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AMLiS 2026

ASIA MEDICAL LIBRARY SEMINAR

E-PROCEEDINGS



ASIA MEDICAL LIBRARY SEMINAR (AMLiS) 2026 : E-PROCEEDINGS

ASIA MEDICAL LIBRARY SEMINAR 2026

8-9 SEPTEMBER 2026

BORNEO CULTURES MUSEUM, KUCHING, SARAWAK

"EMPOWERING HEALTH KNOWLEDGE:
THE FUTURE ROLE OF MEDICAL LIBRARIES IN ASIA"

Malaysian Medical Library Group
Librarians Association of Malaysia

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MESSAGE FROM THE ADVISOR



Datu Dr. Hajah Rashidah Haji Bolhassan
Advisor
Asia Medical Library Seminar 2026

Special Officer
Ministry of Tourism, Creative Industry and Performing Arts (MTCP) Sarawak

Welcome, Delegates, to Cat City!

We were delighted to welcome you to the Asia Medical Library Seminar (AMLiS) 2026, organised by the Malaysian Medical Library Group (MLG), and especially pleased that AMLiS was held in Kuching for the first time.

This year's theme was Empowering Health Knowledge: The Future Role of Medical Libraries in Asia. As digital medical literature and health data continue to grow rapidly, our profession remains central to advancing evidence-based healthcare.

The Seminar provided an important platform for medical librarians, information specialists, and knowledge managers to connect, collaborate, and examine the expanding role of medical libraries in digital health, clinical research, and policy support.

Our goal was to equip participants with practical skills and meaningful insights to better support clinicians, researchers, and students in an increasingly digital information landscape.

In an era of rapid data growth and evolving health technologies, the challenge is no longer simply gaining access to information, but ensuring access to accurate, authoritative, and actionable evidence.

Medical libraries now serve as engines of clinical decision-making, scholarship, and health equity. As trusted knowledge navigators, synthesisers, and educators, medical librarians help connect complex biomedical evidence with patient care.

From assessing AI-driven search tools to supporting systematic reviews and point-of-care answers, your work continues to strengthen health outcomes. As we explored the future of medical librarianship, we honoured your expertise, critical inquiry, and commitment to the highest professional standards.

An event of this scale was only possible through the dedication of MLG's committee members. We thank our programme committee and abstract reviewers for curating an excellent lineup of presentations, panels, and workshops, and we also extend our appreciation to our sponsors and exhibitors for their steadfast support.

We hope this programme inspired new strategies, meaningful dialogue, and lasting professional connections.

FOREWORD



Norazlina Abdul Rahman
Chairperson
Asia Medical Library Seminar 2026

The Asia Medical Library Seminar (AMLiS) 2026, held on 8–9 September 2026 at the Borneo Cultures Museum, Kuching, Sarawak, brought together medical librarians, information professionals, academics, researchers, healthcare practitioners, and other stakeholders from across the region under the theme “Empowering Health Knowledge: The Future Role of Medical Libraries in Asia.”

The rapid transformation of healthcare information, digital technologies, artificial intelligence, and scholarly communication continues to shape the role of medical libraries. Beyond providing access to information resources, medical libraries have increasingly become important partners in supporting research, education, evidence-based practice, lifelong learning, and the effective use of health information.

AMLiS 2026 provided a valuable regional platform for medical librarians, information professionals, academics, researchers, healthcare practitioners, and other stakeholders to share knowledge, exchange experiences, and explore emerging developments in medical librarianship and health information services. The seminar also strengthened professional networks and encouraged greater collaboration among the medical library community across Asia.

This e-proceedings brings together the scholarly contributions presented during AMLiS 2026. It serves as a record of the ideas, research findings, professional experiences, and perspectives shared throughout the seminar. I hope that these contributions will provide useful references for further discussion, research, innovation, and professional development in the field of medical librarianship.

I would like to express my sincere appreciation to all keynote speakers, invited speakers, presenters, authors, reviewers, committee members, partners, sponsors, and participants for their valuable contributions and support. The success of AMLiS 2026 was made possible through the collective efforts and commitment of everyone involved.

May this e-proceedings serve as a lasting resource that continues to support knowledge sharing, professional collaboration, and the advancement of medical libraries and health information services in Asia.

INTRODUCTION

Empowering Health Knowledge: The Future Role of Medical Libraries in Asia

AMLiS 2026 brought together medical librarians, health information professionals, researchers and other stakeholders from across Asia to share knowledge, exchange perspectives, and explore emerging developments in medical library services.

As healthcare and information landscapes continue to evolve through digital transformation, artificial intelligence, and new approaches to evidence-based practice, medical libraries are increasingly taking on a vital role in supporting research, education, innovation, and informed healthcare decision-making.

The seminar provided an opportunity for participants to engage in relevant conversations, learn from practical experiences and best practices, and discover innovative technologies that can shape the future of medical library services.

More importantly, AMLiS 2026 served to strengthen professional networks and foster meaningful regional collaboration among institutions and professionals across Asia, creating opportunities to learn from one another and develop future partnerships. This e-proceedings brings together contributions covering digital health transformation, clinical research and evidence-based practice, health information equity, and the development of resilient and future-ready medical libraries.

Held in the beautiful city of Kuching, Sarawak, AMLiS 2026 offered participants an opportunity to experience the rich cultural heritage of Borneo. Organised by the Medical Library Group (MLG), a special interest group under the Librarians Association of Malaysia, AMLiS 2026 is part of MLG's commitment to regional collaboration. MLG began as an informal network of medical librarians in Malaysia before being formally established under the Librarians Association of Malaysia.

Over the years, the group has grown into a platform for professional collaboration, knowledge sharing, and the advancement of medical library services through workshops, benchmarking activities evidence-based practice initiatives, and other professional programmes. One of MLG's longstanding initiatives is MediCore: Mininum Holdings of Medical Books for Medical Libraries in Malaysia, with its latest edition launched during the opening of AMLiS 2026. MLG continues to promote professional development, encourage the exchange of expertise and best practices, and strengthen cooperation among medical and health information professionals in Malaysia and beyond.

As part of this effort, MLG hopes to contribute to a stronger and more connected medical library community in Asia, one that is well positioned to respond to changing information needs and contribute meaningfully to the future of healthcare, education and research.

KEYNOTE SPEAKER

KEYNOTE SPEAKER 1



DR. NG TAO TAO, MAGDELINE
Vice University Librarian
National University of Singapore

Dr. Magdeline Ng is Vice University Librarian and the Cluster Head of Digital Strategy and Innovation at National University of Singapore (NUS) Libraries. She also serves on the World Health Organisation Western Pacific Region Librarians Network (WPRLN) and FSTA Librarian Advisory Board.

At NUS, Magdeline co-teaches two popular courses - ALS1010 Strategic Learning: A Holistic Approach to Studying and ALS1020 Learning to Choose Better (general undergraduate electives). She co-authored the book, Strategic Learning: A Holistic Approach to Studying, along with Prof Robert Kamei. Her scholarship includes works on systematic review, pedagogical research and innovative teaching methods.

Beyond her academic and library leadership roles, Dr Magdeline holds a joint appointment with NUS Agility Office that advances NUS's strategic objective and transformative change. Her interests include pedagogical research, digital innovation, educational interventions, and research impact assessment.

She holds a Bachelor of Science (Hons). in Chemistry from National University of Singapore, and Ph.D. in Chemistry from Nanyang Technological University.

At AMLiS 2026, she delivered the keynote presentation entitled "**Scaling Capabilities and Capacities in Health Sciences: The NUS Libraries Playbook.**"

KEYNOTE SPEAKER

KEYNOTE SPEAKER 2



MADAM NOR HASYIMAH MUSTAPA

Chief Librarian,
Dar al-Hikmah Library,
International Islamic University Malaysia

Madam Nor Hasyimah Mustapa is the Chief Librarian of Dar al-Hikmah Library at the International Islamic University Malaysia (IIUM). Having joined IIUM in 1997, she has contributed significantly to the development of the university's library services, including the planning and establishment of its campus libraries in Kuantan and Gambang.

She is a strong advocate for library leadership, staff development, and empowerment. From 2018 to 2020, she served as Chairperson of Malaysia's Medical Librarians Group (MLG), during which she was involved in organising the IFLA 2018 Satellite Meeting on Evidence for Global and Disaster Health. She also coordinated the development of the Guidelines on Managing Library Operations Post Movement Control Order (MCO), which served as a key reference for libraries across Malaysia during the reopening phase following the pandemic.

Madam Nor Hasyimah holds a Bachelor's degree in Library and Information Science from Universiti Teknologi MARA (UiTM) and a Master's degree in the same field from the International Islamic University Malaysia. Her contributions to the profession and institution have also been recognised through the KhAIR Administrative Award at IIUM's Takrim Day 2024.

At AMLiS 2026, she delivered the keynote presentation entitled "**From Custodians to Catalysts: Accelerating Research and Health Information Across Asia.**"

INVITED SPEAKERS

01 REFINING MEDICAL LIBRARIES IN THE DIGITAL HEALTH ECOSYSTEM



Dr. Jamalludin Ab. Rahman (Malaysia)



Mrs. Peangkobfah Punyaphet (Thailand)



Ms. Najin Kim (Republic of Korea)



Dr. Pappu Ram Meena (India)

02 MEDICAL LIBRARIANS AS PARTNERS IN CLINICAL RESEARCH, AND POLICY SUPPORT



Dr. Tang Wing Chung (Hong Kong)



Dr. Prashant Shrivastava (India)



Dr. Steve McDonald (Australia)



Dr. Tzu-heng Chiu (Taiwan)

INVITED SPEAKERS

03 BRIDGING HEALTH INFORMATION GAPS IN DIVERSE AND UNDERSERVED COMMUNITIES



Dr. Cheong Sok Ching
(Malaysia)



Ms. ChingJu Hsiao
(Taiwan)



Dr. Abdul Rashid Khan
(Malaysia)



Dr. Rekaya Anak Vincent Balang
(Malaysia)

04 BUILDING RESILIENT, COLLABORATIVE, AND FUTURE-READY MEDICAL LIBRARIES



Mr. Aziz Alfarisy
(Indonesia)



Dr. Jazlan Jamaluddin
(Malaysia)



Mrs. Ambar Pratiwi
(Indonesia)



Ms. Namita Santra
(Malaysia)

SEMINAR PROGRAMME

DAY 1 : 8 SEPTEMBER 2026 (TUESDAY)

TIME	PROGRAMME
8.00 am - 9.00 am	Registration and Networking Breakfast
9.00 am - 9.45 am	Keynote Address 1 *Scaling Capabilities and Capacities in Health Sciences* **Dr. Magdeline Ng** Vice University Librarian, National University of Singapore
9.45 am - 10.00 am	Product Highlight 1 *The AI-Powered Library: From Medical Education to Clinical Excellence* **Mr. Keat Ang** Director of Business Development, Ed Connect
10.00 am - 10.45 am	Keynote Address 2 *From Custodians to Catalysts: Accelerating Research and Health Information Across Asia* **Madam Nor Hasyimah binti Mustapa** Chief Librarian, International Islamic University Malaysia
10.45 am - 11.00 am	Product Hightlight 2 *Connecting Healthcare Professionals With Trusted Medical Knowledge - When and Where It Matters Most* **Mr. Dirk Fingerhut** Sales Manager, Thieme Sales APAC
11.00 am - 12.00 pm	Opening Ceremony of AMLiS 2026 • National and State Anthems • Welcoming Performance • Doa Recital by Ustaz Haji Wan Muhammad Mujahid bin Wan Alwi • Montage Presentation • Welcoming Remarks by Ms. Norazlina Abdul Rahman, Chairperson of AMLiS 2026 • Opening Address by YB Datuk Amar Professor Dr. Sim Kui Hian, Deputy Premier of Sarawak and Minister of Public Health, Housing and Local Government Sarawak • Official Opening of AMLiS 2026 & Launch of MediCore 3rd ed. • Presentation of Mementos • Group Photo
12.00 pm - 2.00 pm	Lunch

