to systemic ecosystem governance is imperative to elevate LMIC hospitals from mere data extraction sites to equitable centers of health knowledge production.

Keywords: Research capacity; hospital governance; hospital-based research; health systems; Vietnam; scientific research management; mixed-methods; learning organization; systemic capacity.

1. INTRODUCTION

Scientific research is increasingly recognized as a core component of modern healthcare systems. Beyond generating new knowledge, research contributes to evidence-based clinical practice, healthcare quality improvement, policy development, institutional learning, and health system strengthening [1–3]. Hospitals are no longer expected solely to provide clinical services but also to function as research-oriented and learning-based organizations integrating patient care, education, innovation, and quality management. Hospital-based research has particular importance because it originates from real-world clinical practice. Research questions emerging within hospitals frequently involve diagnosis, treatment, patient safety, infection control, workflow optimization, nursing care, medication management, and healthcare delivery. Such studies may therefore generate highly relevant evidence for local healthcare systems.

However, the global health research agenda is frequently dictated by high-income countries (HICs), creating structural power imbalances where LMIC institutions serve

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primarily as data extraction sites rather than equitable partners with local ownership. Historically, less than half of clinical trials for diseases disproportionately impacting LMIC populations are actually conducted in these settings, reflecting a profound inequity in global research capacity and investment. Addressing this disparity requires a paradigm shift from viewing research capacity solely as an individual skill to understanding it as a collective, systemic attribute encompassing individual, organizational, and network capacities. In resource-constrained settings, healthcare workers often face a dilemma: fulfilling overwhelming clinical duties versus engaging in academic inquiry that receives inadequate institutional backing.

Despite increasing recognition of its importance, sustainable research development within hospitals remains difficult, particularly in low- and middle-income countries. Previous studies have identified persistent barriers including limited funding, insufficient methodological expertise, fragmented governance, lack of mentorship, inadequate publication support, and competing clinical responsibilities [8–10]. These barriers may result in low publication productivity, discontinuous participation, limited translation of findings into practice, and underdeveloped institutional research culture. In Southeast Asia, research productivity remains concentrated in universities and national institutes, while many public hospitals continue to struggle with research implementation. Heavy workload, workforce shortages, fragmented health information systems, and limited digital integration remain substantial barriers [13–15].

Although national policies increasingly encourage scientific and technological development in healthcare, institutional implementation capacity remains heterogeneous[7]. Vietnamese public hospitals are currently undergoing major transformations related to hospital autonomy, digitalization, healthcare quality management, and evidence-based governance. Specifically, the issuance of Circular 24/2023/TT-BYT by the Ministry of Health has established new, stringent regulatory standards for grassroots scientific research management, demanding greater accountability and structural support. Concurrently, Resolution No. 57-NQ/TW (2024) issued by the Political Bureau emphasizes a national strategic breakthrough in science, technology, and innovation, targeting a significant increase in research and development (R&D) funding to reach 2% of the national GDP by 2030. These macroeconomic policy shifts mandate that public hospitals evolve beyond their traditional service-delivery roles to become robust hubs for clinical trials and digital health innovation.

In this context, strengthening hospital-based research capacity has become increasingly important. Scientific research is now expected to contribute not only to academic productivity but also to service quality, institutional competitiveness, healthcare innovation, and professional development[8]. Nevertheless, many hospitals continue to face organizational and structural barriers limiting sustainable research development. Research activities often remain dependent on a small number of motivated senior physicians, while broader multidisciplinary participation is limited. In many settings, research is still perceived as an additional academic or administrative obligation rather than an integrated institutional function.

Trung Vuong Hospital is a Grade I public general hospital under the Ho Chi Minh City Department of Health. During recent years, the hospital has promoted scientific research through institutional projects, quality improvement initiatives, postgraduate training, and academic collaboration. Previously reported findings from a mixed-methods assessment demonstrated sustained research engagement but also identified multiple barriers affecting research productivity and sustainability. The present study does not aim to reproduce previously published findings. Instead, it provides an expanded institutional analysis focusing specifically on research capacity as a health system function. Using the WHO health system building blocks framework, combined with contemporary systemic capacity-strengthening models, this study analyzes organizational determinants influencing hospital-based research and proposes governance-oriented strategies for strengthening institutional research systems in resource-constrained healthcare settings.