TIME	PROGRAMME
2.00 pm - 4.00 pm	**Sub-theme 1: Refining Medical Libraries in the Digital Health Ecosystem** Chair: Ms. Levas Anak Mejus Perpustakaan Tun Abdul Rahman Ya'kub, UNIMAS Paper 1 *Medical Libraries in Digital Health Transformation: Towards a Knowledge Governance Framework* **Dr. Jamalludin Ab Rahman (Malaysia)** Paper 2 *Navigating Generative AI Policies in Clinical Medical Journals: Implications for Researchers and Medical Librarians* **Mrs. Peangkobfah Punyaphet (Thailand)** Paper 3 *Medical Librarians in the Evidence Ecosystem: Systematic Search Collaboration, Research Education, and AI Literacy in Korea* **Ms. Najin Kim (Republic of Korea)** Paper 4 *Refining Medical Libraries in the Digital Libraries Ecosystem: A Scoping Review of Transformations, Challenges, and Emerging Paradigms* **Dr. P. R. Meena & Dr. Prashant Shrivastava (India)**
4.00 pm - 4.15 pm	Product Highlight 3 *Research Discovery in the Age of AI* **Dr. Diu Seng See** Business & Sales Enablement Manager, iGroup (Asia-Pacific) Inc.
4.15 pm	End of Day 1

SEMINAR PROGRAMME

DAY 2 : 9 SEPTEMBER 2026 (WEDNESDAY)

TIME	PROGRAMME
8.00 am - 9.00 am	Networking Breakfast
9.00 am - 10.30 am	**Sub-theme 2: Medical Librarians as Partners in Clinical Research, and Policy Support** Chair: Ms. Faten Farhana Mohamad Taib RCSI & UCD Malaysia Campus Paper 1 *Beyond Information Retrieval: Medical Librarians as Clinical Research Partners in the Age of AI* **Dr. Tang Wing Chung & Ms. Tina Yang (Hong Kong)** Paper 2 *Medical Librarian as a Strategic Partner in Clinical Research and Health Policy: A Narrative Review from an Evidence-Based Research Data Excellence Perspective* **Dr. Prashant Shrivastava (India)** Paper 3 *Living Evidence Synthesis and AI-Enabled Evidence Surveillance* **Dr. Steve McDonald (Australia)** Paper 4 *An Exploratory Study of the Role of Medical Librarians in Systematic Review Research: Experiences From Several Major Hospital Libraries in Taiwan* **Dr. Tzu-heng Chiu (Taiwan)**
10.30 am - 11.00 am	Tea Break

TIME	PROGRAMME
11.00 am - 12.30 pm	**Sub-theme 3: Bridging Health Information Gaps in Diverse and Underserved Communities** Chair: Ms. Rosyidah Taju Rahim Dar al-Hikmah Library, International Islamic University Malaysia (Kuantan) Paper 1 *Bridging Health Information Gaps Through Community Empowerment: Lessons from NORA® and MeMoSA® in Malaysia* **Dr. Cheong Sok Ching (Malaysia)** Paper 2 *Win Win Win: The Bargain Experience of VHCNet (Veterans Hospital Cooperation Network) in Taiwan* **Ms. ChingJu Hsiao (Taiwan)** Paper 3 *Trust, Tech, and Translation: Closing the Health Literacy Gap in Indigenous Populations* **Dr. Abdul Rashid Khan (Malaysia)** Paper 4 *Beyond the Digital Divide: Delivering Trusted Health Information to Remote and Indigenous Communities in Borneo* **Dr. Rekaya Anak Vincent Balang (Malaysia)**
12.30 pm - 2.30 pm	Lunch
2.30 pm - 2.45 pm	Product Highlight 4 *The Question Behind the Query: AI-Powered Discovery for Medical Librarians* **Mr. Chew Ching Wei** Library Service Engineer, EBSCO International Inc.

TIME	PROGRAMME
2.45 pm - 4.15 pm	**Sub-theme 4: Building Resilient, Collaborative, and Future-Ready Medical Libraries** Chair: Mr. Wan Mazli Wan Razali Sarawak State Library Paper 1 *The Role of Kariadi Hospital Library in Building a Resilient and Collaborative Medical Library* **Mr. Aziz Alfarisy (Indonesia)** Paper 2 *Collaborative Knowledge for Better Care: Medical Libraries as Partners in Evidence-Based Medicine* **Dr. Jazlan Jamaluddin (Malaysia)** Paper 3 *From Practice to Innovation: Advancing Resilient and Visionary Medical Libraries Tarumanagara University Libraries* **Mrs. Ambar Pratiwi (Indonesia)** Paper 4 *Building Future-Readiness: A Collaborative Model at Monash Malaysia Library* **Ms. Namita Santra & Ms. Aniza Ahmad (Malaysia)**
4.15 pm - 4.45 pm	Closing Ceremony by Datu Dr Rashidah Bolhassan, Advisor of AMLiS 2026
4.45 pm	End of AMLiS 2026

KEYNOTE ADDRESSES

Scaling Capabilities and Capacities in Health Sciences: The NUS Libraries Playbook

Dr. Ng Tao Tao, Magdeline

NUS Libraries, National University of Singapore,
Singapore

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Abstract

As artificial intelligence (AI) rapidly reshapes the ways learners, educators, and researchers discover, access, evaluate, and synthesize scientific evidence, academic medical libraries must evolve beyond their traditional role as providers of information access to become trusted navigators within increasingly complex health information ecosystems. To remain relevant in this changing landscape, NUS Libraries has strategically repositioned itself as a digitally enabled, trusted intermediary that bridges reliable evidence and responsible AI adoption. This keynote address presents NUS Libraries' strategic framework and operational playbook for strengthening health sciences librarianship, advancing interprofessional healthcare education, and supporting evidence-based practice across academic, research, and clinical communities. The playbook is anchored on five interconnected strategic pillars: 1. Faculty-Librarian Curriculum Co-Design, 2. Interprofessional Healthcare Education, 3. AI Innovations in Evidence Synthesis, 4. Transformed Spaces & Experiential Programmes, and 5. Global and Regional Network Expansion Through these initiatives, NUS Libraries offers a proactive and scalable model for academic medical libraries in Asia. The keynote illustrates how librarians can serve as strategic partners in healthcare education, innovators in evidence synthesis, and champions of equitable access to trusted health information at both regional and global levels. By combining human expertise with emerging AI capabilities, academic medical libraries can strengthen their role as "Architects of Trust" in an era of information abundance and increasing complexity.

Keywords: Artificial intelligence (AI) literacy; Interprofessional education; Evidence synthesis; Medical libraries; Academic libraries

From Custodians to Catalysts: Accelerating Research and Health Information Across Asia

Nor Hasyimah Mustapa

International Islamic University Malaysia,
Jalan Gombak, Kuala Lumpur, Malaysia

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Abstract

Health knowledge is expanding rapidly, with over 40 million biomedical citations indexed in PubMed, alongside shifting demographics and AI-driven transformations in information delivery. Concurrently, recent cases of academic fraud such as fake identities and unverified findings presented at the 2026 Copenhagen pneumonia conference, demonstrate how unvetted evidence can quietly enter the literature, risking dangerous clinical or policy decisions if information access and evaluation remain unchecked. This keynote explores the imperative for medical libraries and library professionals to evolve from traditional custodians to strategic catalysts for discovery, accelerated research, and trustworthy knowledge translation. Using trends and real-world examples from Malaysia, Indonesia, and Taiwan, this talk presents a simple three-part framework: intelligence, identity, and interconnection. The presentation addresses both the opportunities and risks associated with artificial intelligence, outlines the emerging core competencies required of information professionals, and examines ongoing regional partnerships that bridge infrastructure gaps. The keynote demonstrates how collaborative networks among Asia's medical libraries can establish a global model for accelerating health research and improving information access, offering a concrete roadmap for moving the profession from custodians of collections to active catalysts for health knowledge. Librarians are no longer just helping people find information; they are teaching them how to trust it.

Keywords: Medical libraries; Library professionals; Artificial intelligence; Health knowledge; Regional collaboration

Sub-Theme 1: Refining Medical Libraries in the Digital Health Ecosystem

Chair:
Levas Anak Mejus
Perpustakaan Tun Abdul Rahman Ya'kub,
Universiti Malaysia Sarawak

Medical Libraries in Digital Health Transformation: Towards a Knowledge Governance Framework

Dr. Jamalludin Ab. Rahman

International Islamic University Malaysia,
Centre for Natural and Health Sciences,
Kuantan Campus, Malaysia

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Abstract

Medical libraries were built to solve one problem: giving people access to medical knowledge they could not find on their own. That problem has largely been solved. Open-access publishing, preprint servers, and artificial intelligence (AI) tools now make biomedical information available to almost anyone. Yet healthcare professionals are still making poor decisions based on false or low-quality information. Access was never enough. What is needed is governance: institutions that take responsibility for the quality, accuracy, and ethical use of medical knowledge. This paper proposes a Knowledge Governance Framework (KGF) for medical libraries built around four areas: Evidence Integrity, AI Stewardship, Digital Scholarship Infrastructure, and Health Information Equity. The framework is grounded in an ethical principle that knowledge carries obligations and must be managed in service of those who depend on it. Medical libraries that adopt this framework will not simply help people find information. They will help ensure that the information found is worth trusting.

Keywords: Medical libraries; Digital health; Knowledge governance; Artificial intelligence; Evidence integrity; Infodemic; Health information equity

1. Introduction

For most of the twentieth century, medical libraries served a clear purpose. They collected books, journals, and databases so that doctors, researchers, teachers, and students could access knowledge they could not obtain on their own. The library was the gatekeeper. If you wanted reliable medical information, you went to the library.

That world no longer exists. Today, a doctor working in a rural clinic can retrieve hundreds of research articles within minutes using a smartphone. Preprint servers publish findings before peer review. AI tools can summarise entire fields of research on demand. Access to medical information has never been easier.

Yet something has gone wrong. More information is available than ever before, but healthcare decisions are not getting better. False health claims spread rapidly through social media. Journals that charge fees to publish articles without proper review are proliferating. AI tools produce confident-sounding medical summaries that are sometimes factually wrong. The COVID-19 pandemic showed the consequences clearly. The World Health Organization called it an

"infodemic": a flood of information, much of it false, that made it harder for the public and health workers to respond effectively (Zarocostas, 2020).

Three examples illustrate the problem. First, during the COVID-19 pandemic, studies with serious methodological flaws and, in some cases, fabricated data were published rapidly and widely cited before retraction, directly influencing treatment decisions in hospitals across several countries (Zarocostas, 2020). Clinicians administered unproven therapies based on findings that were later withdrawn, sometimes with harmful consequences. Second, retracted studies are known to continue accumulating citations for years after their retraction notices are published, meaning that flawed or fraudulent findings quietly shape clinical practice and systematic reviews long after their formal withdrawal. Third, AI tools used for clinical information retrieval have been shown to produce fabricated references and inaccurate treatment recommendations, yet many students and junior clinicians use these tools without verification or institutional guidance (van Dis et al., 2023). In each case, the failure was not one of access. It was a failure of governance.

The problem is not that people lack access to information. The problem is that they cannot tell good information from bad. No one is taking responsibility for the quality of the knowledge environment in which healthcare decisions are made. This paper argues that medical libraries should take on that responsibility. They have the skills, the position, and the professional values to do it. What they need is a clear framework.

This paper proposes the Knowledge Governance Framework (KGF), which organises the governance role of medical libraries into four areas. Section 2 reviews what the literature says about the current challenges in health information. Section 3 explains how the paper was developed. Section 4 presents the KGF and its four areas in detail. Section 5 offers conclusions and practical recommendations.

2. Literature Review

2.1 An Ethical Foundation: Knowledge as Stewardship

A practical framework for knowledge governance requires more than a management strategy. It requires a view of what knowledge is and what obligations come with holding it. This paper draws on a foundational ethical principle found across multiple intellectual traditions: that knowledge is not a commodity to be traded but a trust to be managed responsibly for the benefit of others.

This principle has been articulated with particular clarity in the Islamic intellectual tradition through the concept of amanah, meaning trusteeship or a trust held on behalf of others. Those who hold, transmit, or manage knowledge do not own it. They are responsible for it. If knowledge is distorted, suppressed, misrepresented, or carelessly passed on, the trust has been broken. Al-Faruqi (1982), al-Attas (1978), and Osman Bakar (1991) each developed this idea in the context of knowledge systems, arguing that all knowledge shares a common ethical character regardless of its disciplinary domain. The unity of knowledge means that scientific, clinical, and social knowledge cannot be treated as separate territories with different standards of care. The same obligation of fidelity applies across all of them.

The practical implication for medical libraries is direct. If knowledge is a trust, then providing access without ensuring quality is an incomplete discharge of that responsibility. A library that makes information available without validating its integrity, distinguishing reliable from unreliable sources, or governing how AI tools synthesise evidence for clinical use, has not fulfilled

its stewardship role. Governance is not an optional addition to access. It follows necessarily from a view of knowledge as something held in trust for the people who depend on it.

This ethical framing is not restricted to any single cultural or religious tradition. The principle that those who manage knowledge bear responsibility for its quality and use is recoverable from many philosophical traditions and from the professional ethics of medicine, science, and librarianship itself. It is offered here because it provides a stronger foundation for the KGF than efficiency arguments alone, and because it connects naturally to the public health ethic that motivates much of what medical libraries do: the commitment to knowledge in service of human welfare.

2.2 The Changing Role of Medical Libraries

The role of medical libraries has been changing for decades. Cox et al. (2019) showed how academic libraries were maturing into partners in research management, supporting data storage, open access publishing, and research data archiving as their research data services developed.

The PRESS guideline (McGowan et al., 2016) formalised the role of librarians in designing search strategies for systematic reviews, recognising them as methodological contributors to research, not just support staff.

These developments point in a consistent direction. Medical libraries are moving from providing access to participating in the production and validation of knowledge. What is missing from the existing literature is a unified framework that brings these contributions together under a single governance model.

2.3 Challenges in the Current Health Information Environment

The digital health environment has created serious problems for the quality of medical information. Davenport and Kalakota (2019) described how AI is being integrated into clinical decision-making, diagnostics, and documentation. Topol (2019) argued that AI has real potential to improve healthcare but only if the information systems that support it are trustworthy. Both authors point to information quality as the critical issue.

Predatory journals are a growing concern. These are publications that look like legitimate scientific journals but do not conduct proper peer review. Beall (2012) was among the first to name this problem systematically. Later work by Shamseer et al. (2017) showed that findings from predatory journals are finding their way into systematic reviews and clinical guidelines, corrupting the evidence base that clinical decisions depend on.

Generative AI tools introduce a different type of risk. Van Dis et al. (2023) identified several serious concerns, including the tendency of large language models to produce false but plausible-sounding references, incorrect medical recommendations, and outputs that reflect the biases in their training data. These errors are particularly dangerous because they are difficult to detect. A fabricated citation looks exactly like a real one.

The COVID-19 infodemic illustrated the public health consequences of a broken information environment. False claims about vaccines, treatments, and transmission spread faster than accurate guidance. Zarocostas (2020) described how this complicated every aspect of the pandemic response. The infodemic was not caused by a lack of access to information. It was caused by a failure to govern the quality of information that reached the public and health workers.

3. Research Methodology

This paper takes a conceptual approach, drawing loosely on the framework development tradition described by Jabareen (2009). Literature was identified purposively rather than exhaustively, drawing on PubMed, Scopus, and WHO policy documents across three thematic areas: challenges in digital health information, the changing role of medical libraries, and the ethical foundations of knowledge governance.

Four recurring challenges were identified across the literature: evidence quality, AI risk, research infrastructure, and information inequality. These were then mapped to the existing competencies of medical librarians to produce a set of practical governance functions that libraries can adopt.

The result is the KGF, a purposively constructed conceptual tool rather than a product of exhaustive systematic searching. It is designed to be practical, not just theoretical. Each of its four domains identifies a specific problem, explains what medical libraries can do about it, and suggests concrete actions.

4. Discussion: The Knowledge Governance Framework

The KGF is built on a simple premise. Medical libraries should stop defining their value by how much information they can provide and start defining it by how much they can improve the quality of the information environment around them. The four domains draw on competencies that medical librarians already possess, including literature searching, evidence retrieval, search quality assurance, source evaluation, and research data management, as demonstrated in the existing literature (McGowan et al., 2016; Shamseer et al., 2017; Cox et al., 2019). The four domains of the KGF each address one aspect of that environment.

4.1 Domain 1: Evidence Integrity

Evidence integrity means making sure that the information used in clinical decisions, research, and education has actually been checked. It means distinguishing between well-conducted studies and poor ones, between genuine journals and predatory ones, between accurate AI summaries and fabricated ones.

Medical librarians have the skills to do this work. They are trained in literature searching, source evaluation, and search quality assurance. The PRESS guideline (McGowan et al., 2016) already recognises their contribution to systematic reviews. But this contribution should go further. Librarians are well positioned to contribute to clinical guideline development teams. They can monitor whether retracted studies are still being cited. They can develop protocols for reviewing AI-generated literature summaries before those summaries inform care decisions.

In practical terms, this might mean setting up a retraction alert service for the institution, training clinical teams to recognise predatory journals, or developing a checklist for verifying AI-generated medical content before use. None of these require new skills. They require a shift in how the library defines its role.

4.2 Domain 2: AI Stewardship

AI tools are already being used by students, doctors, and researchers to find and summarise medical information. Most of this is happening without any institutional guidance. No one is checking whether the tools being used are reliable. No one is teaching users what to do when a tool produces a wrong answer.

Medical libraries are well positioned to take a leading role in this. They already manage information quality standards. The skills needed to evaluate an AI output, asking where the information comes from, whether the citations are real, whether the summary is consistent with the original sources, are the same skills librarians apply to any other source.

Practically, this domain might involve developing institutional guidelines on which AI tools are appropriate for which tasks. It could include running training sessions on how to check AI-generated content, for both students and clinical staff. It might mean developing verification steps for the research process, so that AI-assisted literature reviews can be quality-checked before use. The goal is not to block AI. It is to make sure AI is used responsibly.

The governance challenge extends beyond clinical settings into academic writing itself, and this is where the debate remains genuinely unresolved. Most publishers, including *Nature*, *The Lancet*, and the International Committee of Medical Journal Editors, now agree on two points: AI cannot be listed as an author because it cannot be held accountable, and any use of AI in preparing a manuscript must be disclosed. Beyond those two points, consensus breaks down. Using AI to edit grammar is widely accepted. Using AI to search and summarise literature is contested. Using AI to draft arguments and structure a paper sits in genuinely disputed territory, with some journals prohibiting it outright and others permitting it with disclosure.

One particular risk deserves emphasis because it is poorly understood even among researchers who use AI regularly. Large language models generate references that look entirely legitimate but do not exist. The author names are plausible, the journal titles are real, the volume and page numbers follow the correct format. But the paper was never published. This is not a minor formatting error. It is a form of unintentional fabrication, and it contaminates the evidence base in the same way a fraudulent study does. The difference is that a fabricated study can sometimes be traced back. A fabricated reference simply disappears when someone tries to retrieve it. Researchers who use AI for literature work without independent verification of every citation are unknowingly introducing this risk into their work.

The principle that emerges from this debate is straightforward. Human authorship requires human judgment applied to the output, not just human direction of the input. Declaring AI use and then verifying nothing is disclosure without governance. What responsible use looks like in practice is this: the author provides the intellectual direction, the AI assists with structure and language, and the author independently verifies all claims, references, and factual assertions before submission. This paper was developed using that process. All references were verified through independent database searches. Errors found during verification were corrected. Claims about library science practice were reviewed for accuracy. Medical libraries can play a meaningful role in establishing and teaching these standards, precisely because source verification, evidence quality assessment, and research integrity are already central to what they do.

4.3 Domain 3: Digital Scholarship Infrastructure

Research today produces much more than journal articles. It produces datasets, codes, survey instruments, registered protocols, preprints, and grey literature. Most research teams have no clear system for managing these outputs. They are often stored on personal laptops, shared through email, or simply lost when a researcher moves institution.

This matters for two reasons. First, it makes research harder to reproduce. If no one can find the original dataset or check the analysis code, the findings cannot be verified. Second, it means valuable public health data is routinely wasted. In large national health surveys, for example, datasets that took years to build may be inaccessible within a few years of the study completing. Medical libraries can address this by providing research data management support: helping teams to store, document, and share their data in an organised way. Cox et al. (2019) showed that academic libraries are already developing these capabilities as part of maturing research data services. The medical library context adds additional considerations around patient data privacy, ethical approval, and data sharing agreements. Libraries that build expertise in these areas become genuinely useful partners in research governance, not just repositories for finished publications.

4.4 Domain 4: Health Information Equity

Not everyone has the same access to good health information. A doctor at a well-resourced university hospital has colleagues, databases, and institutional support to help evaluate complex evidence. A nurse working in a rural health clinic may have none of these. A patient researching their own condition online encounters a mix of accurate guidance, commercial content, and outright misinformation, with no reliable way to tell them apart.

The COVID-19 pandemic made this inequality visible. Misinformation caused the most damage in communities where institutional information governance was weakest (Zarocostas, 2020). This is not simply a social justice concern, though it is that. It is a patient safety concern. Unequal access to trustworthy health information leads to unequal health outcomes.

Medical libraries serving regional campuses, community hospitals, and teaching institutions in lower-resource settings have a specific role to play here. They can develop accessible, verified health information for clinical staff who do not have research training. They can partner with public health units to counter misinformation at the community level. They can build digital literacy programmes that reflect the actual needs and limitations of their users, rather than assuming the same competencies as elite urban institutions.

4.5 Making the Framework Work in Practice

Adopting the KGF requires changes at three levels. At the professional level, medical librarians need to be recognised differently. They should be listed as co-investigators on systematic reviews, not just acknowledged in the methods section. Representation on research ethics committees and institutional AI governance bodies would further formalise this contribution. Their contributions to research quality should be documented and counted in institutional assessments.

At the measurement level, the way libraries report their impact needs to change. Counting loans and database logins does not capture governance value. Better measures would include: how many systematic reviews included a librarian-designed search strategy, how many staff completed AI literacy training, how many datasets were properly archived through library support. Without better metrics, governance work stays invisible to those who make budget decisions.

At the engagement level, the timing of library involvement matters. Currently, librarians are often consulted at the end of a research project, when the literature review is already written and the analysis is done. Governance means being involved at the beginning: when the research question is being formed, when the search strategy is being designed, when the data management plan is being written. Libraries that wait to be asked will always be too late to govern anything.

5. Conclusion and Recommendations

This paper started from a simple observation. Medical libraries were built to give people access to knowledge they could not find on their own. That problem has been largely solved by digital technology. But a harder problem has taken its place: how do we ensure that the vast amount of available health information is actually trustworthy?

Knowledge is not a product. It is a trust. Those who manage it have a duty to protect its integrity, ensure it serves human welfare, and return it, in the end, to its purpose: guiding people toward what is true and good. This is not a task that digital technology can perform on its own. It requires human judgment, professional commitment, and institutional responsibility.