2. METHODS

2.1. Study design

Study design This study was conducted as an expanded secondary institutional analysis using previously collected mixed-methods data from Trung Vuong Hospital, Ho Chi Minh City, Vietnam. The original study included retrospective institutional record review, a cross-sectional survey among healthcare workers, in-depth interviews, and focus group discussions. The present analysis focused specifically on institutional research capacity and governance-related determinants rather than reproducing descriptive epidemiological findings. To ensure transparency, methodological rigor, and reproducibility, this secondary analysis adheres strictly to the Good Reporting of a Mixed Methods Study (GRAMMS) framework, complemented by the Standards for Reporting Qualitative Research (SRQR).

Data Secondary analysis of qualitative and quantitative health data is increasingly recognized as a vital approach to maximize data utility, particularly for uncovering organizational behaviors and policy implications without overburdening healthcare workers with repeated primary data collection.The 5-year retrospective administrative dataset (2019-2024) and the rich qualitative transcripts from the original mixed-methods study provided an optimal "data fit" to explore the complex, systemic mechanisms of research capacity. While primary studies often focus on surface-level descriptive metrics, this secondary analysis re-interrogates the qualitative transcripts through the specific theoretical lens of epistemic power dynamics, institutional governance, and health systems resilience.

2.2. Data sources

- Quantitative data included:

+ Institutional scientific research records from 2019 to 2024.

+ Administrative data regarding research projects, publications, and postgraduate activities.

+ Survey responses from 316 healthcare workers. The survey employed a simple random sampling method drawn from the entire hospital workforce. The final sample consisted of 71.5% females and 28.5% males, with a mean age of 36.6 ± 9.2 years. Professionally, 78.2% belonged to the clinical block, 11.1% to the paraclinical block, and 10.7% to the administrative block.

- Qualitative data included:

+ Eight in-depth interviews (IDIs) with hospital leaders and research management personnel. Purposive sampling was used to select key informants, including the Deputy Director of the hospital, Head of the Quality Management Department, Head of Pharmacy, and Head of Diagnostic Imaging, ensuring a comprehensive view of institutional policy implementation.

+ Four focus group discussions (FGDs) involving healthcare workers from multiple departments and

professional groups. FGDs were segmented by professional roles (two groups of physicians and two groups of nursing/midwifery staff) to capture the hierarchical nuances and diverse lived experiences regarding research engagement.

A convergent parallel mixed-methods design was utilized for this expanded analysis. In this design, quantitative and qualitative data were collected concurrently during the primary study phase, analyzed independently, and subsequently integrated during the interpretation phase. The quantitative strand was prioritized to map the magnitude, distribution, and structural limitations of research outputs (e.g., publication-to-project ratios, funding distribution). Concurrently, the qualitative strand was employed to decode the underlying cultural mechanisms, power structures, and lived experiences of the healthcare workforce operating within these structural confines. True methodological integration—the hallmark of rigorous mixed-methods research—was achieved at the reporting level through the construction of visual "Joint Displays". These joint displays systematically juxtaposed quantitative frequencies with thematic qualitative narratives, facilitating the generation of meta-inferences regarding systemic capacity gaps.

Analytical framework Institutional determinants influencing research capacity were analyzed according to the WHO six health system building blocks framework: Human resources for health, Health information systems, Technology and infrastructure, Financing, Leadership and governance, and Service delivery.

To address the recognized limitations of the WHO Building Blocks framework—specifically its tendency to treat system components as linear and static silos—this study integrated the Conceptual Framework for Systemic Capacity Strengthening for Health Policy and Systems Research developed by Mirzoev et al. (2022). The Mirzoev framework posits that capacity is a complex adaptive attribute that must be evaluated across three synergistic, overlapping levels:

- Individual Capacity: Personal expertise, methodological skills, and confidence.

- Organizational Capacity: Institutional systems, internal governance, and the often-invisible organizational culture that enables or constrains individual potential.