Medical libraries can provide all three. The KGF proposed in this paper gives them a structure for doing so. Its four domains, Evidence Integrity, AI Stewardship, Digital Scholarship Infrastructure, and Health Information Equity, each address a real and growing problem. Together, they define what it would mean for a medical library to take genuine responsibility for the quality of the knowledge environment it serves.

Four recommendations follow from this analysis. First, medical library associations should work to formalise the recognition of librarians as research methodology partners, including authorship credit for search strategy contributions and representation on governance bodies. Second, library impact metrics should be reformed to capture governance contributions rather than access statistics. Third, health sciences faculties should embed librarians in research protocol review from the design stage. Fourth, national health information policy should involve medical library networks as active governance partners.

Future research should test these ideas in practice. How much does librarian involvement at the protocol stage improve systematic review quality? How effective are library-led AI literacy programmes in changing student behaviour? What does a well-functioning health information equity programme look like in a regional hospital setting? The framework proposed here is a starting point. The answers to these questions will refine it.

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AI Use Declaration

This paper was developed with the assistance of a large language model (Claude, Anthropic). The author provided all intellectual direction, including the conceptual framework, thematic focus, and theoretical grounding. AI assistance was used for drafting and structuring the manuscript. All references were independently verified using Scite (scite.ai) and database searches prior to submission. Additional relevant references were identified and incorporated during this process. Errors identified during verification were corrected. The author accepts full responsibility for all content in this paper.

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Supplementary Material

The following tables document the methodological steps underlying the development of the Knowledge Governance Framework (KGF). They map the literature sources used to the three thematic areas of the review, identify the four recurring governance challenges, align each challenge with existing medical library competencies, and show how the four KGF domains emerged from this process.

Table S1. Literature sources by thematic area

Thematic area	Sources used	Role in framework
Challenges in digital health information	Zarocostas (2020); van Dis et al. (2023); Beall (2012); Shamseer et al. (2017); Davenport & Kalakota (2019); Topol (2019)	Identified the four governance challenges the KGF must address
Changing role of medical libraries	Cox et al. (2019); McGowan et al. (2016); WHO (2021)	Showed existing library competencies available for governance work
Ethical foundations of knowledge governance	Al-Faruqi (1982); Al-Attas (1978); Osman Bakar (1991); Jabareen (2009)	Provided the normative foundation and framework development method

Table S2. Four recurring challenges mapped to library competencies and KGF domains

Challenge identified	Supporting sources	Library competency applied	KGF domain
Evidence quality: false, retracted, and predatory publications entering clinical practice	Beall (2012); Shamseer et al. (2017); Zarocostas (2020)	Literature searching; evidence retrieval; search quality assurance; source evaluation	Evidence integrity
AI risk: hallucinated citations and inaccurate clinical summaries from generative AI tools	van Dis et al. (2023); Davenport & Kalakota (2019); Topol (2019)	Source verification; information literacy instruction; institutional policy support	AI stewardship
Research infrastructure: loss of datasets, poor documentation, reproducibility failures	Cox et al. (2019); WHO (2021)	Research data management; institutional repository; open access advisory	Digital scholarship infrastructure
Information inequality: unequal access to trustworthy information across institutions and regions	Zarocostas (2020); WHO (2021)	Information literacy instruction; community health information; digital literacy training	Health information equity

Table S3. Resulting framework: Knowledge Governance Framework (KGF)

Domain	Core function	Governance obligation
Evidence integrity	Validating the quality and provenance of information entering clinical and research use	Ensure only trustworthy evidence informs decisions
AI stewardship	Governing institutional use of AI-assisted information tools	Ensure AI tools are used responsibly and outputs are verified
Digital scholarship infrastructure	Managing research outputs, data, and open science compliance	Ensure research is reproducible, accessible, and preserved
Health information equity	Reducing disparities in access to credible health information	Ensure all users have access to trustworthy knowledge
Philosophical foundation	Knowledge as amanah (trusteeship). Al-Faruqi (1982); Al-Attas (1978); Osman Bakar (1991)	Knowledge is a trust. Governance is a moral duty, not a management choice.

Navigating Generative AI Policies in Clinical Medical Journals: Implications for Researchers and Medical Librarians

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Abstract

This study examined policies governing the use of generative artificial intelligence (AI) in manuscript preparation among clinical medical journals and identified current guidance for its application in scholarly writing. Policies were reviewed from 5,307 clinical medicine journals indexed in the Web of Science database across 68 categories. The findings revealed that 4,512 journals (85.1%) referenced recommendations from the International Committee of Medical Journal Editors (ICMJE). A total of 1,047 journals (20.8%) explicitly permitted the use of generative AI for literature searching, while 4,176 journals (82.9%) allowed AI-assisted manuscript development, including research question formulation, content organisation, data synthesis, interpretation, and identification of gaps in the literature. In addition, 3,080 journals (61.2%) permitted the use of generative AI for language editing, such as grammar checking and manuscript organisation, whereas 1,605 journals (31.8%) allowed its use for image enhancement or generation. The results indicate that policies concerning generative AI in clinical medical journals are rapidly evolving and increasingly integrated into editorial guidance. These findings underscore the need for evidence-based best-practice recommendations to support the responsible, transparent, and ethical use of generative AI in scholarly manuscript preparation.

Keywords: Generative artificial intelligence; Research article writing; Scholarly journal policies

1. Introduction

Generative artificial intelligence (generative AI) has quickly become part of the research and scholarly communication landscape. These technologies can generate new content—including text, images, audio, video, and computer code—in response to user prompts. The rapid adoption of large language model–based tools such as ChatGPT, Google Gemini, and Claude has expanded the use of generative AI across education, healthcare, research, and academic publishing (Sallam, 2023).

In medical research and scientific writing, generative AI can assist with a range of tasks, including developing search terms, summarizing literature, organizing ideas, creating outlines, drafting and revising text, improving grammar and readability, and translating content (Lee et al., 2023). For researchers working in a language other than their first language, these tools may offer particular value by reducing the time required for routine writing and editing tasks.

At the same time, generative AI cannot replace subject expertise, critical judgment, or human accountability. AI-generated content may appear authoritative while containing inaccurate statements, fabricated references, incomplete interpretations, or hidden bias. Margetts et al. (2024)

found that AI-assisted writing reduced drafting time, but manuscripts produced with greater reliance on AI contained more incorrect references and still required substantial human review before they were suitable for publication. These findings reinforce a central principle of responsible AI use: efficiency does not eliminate the need for verification.

The use of generative AI in scholarly publishing also raises concerns related to plagiarism, attribution, copyright, confidentiality, authorship, and research integrity. In clinical research, the risks are especially significant because researchers may enter patient information, unpublished findings, confidential manuscripts, or other protected data into externally operated AI platforms. Editors and peer reviewers face similar concerns when using AI tools to evaluate submitted manuscripts. Once confidential material is uploaded to a third-party system, the user may have limited control over how that information is stored, processed, or reused (Cheng et al., 2025; Sallam, 2023).

Professional and editorial organizations have responded by issuing guidance on the responsible use of AI in medical publishing. The International Committee of Medical Journal Editors (ICMJE) states that AI tools should not be listed as authors because they cannot take responsibility for the accuracy, integrity, or originality of a manuscript. Human authors remain accountable for all submitted content and should disclose which AI tools were used and how they were used. The ICMJE also advises editors and reviewers not to upload confidential manuscripts to AI systems when privacy and confidentiality cannot be assured. The Committee on Publication Ethics (COPE) similarly emphasizes that AI cannot meet the requirements for authorship and that human authors remain fully responsible for AI-assisted work.

Despite these international recommendations, journal and publisher policies remain inconsistent. Journals differ in whether they permit generative AI for literature searching, manuscript drafting, language and grammar editing, image generation or enhancement, and peer review. Some journals allow limited language assistance while prohibiting the generation of scientific content or images. Disclosure requirements also vary. Journals may require authors to report AI use in the Methods section, Acknowledgements, cover letter, or a separate disclosure statement. In addition, publisher-level guidance may not always be clearly reflected in the instructions of every journal within the same publishing group.

This lack of consistency creates a practical challenge for researchers. Authors must determine not only whether AI use is allowed, but also which uses are permitted, restricted, or prohibited. They must also understand whether different requirements apply to text, references, images, confidential information, and peer review. Because these policies continue to evolve, researchers cannot assume that the practices accepted by one journal will be accepted by another.

Medical librarians are well positioned to help researchers navigate this changing environment. Their expertise in literature searching, information evaluation, research consultation, scholarly communication, and publication support provides a strong foundation for AI-related services. Medical librarians can help researchers locate and interpret journal policies, compare requirements across target journals, evaluate AI-generated information and references, protect confidential information, and prepare appropriate disclosure statements. They can also contribute to AI literacy programs and institutional guidance on responsible AI use. However, empirical evidence directly evaluating the effectiveness of medical librarian–led AI policy services remains limited.

This study therefore examined generative AI policies among journals indexed in 59 Web of Science Clinical Medicine categories. Specifically, it aimed to: (1) determine the extent to which journals referred to ICMJE recommendations; (2) classify policies concerning the use of generative AI for literature searching, manuscript writing, grammar and style improvement, and image generation or enhancement; (3) examine disclosure requirements and policies concerning AI use in peer review; (4) identify variations across clinical subject categories and major publishers; and (5) discuss the implications of these policies for researchers and medical librarians. By mapping the current policy landscape, this study seeks to support clearer publication guidance, more responsible use of generative AI, and the continued development of research and scholarly communication services in medical libraries.

2. Literature Review

Generative AI refers to computational models that produce new content, including text, images, audio, video, and code, by learning statistical patterns from large datasets. The development of transformer-based language models substantially expanded the capacity of AI systems to generate fluent, context-sensitive text (Brown et al., 2020). More recent systems have been integrated into widely available tools, making generative AI accessible to researchers, students, clinicians, editors, and other participants in scholarly communication.

Within academic publishing, the significance of generative AI lies less in the novelty of individual products than in their ability to support or automate elements of knowledge production. These systems can generate summaries, reorganize information, suggest language, produce preliminary drafts, and transform content across formats. At the same time, they do not independently establish the validity of evidence, understand disciplinary context in the manner of a human expert, or accept responsibility for errors. Consequently, the use of generative AI in scholarly communication must be understood as a sociotechnical practice involving human judgment, editorial rules, research integrity, and institutional accountability.

Generative AI can support several stages of the research and writing process. Reported applications include developing search terms, summarizing literature, organizing ideas, generating outlines, drafting or revising text, improving grammar and readability, translating content, and assisting with scientific communication (Lee et al., 2023; Sallam, 2023). These functions may be particularly valuable for researchers writing in a language other than their first language or working under substantial time constraints. Evidence also demonstrates that efficiency gains must be balanced against accuracy. Margetts et al. (2024) compared human-written, AI-generated, and human-AI collaborative drafts of a scientific review article. AI-supported approaches reduced drafting time, but the AI-only manuscript contained a higher proportion of incorrect references and all versions required substantial human revision before publication. Babl and Babl (2023) similarly showed that ChatGPT could generate a well-structured academic abstract from supplied data, but one of the references was fabricated. These studies illustrate a recurring limitation: generative AI can produce convincing scholarly prose while introducing factual or bibliographic errors. Reviews of generative AI in healthcare and academic writing identify additional concerns, including hallucinated information, bias, incomplete reasoning, outdated knowledge, inconsistent reproducibility, copyright uncertainty, and unequal access to advanced paid tools (Sallam, 2023). Generative AI may therefore function as a writing or organizational assistant, but its output requires verification against reliable sources and review by researchers with appropriate subject expertise.

The use of generative AI in medical publishing raises questions about authorship, accountability, transparency, confidentiality, and intellectual property. AI systems cannot satisfy accepted authorship criteria because they cannot approve a final manuscript, respond to questions about its integrity, disclose conflicts of interest, or assume legal and ethical responsibility. The ICMJE therefore states that AI and AI-assisted technologies should not be listed or cited as authors and that human authors remain accountable for all submitted material (International Committee of Medical Journal Editors [ICMJE], 2026).