- Network Capacity: Boundary-spanning collaborations, shared resources, and connectivity with broader academic and policy ecosystems.

This dual-theoretical framework was selected because it allows evaluation of research capacity not only as an individual competency but also as an organizational and institutional function, explicitly accounting for power dynamics and structural inequities within the hospital setting.

2.3. Data analysis

Quantitative findings were summarized descriptively to support institutional interpretation. Qualitative findings were analyzed thematically using an inductive and deductive approach guided by Braun and Clarke's thematic analysis principles. Emphasis was placed on governance-related barriers, organizational facilitators, institutional sustainability, and implementation mechanisms. Integration of quantitative and qualitative findings was conducted during interpretation to identify relationships between institutional structures and research performance, culminating in the generation of joint display matrices.

2.4. Ethical considerations

The original mixed-methods study was conducted according to ethical principles for biomedical and public health research. Participation was voluntary, and confidentiality was maintained throughout data collection and reporting. The original study protocol was formally reviewed and approved by the Institutional Review Board (IRB) of the Hanoi University of Public Health (Approval No. 218/2025/YTCC-HD3). For this secondary analysis, an ethical waiver for re-consent was applied, given the use of fully anonymized and de-identified administrative and transcript data. Furthermore, acknowledging the need for reflexivity in qualitative health research (Domain 1 of COREQ guidelines), the research team maintained continuous reflexive dialogue to mitigate interpretive biases stemming from their positions as external health policy analysts and internal clinical stakeholders.

3. RESULTS

3.1. Institutional profile of scientific research activities

Scientific research activities at Trung Vuong Hospital demonstrated sustained institutional engagement during 2019–2024. During this period, the hospital implemented 55 scientific research projects and 147 quality improvement initiatives. However, research productivity remained modest relative to the institutional scale and clinical capacity of the hospital. Institutional-level projects represented most research activities, while ministry- or sector-level projects remained limited. Scientific publication output was also relatively low compared with the total number of implemented projects. International publications accounted for only a minority of outputs. Research participation was concentrated primarily among physicians, senior staff, and healthcare workers with postgraduate education. Younger healthcare workers, nurses, pharmacists, technicians, and frontline staff participated less frequently in research leadership roles. These findings suggest that scientific research activities remained dependent on a relatively small institutional workforce rather than functioning as a broadly distributed organizational culture.

Table 1. Institutional scientific research activities at Trung Vuong Hospital, 2019–2024

Indicator	Findings
Total scientific research projects	55
Total quality improvement initiatives	147
Domestic publications	9
International publications	5
Total publications	14
Publication-to-project ratio	25.5%
Institutional-level projects	71.0%
Ministry-/sector-level projects	29.0%
Total theses/dissertations	89

3.2. Human resources for research

Human resources emerged as one of the most important determinants influencing research capacity. Healthcare workers generally recognized the importance of scientific research for improving clinical reasoning, evidence-based practice, professional development, and institutional reputation. However, participation remained uneven across professional groups. Physicians accounted for most principal investigators, while multidisciplinary participation remained limited. Research engagement was significantly higher among healthcare workers with postgraduate education, managerial responsibilities, and longer

professional experience. Heavy clinical workload was consistently identified as the most important barrier. Participants reported that patient care responsibilities frequently took priority over academic activities, particularly in departments with high patient volume and workforce shortages. Consequently, research activities were often conducted outside routine working hours, reducing sustainability and increasing the risk of delayed or incomplete projects.

The qualitative data starkly illuminated the profound impact of professional hierarchies on research engagement. A striking discrepancy was observed between physicians and nursing staff regarding the perceived feasibility and institutional validation of their research ideas. One nurse shared during a focus group: "Usually, in a research team, doctors are the ones discussing, helping each other, and looking up medical records more than nurses... Nurses only do care-related topics which are hard to pass the Ethics Committee because they are considered too simple" (FGD-Medical staff 09). This quote exposes a deep-seated epistemic hierarchy where nursing research is institutionally undervalued, thereby diminishing the confidence and willingness of allied health professionals to initiate formal studies.

Limited methodological and statistical skills represented another major barrier. Many healthcare workers lacked confidence in study design, statistical analysis, scientific writing, and publication procedures. Junior staff frequently reported uncertainty regarding protocol development and manuscript preparation. Research mentorship was also inconsistent. Research activities depended heavily on individual initiative rather than structured institutional mentorship systems.

Table 2. Characteristics associated with research participation among healthcare workers

Characteristics	Higher research participation
Older age	Yes
Postgraduate education	Yes
Longer work experience	Yes
Managerial position	Yes
Administrative departments	Yes
Frontline junior staff	Lower participation
Nurses/technicians	Lower leadership participation

3.3. Health information systems

Health information systems played both enabling and limiting roles in research implementation. The availability of clinical data and partial electronic medical record systems facilitated retrospective studies and quality improvement initiatives. However, fragmented databases, inconsistent documentation, incomplete records, and limited interoperability complicated data extraction and analysis. Participants reported that clinical data were frequently stored across separate systems without centralized integration. This fragmentation reduced efficiency in data retrieval and increased time required for data cleaning and validation.

The qualitative narratives revealed the frustration of researchers dealing with archaic data management practices. A member of the leadership team noted: "Currently, the hospital does not have an online storage system for research projects, so searching or reviewing studies from previous years can be difficult as it requires searching directly in paper documents at the library" (IDI-Leader 01).The absence of a centralized institutional research repository further limited project monitoring, knowledge sharing, and long-term research continuity. These findings suggest that digitalization alone is insufficient for strengthening research capacity unless accompanied by standardized data governance mechanisms and integrated research information systems.

3.4. Technology and infrastructure

Technology and infrastructure created both opportunities and constraints for research activities. Participants acknowledged the increasing role of digital technologies, statistical software, artificial intelligence applications, and online scientific resources in supporting research implementation. External academic collaboration also facilitated access to technical expertise. Nevertheless, several limitations remained. Participants reported insufficient access to advanced statistical consultation, limited availability of specialized research software, inadequate research workspace, and restricted access to international scientific databases.

Interestingly, the application of Artificial Intelligence (AI) emerged as a double-edged sword within the qualitative findings. Frontline researchers frequently turned to AI tools like ChatGPT as a compensatory mechanism for the lack of institutional methodological support. As one participant expressed: "Sometimes when I have an article or a protocol that I've been thinking about for a long time, I just ask AI, and it saves a lot of time... I think AI is beneficial if used correctly in research" (FGD-Medical staff 10). However, this organic, bottom-up adoption of technology was accompanied by profound concerns regarding data security and academic integrity. The same participant warned: "A difficulty when asking AI to write or analyze data is that we have to input our data for it to process, which is a risk for information leakage" (FGD-Medical staff 10). Participants emphasized that technological tools could not replace methodological expertise or institutional governance.

Financing mechanisms Financing represented a persistent institutional challenge. Although the hospital provided certain financial support for scientific activities, funding remained insufficient for data collection, laboratory testing, statistical analysis, conference participation, and publication fees. Some healthcare workers reported using personal financial resources to complete research activities. This normalization of self-funding creates an invisible barrier, effctively pricing out younger or less affluent staff from participating in the knowledge economy. As candidly revealed during a focus group: "Usually for small projects, costing a few hundred thousand or a few million VND, we just pay out of pocket to get them done"(FGD-Medical staff 09).

This situation reduced sustainability and potentially created inequities between staff with different financial capacities. Funding limitations also affected research quality. Participants noted that insufficient budgets sometimes restricted sample size, laboratory testing, follow-up activities, and external consultation. Current financial support mechanisms were perceived as fragmented and inconsistent. The lack of funding for Article Processing Charges (APCs) specifically hindered the dissemination of robust local findings to international audiences. "Research is very expensive—tests, equipment, software, not to mention international publication fees. If there is no sponsorship, it is very hard to do," lamented another participant (FGD-Medical staff 10).