The International Committee of Medical Journal Editors provides guidance for authors, reviewers, and editors. The ICMJE states that authors should disclose the AI tool used and its purpose, carefully review AI-generated content, verify citations, and remain accountable for the submitted work. It also advises reviewers and editors not to upload manuscripts to AI systems when confidentiality cannot be assured without the authors' explicit permission. Journals are encouraged to establish and communicate clear policies for AI use throughout the editorial process (ICMJE, 2026) Confidentiality is especially important in clinical medicine. Manuscripts may contain unpublished findings, identifiable patient information, proprietary methods, or intellectual property. Uploading such material to third-party AI platforms may expose it to storage, processing, or reuse conditions that are not transparent to authors or reviewers. Responsible AI governance must therefore address not only the accuracy of generated content but also data protection, informed authorization, and the preservation of trust in peer review.

International studies show substantial variation in how journals and publishers regulate generative AI. Ganjavi et al. (2024) examined the 100 largest academic publishers and 100 highly ranked scientific journals. Only 24% of publishers had issued generative AI guidance, compared with 87% of the journals. Among organizations with guidance, most prohibited listing AI as an author, but disclosure requirements and the location of disclosure statements varied. The study also identified inconsistencies between journal-level and publisher-level instructions.

Specialty-specific research has produced similar findings. Inam et al. (2024) reviewed leading cardiology and cardiovascular medicine journals and found that AI-assisted scientific writing was generally permitted within defined limits, while AI authorship and AI-generated images were restricted. Policies for peer review were more prohibitive because of confidentiality concerns. These findings demonstrate that permission to use AI for language assistance should not be interpreted as permission to generate substantive scientific content or visual material.

Yin et al. (2025) conducted a cross-sectional study of medical journals and found that most journals either published their own generative AI guidelines or referred users to external guidance. However, important areas—such as AI use for data analysis and interpretation—were frequently not addressed. Journals with lower SCImago Journal Rank scores were less likely to provide guidance. This pattern suggests that researchers may encounter the greatest uncertainty in journals with limited editorial resources or less developed policy infrastructure.

Policies for AI use in peer review also remain inconsistent. Li et al. (2024) examined the top 100 medical journals and found that 78 provided guidance on AI use in peer review. Among those journals, 46 explicitly prohibited AI use, while others permitted restricted use when confidentiality and authorship rights were protected. Most journals with guidance prohibited uploading manuscript-related content to AI platforms. Together, these studies indicate that AI policy is

becoming a core component of editorial governance, but the level of detail, accessibility, and restrictiveness still varies across journals, disciplines, and publishers.

Medical librarians have established responsibilities in literature searching, evidence appraisal, research consultation, scholarly communication, and publication support. These competencies provide a logical foundation for new services related to generative AI. Librarians can assist researchers in locating journal and publisher policies, comparing requirements among target journals, verifying AI-generated references, identifying disclosure requirements, and recognizing confidentiality risks. An international librarianship perspective also emphasizes information literacy rather than tool promotion. Responsible AI support should help users understand how outputs are produced, evaluate the authority and provenance of information, document AI assistance, and retain human accountability. Medical librarians may therefore serve as policy navigators and AI literacy educators within research support programs. However, empirical evidence directly measuring the effect of librarian-led AI policy consultation on manuscript quality, acceptance rates, or research integrity outcomes remains limited. This remains an important area for future research.

The international literature converges on four findings. First, generative AI can reduce the time required for selected writing and editing tasks, but it may generate inaccurate content and fabricated references. Second, human authors remain responsible for the accuracy, originality, and ethical integrity of submitted work. Third, international organizations agree that AI cannot qualify for authorship and that its use should be transparent. Fourth, journal and publisher policies remain uneven in scope and detail, particularly in relation to images, data analysis, disclosure location, and peer review.

Previous studies have generally focused on highly ranked journals, selected medical specialties, major publishers, or limited samples. Their findings provide important evidence of policy variation but do not fully describe the policy landscape across the breadth of clinical medicine. A larger analysis covering multiple clinical categories is needed to determine whether journals refer to ICMJE recommendations, how they regulate different forms of AI assistance, and where policy gaps remain.

The literature establishes that generative AI policy is now a significant issue in medical publishing, yet three gaps remain. First, many studies evaluate only a small number of leading journals and may not represent the wider clinical publishing environment. Second, policy categories are often treated broadly, even though journals may distinguish among literature searching, manuscript writing, grammar and style editing, image generation or enhancement, disclosure, and peer review. Third, the implications of policy variation for research and publication support services have received limited attention.

The present study addresses these gaps by examining generative AI policies across 59 Web of Science Clinical Medicine categories. It classifies policies by type of AI use, identifies patterns across clinical fields and publishers, and considers how the findings can inform researchers and medical librarians. This broader approach is intended to provide a more representative account of current policy practice and a practical evidence base for responsible AI guidance in medical libraries.

3. Research Methodology

3.1 Study Design and Population

This study employed a cross-sectional descriptive policy analysis to examine the use of generative artificial intelligence in manuscript preparation among clinical medical journals. Data was collected between January 1 and April 30, 2026, and each journal's policy was assessed once during the data-collection period.

The study population comprised of 5,307 journals classified within 59 Clinical Medicine categories in the Web of Science database. The journals were published by commercial publishers, professional associations, medical societies, universities, and other scholarly organizations.
The study examined publicly available journal and publisher policies, including instructions for authors, editorial policies, publication ethics statements, and specific guidance concerning generative AI and AI-assisted technologies.

3.2 Research Instrument

A structured data-extraction form was developed in spreadsheet format to ensure consistent data collection. The form recorded the following information:

1. journal title;
2. Clinical Medicine category;
3. publisher or publishing organization;
4. journal policy or instructions-for-authors URL;
5. reference to the International Committee of Medical Journal Editors recommendations;
6. policy concerning AI-assisted literature searching;
7. policy concerning manuscript writing;
8. policy concerning grammar, language, and style improvement;
9. policy concerning image generation or enhancement;
10. requirements for disclosure of AI use;
11. policy concerning AI use in peer review; and
12. additional restrictions, conditions, or conflicting guidance.

Each policy was classified as allowed**,** allowed with restrictions**,** not allowed**,** not mentioned**, or** unclear or conflicting**.**

The instrument was pilot tested using 32 journals in the Emergency Medicine category and 10 publishers or professional associations. Minor revisions were made to clarify the distinction between journal-level and publisher-level policies before full data collection.

3.3 Data Collection

Data was collected between January 1 and April 30, 2026. The official websites of the included journals and publishers were systematically reviewed. Relevant information was searched within instructions for authors, editorial policies, publication ethics pages, and specific AI policy statements.

The search terms included *artificial intelligence*, *generative artificial intelligence*, *generative AI*, *AI-assisted technologies*, *ChatGPT*, *large language model*, *AI-generated text*, *AI-generated image*, *authorship*, *disclosure*, and *peer review*.

When no journal-specific policy was identified, the relevant publisher, professional association, or medical society policy was examined. If journal-level guidance differed from the general publisher policy, the journal-specific instructions were prioritized.

The absence of an identified policy was classified as not mentioned and was not interpreted as permission to use generative AI.

3.4 Data Quality and Verification

Policy information was recorded together with the source URL and a summary of the relevant policy statement. Each record was reviewed for consistency in terminology and coding.
Policies with unclear wording were examined again before final classification. When journal-level and publisher-level policies were inconsistent, the case was classified as unclear or conflicting rather than being assigned to an allowed or prohibited category without sufficient evidence.
As online policies may change over time, the findings represent a cross-sectional snapshot of the policy landscape available as of April 30, 2026.

3.5 Data Analysis

The collected data were analyzed using descriptive statistics. Frequencies and percentages were calculated to determine:

1. the proportion of journals referring to ICMJE recommendations;
2. the distribution of policies concerning each type of generative AI use;
3. the frequency and form of AI disclosure requirements;
4. the distribution of policies concerning AI use in peer review; and
5. differences in policy patterns across Clinical Medicine categories and major publishers.

Cross-tabulations were used to compare policy patterns across clinical subject categories and publishers. Qualitative notes were also reviewed to identify recurring policy conditions, including human verification, author accountability, disclosure, confidentiality, and restrictions on AI-generated images.

3.6 Ethical Considerations

This study analyzed publicly available journal and publisher policies. It did not involve human participants, patient information, personal data, or confidential records. Therefore, informed consent was not required.

All policy information was obtained from official journals, publishers, professional association, or medical society websites and was reported solely for academic analysis.

4. Results and Discussion

4.1 Reference to ICMJE Recommendations

A total of 4,512 journals (85.01%) referred to or adopted the recommendations of the International Committee of Medical Journal Editors (ICMJE). The proportion was highest among Q1 journals, of which 1,260 (94.38%) referred to ICMJE guidance, and declined across lower quartiles. Five subject categories 1) Allergy 2) Critical Care Medicine 3) Neuroimaging 4) Otorhinolaryngology and 5) Reproductive Biology showed complete coverage, with all included journals referring to ICMJE recommendations.

This finding confirms the central role of the ICMJE in medical publishing. Its guidance establishes that AI tools cannot qualify for authorship, that human authors remain accountable for all submitted content, and that AI use should be disclosed. The high rate of ICMJE reference therefore indicates broad acceptance of a common ethical foundation. However, reference to ICMJE should not be interpreted as evidence that all journals apply identical operational rules. Many journals supplemented the recommendations with publisher-specific or journal-specific restrictions, while others referred to ICMJE without providing detailed instructions for particular uses of generative AI.

Earlier studies also reported considerable variation in the implementation of general editorial guidance. Ganjavi et al. (2024) found that highly ranked journals were more likely than publishers to provide generative AI instructions, but disclosure locations and the relationship between journal- and publisher-level policies remained inconsistent. More recently, Giusti et al. (2026) examined 60 high-impact oncology journals and found strong convergence around core editorial principles: 96.7% explicitly prohibited AI authorship, 96.7% required disclosure of AI use, and 96.7% specified permissible uses. These findings support the present study's observation that international editorial principles are increasingly incorporated into journal policy. At the same time, Giusti et al. found that only 35.0% of journals specified enforcement mechanisms or sanctions, suggesting that agreement on ethical principles does not necessarily translate into equally developed procedures for implementation. The present findings extend this evidence across a substantially larger and more diverse group of clinical journals.

4.2 Manuscript Writing

Manuscript writing was the most widely accepted use. A total of 3,851 journals (72.56%) permitted AI assistance with drafting or manuscript preparation, while 212 journals (3.99%) explicitly prohibited such use except when AI itself formed part of the research methods. The remaining journals did not provide sufficiently explicit guidance.

The high level of permission does not imply unrestricted generation of scientific content. In most policies, permission was conditional on human review, author accountability, disclosure, and the exclusion of AI from authorship. This pattern is consistent with the findings of Inam et al. (2024), who reported that leading cardiology journals generally allowed AI-assisted writing within defined limits while maintaining full responsibility with human authors. Giusti et al. (2026) similarly found that high-impact oncology journals generally restricted acceptable AI use to technical or supportive functions, such as grammar checking, language polishing, and formatting under human supervision, while discouraging or prohibiting autonomous scientific interpretation, reasoning, or content generation. Taken together, these findings suggest that journals increasingly recognize AI as an assistive tool rather than an independent contributor to scientific authorship. Generative AI may support organization, preliminary drafting, and language revision, but it cannot verify

evidence, determine the scientific validity of an argument, or take responsibility for the final manuscript.