3.5. Leadership and governance

Leadership and governance emerged as the most strategic determinants influencing institutional research capacity. Hospital leadership recognized the importance of scientific research and incorporated research into institutional development strategies. However, the hospital did not yet have a dedicated research management or research support unit. Research-related responsibilities were distributed across multiple departments, creating fragmented coordination, administrative complexity, and inconsistent guidance. Participants frequently reported difficulties related to proposal approval processes and unclear responsibilities between institutional units.

The administrative labyrinth was repeatedly cited as a primary deterrent. A leader admitted: "When doing research, you have to contact many departments: finance, planning, human resources... each place has a different opinion, it takes a lot of time" (IDI-Leader 02). Furthermore, the concentration of decision-making power was highlighted as a vulnerability to objective scientific evaluation: "The Director manages the hospital and is also the Head of the Scientific Council, so the final decision on research depends on one person" (IDI-Leader 02).

The absence of centralized governance limited institutional continuity and reduced the hospital's ability to develop long-term research strategies. Participants emphasized the need for a dedicated institutional research structure capable of providing: Methodological consultation, Statistical support, Ethical review coordination, Project monitoring, Publication assistance, Research training, Grant development support, and Digital repository management.

3.6. Service delivery and research integration

Clinical service delivery generated important research opportunities but also created substantial implementation barriers. Many research questions emerged directly from practical clinical problems and quality improvement needs. Participants reported that research activities helped identify weaknesses in diagnosis, treatment, workflow organization, nursing care, and patient safety processes. However, service delivery remained the dominant institutional priority. Under conditions of high clinical workload, research was frequently viewed as secondary to routine patient care. Translation of research findings into clinical practice was also inconsistent. Several participants noted that completed research projects did not always result in sustained implementation changes, clinical guidelines, or institutional policy adjustments.

To transcend descriptive reporting and achieve a deeper systemic understanding, Table 3 presents a Joint Display that maps the quantitative constraints against qualitative narratives, framed within the WHO building blocks and the Mirzoev capacity levels. This visual integration enables the synthesis of higher-order meta-inferences, illustrating how structural deficits directly shape the lived experiences and research outputs of healthcare professionals.

Table 3. Joint Display of Integrated Mixed-Methods Findings on Institutional Research Capacity

WHO Domain / Mirzoev Capacity Level	Quantitative Findings (Records & Survey)	Qualitative Themes & Representative Quotes (IDIs & FGDs)	Integrated Meta-Inferences
Human Resources / Individual Capacity	High participation among senior physicians; near 0% Principal Investigator rates among nurses/technicians. Heavy workload cited by 85% of respondents.	Theme: Exhaustion and Epistemic Hierarchy. "Nurses only do care-related topics which are hard to pass the Ethics Committee because they are considered too simple" (FGD-Medical staff 09).	The absence of protected research time transforms scientific inquiry into an uncompensated burden. This marginalizes allied health workers and reinforces an elite, physician-centric research hierarchy, stalling multidisciplinary innovation.
Leadership & Info Systems / Organizational Capacity	Low publication-to-project ratio (25.5%). 100% of departments report fragmented data systems. 0 dedicated Clinical Research Support Units (CRSU).	Theme: Administrative Labyrinth & Data Silos. "When doing research, you have to contact many departments: finance, planning, human resources... each place has a different opinion, it takes a lot of time" (IDI-Leader 02).	Administrative fragmentation and the absence of centralized governance (CRSU) create a severe implementation bottleneck. Copious clinical data becomes "waste" because the organizational scaffolding required to convert data into peer-reviewed science is missing.
Financing & Service Delivery / Network Capacity	Only 5 international publications in 5 years. 71% of projects are small-scale institutional level. Insufficient funding reported by 78% of staff.	Theme: Out-of-pocket Science & Isolation. "Usually for small projects, costing a few hundred thousand or a few million VND, we just pay out of pocket to get them done" (FGD-Medical staff 09)	The lack of sustainable internal seed funding and open-access support isolates the hospital from global networks. Consequently, research remains locally confined, failing to influence broader national or international health policy discourses.

4. DISCUSSION

This expanded institutional analysis demonstrates that strengthening hospital-based research capacity requires organizational reform rather than isolated encouragement of individual participation. Although Trung Vuong Hospital maintained scientific research activities over multiple years, research productivity, sustainability, and dissemination remained limited. By applying the systemic capacity strengthening framework (Mirzoev et al., 2022), this discussion moves beyond merely listing barriers to unravelling the complex interplay between individual actions, organizational structures, and broader health system financing.

4.1. The Paradox of Hospital Autonomy and Research Financing

One of the most important findings was the concentration of research activities among senior physicians and healthcare workers with postgraduate education. This pattern is common in many resource-constrained healthcare systems, where research capacity depends heavily on a relatively small number of academically trained individuals. Although experienced investigators provide leadership and institutional continuity, excessive concentration of research leadership may reduce multidisciplinary participation and long-term sustainability. The findings also demonstrate that research engagement was strongly influenced by structural organizational factors. Heavy clinical workload consistently emerged as the most important barrier.

This phenomenon is intricately linked to the realities of hospital autonomy in LMICs. In models where public hospitals must self-generate revenue, clinical service delivery naturally becomes the dominant, revenue-producing institutional priority. Without designated budgetary allocations for protected research time, scientific research becomes an unfunded mandate performed outside routine working hours. This financial paradox effectively penalizes research engagement, increasing the risk of incomplete projects, burnout, and limited high-impact publication output. Our qualitative findings showing that clinicians frequently self-fund their research underscore a profound systemic failure. Ultimately, the structural failure to finance protected time solidifies an inequitable "epistemic power" dynamic, where only a privileged few can participate in knowledge creation.

The Translation Gap and the Deficit of Knowledge Brokering

The study further highlights the importance of institutional governance. Research activities were not limited primarily by lack of motivation alone but by fragmentation of organizational support systems. The absence of a dedicated research support structure created discontinuity in mentorship, methodological assistance, project monitoring, publication support, and strategic planning. These findings support broader evidence showing that research capacity should be understood as a health system function rather than solely an individual competency. Sustainable research development depends on coordinated investment in governance, human resources, financing, digital systems, mentorship, and implementation pathways.

Health information systems represented another critical issue. Although electronic systems and digital tools were increasingly available, fragmented databases and limited interoperability substantially reduced research efficiency. Digital transformation alone does not automatically improve research productivity unless data systems are standardized, integrated, and governed appropriately [13–15]. Our findings resonate with recent assessments of digital health maturity in Vietnam, which indicate that while basic electronic medical records exist, the lack of integrated clinical data repositories severely hampers secondary data analysis and larger-scale epidemiological research. Furthermore, the limited translation of research findings into institutional practice reveals a critical gap in "knowledge brokering." Many research projects were completed primarily for academic promotion or administrative compliance without sustained implementation into clinical guidelines. To bridge this gap, hospitals must intentionally design pathways where research outputs are systematically reviewed and embedded into local clinical pathways.

4.2. AI Adoption: The Disconnect Between Individual Initiative and Institutional Governance

An unexpected but highly relevant finding was the organic adoption of Artificial Intelligence (AI) by frontline researchers. While the hospital struggled to provide basic statistical consultation, junior researchers actively utilized generative AI tools to bypass these institutional deficits. This highlights a critical discrepancy: individual capacity and technological adaptation are outpacing organizational governance. Without institutional guidelines on data privacy, ethical AI use, and critical appraisal of AI-generated content, this grassroots technological integration poses significant risks to research integrity. Future capacity-strengthening frameworks must rapidly incorporate AI literacy and governance as core competencies.

4.3. Fostering a Learning Organization through Quality Improvement Integration

The study also demonstrates the close relationship between scientific research and healthcare quality improvement. Quality improvement initiatives were substantially more common than formal research projects (147 vs. 55), suggesting that hospitals may find operational improvement activities more feasible than academically oriented research. Integrating scientific research into quality management systems may therefore represent a practical strategy for strengthening institutional research culture.