4.3 Grammar and Style Improvement

Grammar, readability, and style improvement were explicitly permitted by 3,080 journals (58.04%). This level of acceptance likely reflects the similarity between limited AI-assisted editing and established language-editing services. Such use may be particularly helpful for authors writing in an additional language. This finding is consistent with Giusti et al. (2026), who reported that permissible AI use among high-impact oncology journals was generally limited to non-intellectual tasks, particularly grammar correction, language polishing, and formatting under transparent human supervision. Their findings suggest that editorial policies are more accepting of AI when it supports linguistic clarity without replacing scientific reasoning or interpretation. Nevertheless, the boundary between language editing and substantive rewriting is not always clearly defined. A tool asked to "improve clarity" may alter emphasis, interpretation, or technical meaning. Human authors must therefore compare the revised text with the intended scientific message and disclose AI use when required by the target journal.

4.4 Variation across Clinical Categories and Publishers

Policy patterns varied across clinical categories. Complete ICMJE reference coverage was observed in five categories, whereas lower levels were found in several other fields. Differences were also evident in permission for literature searching, manuscript writing, language editing, and image use. These variations should be interpreted cautiously. The study identified policy differences but did not test whether they were caused by clinical risk, disciplinary culture, editorial resources, publisher ownership, or other factors. Publisher-level analysis further demonstrated that journals within the same publishing group did not always present policies with the same visibility or level of detail. Some journals reproduced publisher guidance directly, others linked to general publication-ethics pages, and some provided additional journal-specific restrictions. This finding is important for authors: a general policy issued by a publisher should not replace review of the target journal's current instructions. Ganjavi et al. (2024) similarly identified inconsistencies between journal- and publisher-level guidance, indicating that policy navigation remains a practical challenge even within major publishing organizations. Giusti et al. (2026) further demonstrated that although disclosure requirements were nearly universal among the high-impact oncology journals they studied, enforcement varied considerably across publishers. In their analysis, explicit enforcement mechanisms were present in only 21 of 60 journals (35.0%), and adoption differed significantly across publishing groups. This distinction between policy declaration and policy enforcement is important. A journal may clearly state principles concerning authorship, disclosure, and permissible AI use, yet provide limited guidance on how violations will be identified or managed. Greater harmonization may therefore require not only clearer policies but also more consistent procedures for implementation and enforcement.

4.5 Implications for Researchers and Medical Librarians

The findings have direct implications for manuscript preparation. Researchers should check the policy of the target journal before using generative AI, distinguish language assistance from substantive content generation, verify all factual claims and references, protect confidential information, and disclose AI use in the location required by the journal. The absence of an explicit policy should not be treated as permission. When guidance is unclear, authors should consult the editorial office before submission.

The findings of Giusti et al. (2026) add an important dimension to this issue by showing that disclosure and authorship requirements may be widely accepted while enforcement procedures remain less consistently defined. Researchers therefore need to understand not only what a journal permits, but also how AI use must be documented and what consequences may follow from non-compliance. Their proposed "AI Policy Minimum Dataset"—including standardized disclosure, clearly defined permissible uses, and proportionate enforcement mechanisms—provides one possible model for improving consistency across journals and publishers.

Medical librarians can play an expanded role in this environment. Their expertise in information retrieval, source evaluation, research consultation, and scholarly communication positions them to help researchers locate and interpret journal policies, compare journal- and publisher-level requirements, verify AI-generated references, and prepare disclosure statements. This role is best understood as policy navigation and AI literacy support rather than endorsement of particular commercial tools. Medical librarians may also help researchers distinguish among authorship rules, permissible uses, disclosure requirements, and enforcement provisions when evaluating target journals. Although direct evidence of the impact of librarian-led AI policy services remains limited, the scale and inconsistency of the policy landscape demonstrate a clear need for structured support.

5. Conclusion and Recommendations

5.1 Conclusion

This study provides a large-scale overview of generative AI policies across 5,307 clinical medical journals in 59 Web of Science categories. Most journals referred to ICMJE recommendations, confirming the importance of international editorial standards. At the same time, operational policies differed substantially according to the type of AI use. Manuscript-writing and language-editing assistance were more widely accepted than literature searching, while image generation and enhancement attracted the greatest level of explicit restriction.

The central message is that journal policy is activity-specific. Permission to use generative AI for grammar correction does not imply permission to generate scientific arguments, references, or images. Similarly, a publisher-wide statement may not fully represent the requirements of an individual journal. Human authors remain responsible for the accuracy, originality, confidentiality, and integrity of all submitted material.

For medical libraries, the findings identify an emerging area of professional practice. Medical librarians can help translate a complex and rapidly changing policy environment into practical guidance for researchers. Such support strengthens responsible AI use while reinforcing established principles of information literacy, evidence verification, and scholarly integrity.

5.2 Recommendations

Journals and Publishers

Journals and publishers should provide policies that are easy to locate, written in clear language, and organized by type of AI use. Policies should distinguish among literature searching, substantive writing, language editing, image generation or enhancement, data analysis, and peer review. They should also specify where and how AI use must be disclosed and clarify which policy takes precedence when journal- and publisher-level instructions differ. Separate guidance should be provided for authors, reviewers, and editors, particularly in relation to confidentiality.

Researchers
Researchers should review both journal-level and publisher-level policies before using generative AI in manuscript preparation. They should document the tool, version, purpose, and extent of use; verify all outputs against authoritative sources; retain responsibility for the final text; and avoid entering patient information, unpublished findings, confidential manuscripts, or proprietary data into systems where privacy cannot be assured. AI-generated references should always be checked in bibliographic databases and against the original publication.

Medical Libraries and Librarians
Medical libraries should consider developing journal-policy consultation services, responsible-AI checklists, disclosure templates, and training on source verification and confidentiality. AI literacy programs should emphasize critical evaluation, transparency, reproducibility, and human accountability. Collaboration with research offices, ethics committees, graduate programs, and journal editors may help create consistent institutional guidance while allowing for discipline- and journal-specific requirements.

5.3 Limitations and Future Research
This study has several limitations. First, it analyzed policies that were publicly available between January 1 and April 30, 2026; online policies may subsequently change. Second, a policy coded as "not mentioned" may reflect the absence of public guidance rather than the absence of an internal editorial position. Third, the study examined stated policies and did not evaluate how editors apply them in practice. Finally, descriptive comparisons across categories and publishers cannot establish the reasons for observed differences.

Future research should monitor policy changes longitudinally, examine the clarity and accessibility of disclosure instructions, and investigate how authors, reviewers, and editors interpret AI policies in practice. Further studies should also evaluate whether librarian-led policy consultation and AI literacy services improve disclosure quality, reference accuracy, and compliance with journal requirements.

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Medical Librarians in the Evidence Ecosystem: A Practice-Based Case Study from a Korean Academic Medical Library

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Abstract

The health and medical research environment is changing because of advances in evidence-based medicine, diversification of evidence synthesis methods, and adoption of generative artificial intelligence (AI). This retrospective, single-institution, practice-based case study examined how systematic search collaboration, research education, and AI literacy were interconnected within the institutional evidence ecosystem of a Korean academic medical library. Data were drawn from research support applications and consultation records, systematic search materials, education records, AI-related educational materials, and reports from 2021 to 2025. During this period, 749 systematic search collaboration service instances were provided. Of 156 researchers who received initial keyword selection and a preliminary PubMed search, 115 (73.7%) proceeded to at least one final search. Among 225 collaboration cycles reaching a final search, the median interval from the first preliminary search to the first final search was 8 calendar days (mean, 15.7 days). Among 321 unique research topics, Treatment/Intervention was the largest category each year. Librarian contributions were documented through coauthorship and acknowledgments. Research education comprised 240 sessions and 6,335 participant attendances, while AI literacy education emphasised verification of AI outputs, publication ethics, and information protection. These findings suggest that medical librarians function as search specialists, educators, and collaborators within the evidence ecosystem.

Keywords: Medical librarians; Evidence ecosystem; Systematic searching; Research education; Artificial intelligence literacy

1. Introduction

The health and medical research environment is rapidly changing with advances in evidence-based medicine (EBM), the diversification of evidence synthesis methodologies, and the adoption of artificial intelligence (AI) technologies (Nussbaumer-Streit et al., 2025; Subbiah, 2023). Within this context, a systematic review (SR) is a well-established method of evidence synthesis that systematically and transparently synthesises findings from individual studies according to predefined methods (Nussbaumer-Streit et al., 2025).

Artificial intelligence (AI) and automation technologies are increasingly being applied across multiple stages of evidence synthesis, including structuring research questions, generating search terms, literature searching and study screening, data extraction, risk-of-bias assessment, and evidence summarisation (Clark et al., 2025; Fabiano et al., 2024; Riaz et al., 2024; Scherbakov et al., 2025; van Dijk et al., 2023). Although these technologies have the potential to improve the

efficiency of the research process, evidence supporting the use of generative AI without human oversight remains limited. In particular, the generation of inaccurate or fabricated references, the omission of key studies, incomplete or biased search strategies, database-specific syntax errors, and poor reproducibility have been reported (Chelli et al., 2024; Clark et al., 2025; Guimarães et al., 2024; Park et al., 2025; Sen, 2025). Researchers should therefore directly verify AI-generated outputs, transparently report the tools used and the scope of their use, and retain ultimate responsibility for methodological decisions and research findings (Fabiano et al., 2024; Flemyng et al., 2025; World Health Organization, 2024a).

These developments highlight the need to understand the production and use of evidence not as separate stages, but from the perspective of an interconnected ecosystem. The World Health Organization (WHO) guide for evidence-informed decision-making and discussions of the evidence ecosystem emphasise that evidence generation, retrieval, synthesis, interpretation, use, evaluation, and updating do not follow a one-way process. Rather, they form an iterative and cyclical process involving collaboration among diverse stakeholders, including researchers, healthcare professionals, policymakers, patients, and information professionals (Ravaud et al., 2020; World Health Organization, 2021).

Medical libraries can serve as a professional support infrastructure that connects researchers with information resources, research methodologies, and information technologies within an institutional evidence ecosystem. Medical librarians support the structuring of research questions, the selection of controlled vocabulary and free-text terms, the design and review of database-specific search strategies, the documentation of the search process, and update searches. These activities can improve the comprehensiveness and transparency of systematic literature searches and enhance the reproducibility of search strategies. Previous studies have shown that medical librarian involvement, particularly participation as a coauthor, is associated with better reporting of search methods and higher-quality search strategies in systematic reviews (Pawliuk et al., 2024; Whitney et al., 2024). Studies in Korea have also emphasised the need to expand collaboration with medical librarians and related educational services to improve search strategies for systematic reviews (Lee & Kim, 2021).

Research education is also a core function through which medical libraries contribute to the institutional evidence ecosystem. Medical libraries have traditionally provided instruction in database use and information searching, while also supporting searches that combine Medical Subject Headings (MeSH) with free-text terms, the structuring of research questions using the PICO framework, and the development of search strategies (DeMars & Perruso, 2022; Gill & Parker, 2022; Nevius et al., 2018). Such education helps researchers develop the skills needed to systematically identify evidence relevant to their research questions and conduct and document the search process in a reproducible manner. More recently, the educational role of medical libraries has expanded to include clinical information tools, information technology, and health informatics (Lauseng et al., 2021).

In this study, AI literacy is defined not simply as the ability to use AI tools, but as the capacity to understand the basic principles and limitations of AI, use it appropriately, critically evaluate AI-generated outputs, and apply it responsibly in accordance with the principles of research ethics and transparency (Flemyng et al., 2025; Miao F & Holmes W, 2023; Ng et al., 2021; World Health Organization, 2024a). This capacity is important for ensuring that AI supports rather than replaces

researchers' professional judgment and for managing the potential risks associated with AI use in health and medical research.

This study conceptualises systematic search collaboration, research education, and AI literacy not as separate services, but as complementary functions that support the institutional evidence ecosystem. Accordingly, it presents the activities undertaken in these three areas at a university medical library in Korea as a practice-based case and analyses how they are interconnected within the institutional evidence ecosystem to support researchers' evidence synthesis and research capacity. It also provides practical recommendations on the roles of medical librarians and medical libraries in response to advances in evidence synthesis methodologies and changes in the research environment associated with the adoption of AI.