This highlights an opportunity to transform the hospital into a true "Learning Organization". The high volume of QI projects proves that frontline workers, including nurses and technicians, possess excellent problem-identification skills. However, as our qualitative data showed, their projects are often deemed "too simple" by Ethics Committees, indicating a lack of methodological scaffolding to elevate practical solutions into rigorous, peer-reviewed evidence. By "embedding" formal research standards and ethical frameworks directly into routine QI cycles, hospitals can democratize research participation across all cadres, making scientific inquiry a daily operational norm rather than an isolated academic pursuit.

Another important finding was the limited translation of research findings into institutional practice. Many research projects were completed primarily for academic or administrative purposes without sustained implementation into clinical guidelines or hospital governance processes. This suggests that hospitals should evaluate research not only according to the number of completed projects but also according to implementation impact, dissemination, and contribution to organizational learning.

Overall, the WHO health system framework proved useful for understanding research capacity as a multidimensional institutional function. Weaknesses in governance, financing, digital systems, mentorship, or service integration may each reduce overall research performance even when individual motivation exists.

4.4. Actionable Strategies for Institutional Reform

Several practical implications emerge from this analysis. Public hospitals should establish dedicated research management units capable of providing integrated methodological, statistical, ethical, and publication support. Institutional digital repositories and centralized research databases should be developed to improve research continuity and monitoring. Protected research time, transparent funding mechanisms, mentorship systems, and multidisciplinary collaboration models should also be strengthened.

Table 4. Proposed institutional strategies for strengthening hospital-based research capacity

Strategic area	Proposed interventions
Governance	Establish a dedicated Clinical Research Support Unit (CRSU)
Human resources	Implement protected research time and equitable KPI recognition
Training	Research methodology, academic writing, and ethical AI utilization programs
Information systems	Centralized digital research repository and integrated Clinical Data Repositories
Financing	Institutional seed grants and dedicated Open Access (OA) publication funds
Research dissemination	Dedicated manuscript support and formal knowledge brokering pathways
Multidisciplinary collaboration	Empower allied health professionals (nursing, pharmacy) via tailored mentorship
Quality improvement integration	Embed HPSR methodology into routine hospital quality indicators

This study has several limitations. The analysis was conducted at a single hospital, limiting generalizability. Additionally, the study relied on previously collected data and did not reassess institutional indicators prospectively. However, the rigorous secondary analysis of comprehensive mixed-methods datasets spanning five years provides a uniquely deep, longitudinal view of organizational behavior that prospective cross-sectional studies often miss. Furthermore, while Trung Vuong Hospital serves as a single case study, it acts as a highly representative microcosm for Grade I public hospitals across Vietnam and the broader LMIC context, all of which are navigating similar pressures of financial autonomy, digital transformation, and workforce constraints.

5. CONCLUSION

Scientific research activities at Trung Vuong Hospital demonstrated sustained institutional engagement but limited sustainability and modest research productivity. Research participation remained concentrated among senior physicians and healthcare workers with postgraduate education, while broader multidisciplinary participation remained limited. Major institutional barriers included heavy clinical workload, fragmented governance, insufficient methodological support, limited funding mechanisms, fragmented digital systems, and weak integration of research findings into clinical practice.

Strengthening hospital-based research capacity requires coordinated institutional reform. Public hospitals should establish dedicated research governance structures, strengthen digital research systems, improve methodological and publication support, develop sustainable funding mechanisms, integrate research into quality improvement activities, and create institutional environments supporting long-term multidisciplinary research participation. Ultimately, closing the research capacity gap in LMIC hospitals requires a paradigm shift from ad-hoc, individual-focused training to the deliberate architecture of a resilient, well-financed, and integrated learning ecosystem. Only through such systemic governance reforms can public hospitals fulfill their dual mandate of delivering exceptional clinical care and generating context-specific, policy-shaping scientific evidence.

6. STATEMENT OF SCIENTIFIC CONTRIBUTIONS

Nguyen Thi Phuong Linh contributed to study conceptualization, data collection, data analysis, manuscript drafting, and interpretation of findings. Pham Dinh Nguyen supervised the study, critically revised the manuscript, and approved the final version for publication. All authors read and approved the final manuscript.

7. CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

8. ACKNOWLEDGMENTS

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