2. Practice Context and Case Study Approach

2.1. Practice Context

This case focuses on the research support services provided by the Medical Library of The Catholic University of Korea. The library is an academic medical library that supports faculty members, clinicians, graduate students, and researchers affiliated with the College of Medicine, College of Nursing, graduate schools, and eight healthcare institutions under the Catholic Medical Center. As of 2025, approximately 14,500 faculty members, staff, and students were included in the potential service population.

The library's research support services evolved from traditional reference services and literature search support and now encompasses the structuring of research questions, systematic search collaboration, research education, the use of generative AI in research, and AI literacy support. Accordingly, the scope of these services has expanded from facilitating access to information resources to supporting the competencies needed to structure research questions, systematically identify and synthesise evidence, ensure the reproducibility of the search process, and critically use emerging research tools.

2.2. Case Materials and Analytical Approach

This study was a practice-based, retrospective, single-institution case study that described and interpreted the development and operation of research support activities at a university medical library in Korea. The case analysis drew on research support service applications and consultation records, systematic search support materials, research education records, materials from AI-related lectures and workshops, and internal operational reports accumulated between 2021 and 2025.

The analysis was organised into three core service areas: systematic search collaboration, research education, and AI literacy. For each area, the background to service development, mode of operation, key activities, patterns of service use, and the role of medical librarians were summarised descriptively. Quantitative data, including the number of service instances, applicants, education sessions, and participants, were analysed primarily using frequencies and proportions, with means and medians reported as appropriate. For systematic search collaboration, additional indicators derived from operational records were analysed, including service use by stage, the extent of repeated support provided to individual researchers, and the time from the preliminary search to the final search. Medical librarian contributions to publications were identified separately as coauthorship or acknowledgment. Coauthored publications were identified through research outputs listed in the medical librarian's ORCID profile, whereas publications acknowledging the librarian's contribution were counted based on cases reported by researchers to the library or the

medical librarian responsible for the service. Because standardised data on service use and learning outcomes had not been sufficiently accumulated for the AI literacy program, this area was analysed descriptively based on program records and educational content.

The three areas were interpreted as both independently operated services and interconnected components of the research support process. Researchers' information needs and search-related difficulties identified through research education could lead to individual consultation or systematic search collaboration, while recurring search-related and methodological issues identified during systematic search collaboration could be incorporated into subsequent research education and AI literacy programs.

The purpose of this case study was not to establish the causal effects of specific services or to directly generalise the findings to other institutions, but to describe the development of research support services and changes in the role of medical librarians based on long-term operational records. The case analysis was conducted by the medical librarian who had directly planned and delivered the services. This provided the advantage of offering detailed practical context regarding the development and operation of the services, but the practitioner's perspective may have influenced the selection and interpretation of the data. To minimise this limitation, the findings were described on the basis of operational records and quantitative data wherever possible, and no causal relationships or effects of the services or education were inferred when they were not supported by the available data.

This retrospective, practice-based case study analysed internal operational records generated through routine library research support services. No intervention or additional interaction with service users was conducted for research purposes. The findings are reported only at the aggregate level, and no names, affiliations, contact information, or specific research topics that could identify individual users are presented in the manuscript.

3. Practice-Based Case

In this case, the medical library's research support activities were organised into three areas: systematic search collaboration, research education, and AI literacy. These areas were interconnected in a complementary manner according to researchers' stages of research and information needs.

3.1. Systematic Search Collaboration

Systematic search collaboration is a service in which medical librarians work with researchers to develop comprehensive and reproducible search strategies for systematic reviews, meta-analyses, clinical practice guideline development, and other evidence synthesis projects. Initially, the service focused on recommending databases and search terms appropriate to the research topic. As the need for evidence synthesis support became more specific and diverse, it evolved into a collaborative approach that provided step-by-step support for reviewing the research question, selecting search terms, conducting preliminary and final searches, and performing update searches.

Systematic search collaboration began with a review of the research topic and research question and the selection of an appropriate question-framing framework. Working with the researcher, the medical librarian clarified key elements, including the population, intervention or exposure, comparator, and outcomes, and identified the core concepts to be included in the search strategy. The medical librarian then selected controlled vocabulary terms, such as MeSH, and free-text

terms and conducted a preliminary PubMed search. The appropriateness of the search terms, the volume and relevance of the results, and the retrieval of key studies were reviewed with the researcher. The search terms and strategy were refined based on the researcher's feedback, and an additional preliminary search was conducted when necessary. Once the search concepts and scope had been finalised, the medical librarian adapted the search strategy and ran the final search in selected databases, accounting for the controlled vocabulary, search fields, and syntax of each database. The search date, databases searched, complete search strategies, and number of records retrieved were documented in a reproducible manner, and an update search was conducted when needed (Figure 1).

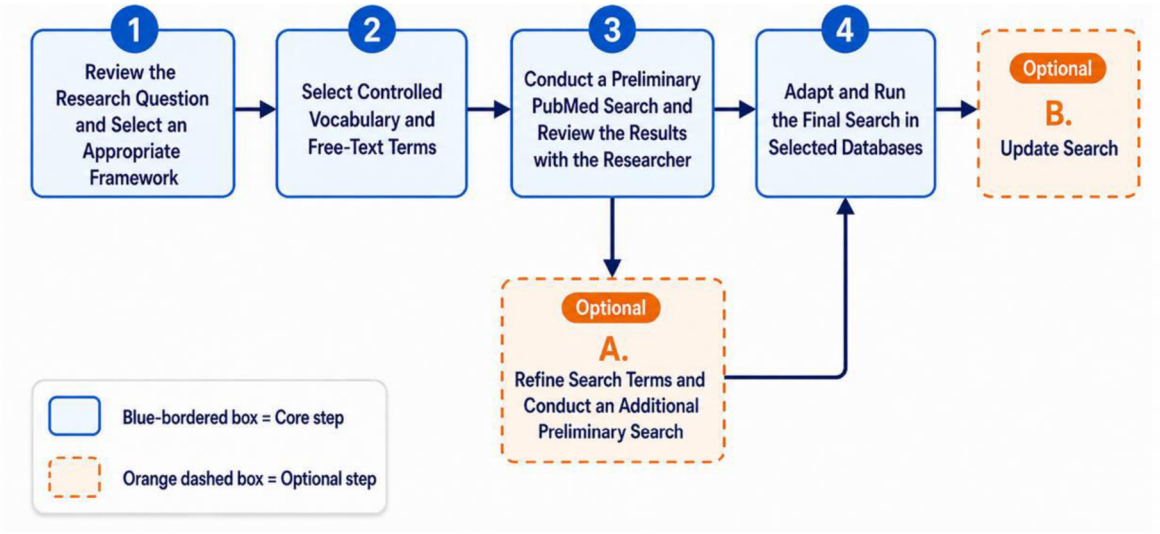


Figure 1: Workflow for systematic search collaboration

This collaboration was not designed as a one-time delivery of a completed search strategy. Instead, it involved an iterative process in which the researcher and medical librarian reviewed and refined the research question, search concepts, search terms, and preliminary search results. The medical librarian participated as a research collaborator whose role extended beyond conducting searches on the researcher's behalf to include translating the research question into searchable concepts, designing and translating database-specific search strategies, and supporting the transparency and reproducibility of the search process.

Between 2021 and 2025, a total of 749 systematic search collaboration services were provided. The number of services provided by year and service stage is presented in Table 1. When preliminary searches, search term refinement, final searches, and update searches were provided sequentially for the same research topic, support at each stage was counted as a separate service instance. Therefore, the total of 749 represents the cumulative number of individual service stages completed during the research support process, rather than the number of unique research topics or researchers.

Table 1. Number of systematic search collaboration services by stage, 2021-2025

SR Service Stage	2021	2022	2023	2024	2025	Total (%)
1. Keyword Selection and Preliminary PubMed Search	51	47	66	66	87	317 (42.32%)
2-1. Keyword Refinement and Second Preliminary PubMed Search	20	21	15	18	29	103 (13.75%)
2-2. Further Keyword Refinement and Third Preliminary PubMed Search	3	7	3	2	7	22 (2.94%)
2-3. Further Keyword Refinement and Fourth Preliminary PubMed Search	2	0	0	0	1	3 (0.40%)
3. Final Search	43	44	38	59	83	267 (35.65%)
3-1. Second Final Search	7	1	2	5	3	18 (2.40%)
3-2. Third Final Search	0	0	0	1	0	1 (0.13%)
4. Update Search	5	3	4	1	5	18 (2.40%)
Total	131	123	128	152	215	749 (100.00%)

Note: Each service stage was counted separately. When multiple preliminary or final searches were conducted for the same research topic, each additional search was recorded as a separate service instance.

Among all service instances, Keyword Selection and Preliminary PubMed Search was the most frequently provided service, with 317 instances (42.32%), followed by Final Search, with 267 instances (35.65%). Additional preliminary PubMed searches conducted after keyword refinement totaled 128 instances (17.09%). Second Final Search and Third Final Search together accounted for 19 instances (2.54%), while Update Search accounted for 18 instances (2.40%). The distribution of services by stage over the five-year period is presented in Figure 2.

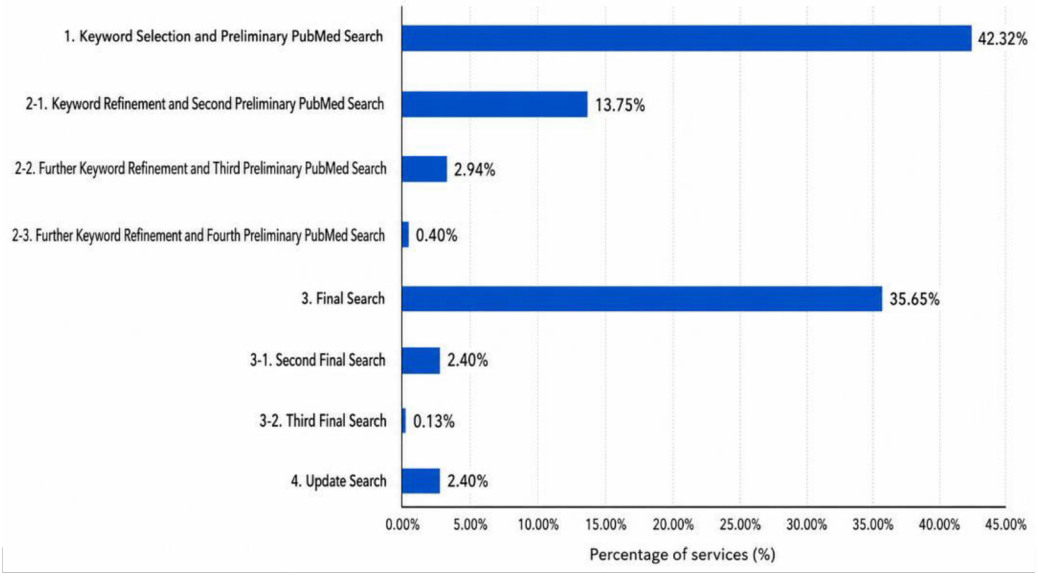


Figure 2: Distribution of systematic search collaboration services by stage, 2021-2025

The 749 service instances were provided to 172 unique researchers, with an average of 4.4 service instances per researcher. A total of 156 researchers received Keyword Selection and Preliminary PubMed Search, of whom 115 (73.7%) proceeded to at least one Final Search stage (Table 2).

Table 2. Key indicators of systematic search collaboration, 2021-2025

Indicator	Result
Total number of Systematic Search Collaboration	749
Unique researchers who received systematic search support	172
Researchers who received initial keyword selection and a preliminary PubMed search	156
Researchers who proceeded to at least one final search	115
Researcher-level proportion proceeding to a final search*	73.7%
Mean number of service instances per researcher	4.4

* Researchers proceeding from an initial preliminary search to at least one final search, n/N (%): 115/156 (73.7%)

In this study, the first preliminary search conducted for each research topic was considered the beginning of a search collaboration cycle. When the same researcher used the service for multiple research topics, each topic was counted as a separate collaboration cycle. Of the 317 search collaboration cycles, 225 (71.0%) proceeded to at least one final search. Among cycles that reached the final search stage, the time from the first preliminary search to the first final search averaged 15.7 calendar days, with a median of 8 days. This indicates that most collaborations were completed within a relatively short period, although some cases required considerably more time. The specific reasons for these delays were not analysed separately.

In some collaboration cases, the medical librarian was listed as a coauthor or acknowledged in publications available at the time of analysis. Figure 3 presents the annual number of services provided between 2021 and 2025, together with the corresponding numbers of publications in which the medical librarian was listed as a coauthor or acknowledged. However, these forms of recognition may be influenced by the time lag to publication, researchers' practices in reporting contributions, and journal authorship policies. Previous research has also reported cases in which librarians contributed to systematic reviews but their contributions or names were omitted from the final publications (Brunskill & Hanneke, 2022). Therefore, coauthorship and acknowledgment alone are insufficient to fully assess the extent of medical librarian involvement or the effects of the service. Accordingly, this case also considered progression to the Final Search stage, repeated refinement of search strategies, Update Searches, and continued interaction with researchers as indicators of service delivery and the level of collaboration. These staged and iterative support processes demonstrate that systematic search collaboration extended beyond the provision of search strategies to include the refinement of research questions, the development and validation of search strategies, and reproducible documentation of the search process. However, because this study did not directly evaluate the effects of medical librarian involvement on the methodological quality or publication outcomes of evidence synthesis research, no causal relationship can be inferred between medical librarian involvement and research outcomes.



Figure 3: Annual number of systematic search collaboration services and publications reporting librarian contributions, 2021-2025

To better understand researchers' research aims and provide appropriate search support and educational services, unique research topics submitted through research support service requests between 2021 and 2025 were analysed. When multiple stages of service were provided for the same topic, they were consolidated and counted as a single research topic. Although 317 topics had a recorded initial keyword selection and preliminary PubMed search, 328 unique research topics were identified regardless of the stage at which they entered the service. After excluding seven topics for which the primary research purpose could not be determined, 321 topics were included in the final analysis.

Each research topic was classified into one of nine categories based on its primary research question and purpose: Treatment/Intervention (T1), Diagnosis/Assessment (T2), Prognosis/Outcome (T3), Risk/Association (T4), Patient Experience/Psychosocial (T5), Education/Competency/Literacy (T6), Health Services/Safety/Organisation (T7), Epidemiology/Status/Research Trend (T8), and Basic Mechanisms/Genetics (T9). This single-category classification may have simplified complex research purposes, and the classifier's judgment may have influenced the retrospective classification process.

The annual distribution of research purposes is presented in Figure 4. Treatment/Intervention (T1) accounted for the largest proportion in every year, increasing from 28.3% in 2021 to 47.5% in 2025. Diagnosis/Assessment (T2) accounted for 16.2% in 2025, while Epidemiology/Status/Research Trend (T8) and Risk/Association (T4) varied across years. However, these findings should not be interpreted as representing the institution's overall research activity or broader research trends. Rather, they should be understood as descriptive data reflecting the research purposes and service needs of researchers who requested library research support services in each year.

Analysis of research purposes can help identify the types of evidence researchers need and the characteristics of the search support required, thereby informing the design of appropriate specialised services. Because question-framing approaches, core search concepts, databases, and search strategies may vary according to research purpose, medical librarians should tailor search consultations, systematic search collaboration, and research education to researchers' stages of research and specific aims. To support this work, medical librarians need to continuously strengthen their expertise in structuring research questions, evidence synthesis methodologies, controlled vocabulary, advanced database-specific search techniques, and reproducible search documentation. Therefore, ongoing analysis of changes in submitted research topics can provide practical evidence for improving the expertise, appropriateness, and responsiveness of research support services.

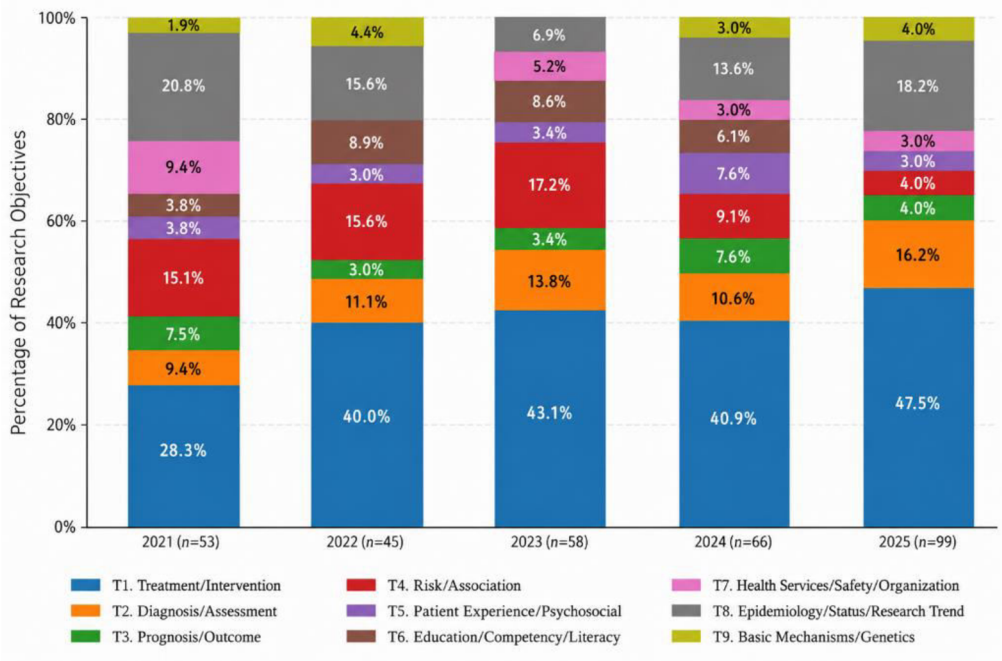


Figure 4: annual distribution of research purpose categories among research support service requests, 2021-2025

3.2. Research Education

Research education aimed to help researchers independently and systematically identify scholarly information relevant to their research questions and to develop and document search strategies and processes in a reproducible manner. Initially, the program focused on instruction in the use of PubMed and major health and medical databases. As demand for systematic reviews and meta-analyses increased, however, its scope expanded to include the structuring of research questions, selection of search terms, development of search strategies, and documentation of the search process.

The content and level of difficulty of the education were adjusted according to participants' search experience and stage of research, and the program was organised into four types: Regularly Scheduled Education, Customised Group Education, Course-Embedded Instruction, and First-Year Student Orientation. Regularly Scheduled Education was offered to all library users, whereas Customised Group Education was tailored in topic and difficulty in response to requests from researcher groups or university units. Course-Embedded Instruction was aligned with the learning

objectives of graduate courses and covered scholarly information searching, search strategy development, and reference management. First-Year Student Orientation was provided as basic information literacy education introducing the library's scholarly information resources and research support services.

Education was delivered through in-person lectures, live online sessions, and small-group workshops. In-person and online formats were offered in parallel, allowing participants to select their preferred format at the time of registration. Some online sessions were recorded, edited, and posted on the library's YouTube channel.

When research questions could not be adequately addressed through education alone or required sophisticated search strategies, participants were referred to individual research consultations or systematic search collaboration. Feedback collected after education sessions, as well as recurring questions and difficulties, was incorporated into revisions of educational materials and the planning of subsequent programs. This approach demonstrates that research education was not an isolated, one-time activity, but part of a continuous research support process that could lead to consultation and systematic search collaboration according to researchers' search competencies and support needs.

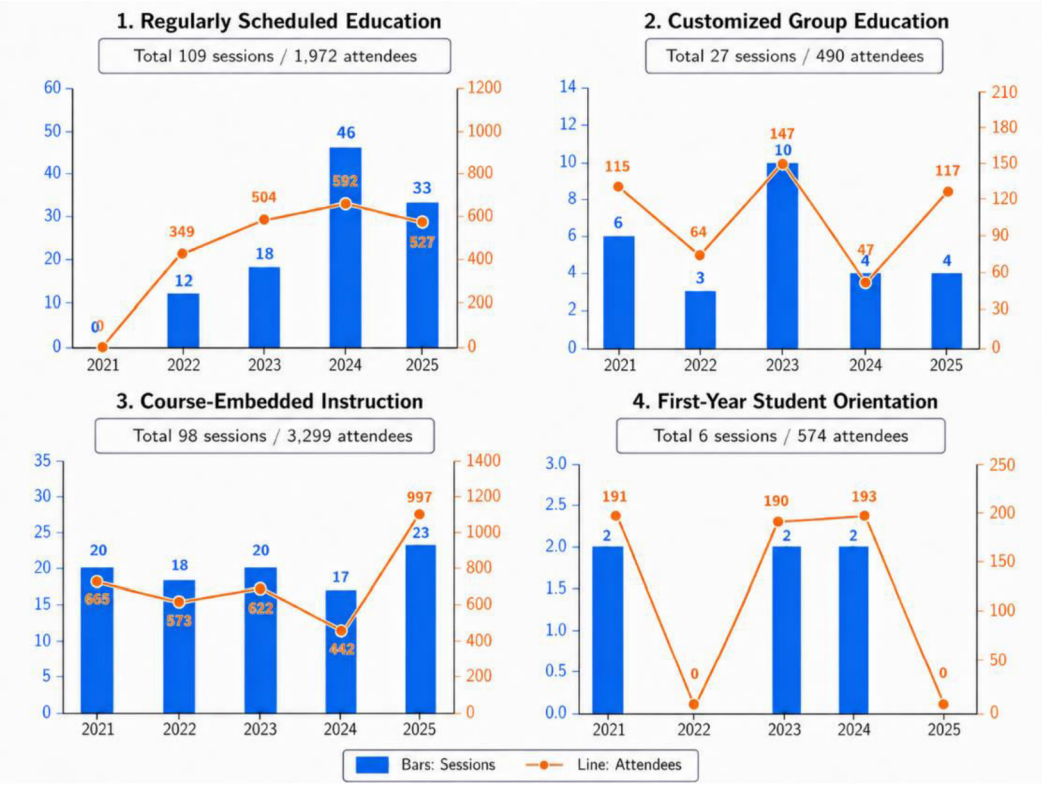


Figure 5: Annual numbers of research education sessions and attendees by program type, 2021-2025

Between 2021 and 2025, a total of 240 research education sessions were conducted, with a cumulative total of 6,335 attendees. Regularly Scheduled Education comprised 109 sessions and 1,972 attendees; Customised Group Education, 27 sessions and 490 attendees; Course-Embedded

Instruction, 98 sessions and 3,299 attendees; and First-Year Student Orientation, 6 sessions and 574 attendees. Among the four program types, Course-Embedded Instruction had the highest cumulative number of attendees. Regularly Scheduled Education reached its largest annual scale in 2024, with 46 sessions and 592 attendees, and remained substantial in 2025, with 33 sessions and 527 attendees. The annual number of Course-Embedded Instruction sessions remained relatively stable, and the program recorded its highest annual attendance in 2025, with 997 attendees across 23 sessions. The annual numbers of research education sessions and attendees by program type are presented in Figure 5.

3.3. AI Literacy

With the widespread adoption of generative AI, researchers began using AI tools throughout the research process, including refining research topics, generating search terms, summarising literature, organising research materials, and writing manuscripts. In response, the medical library expanded its existing information literacy education and research support services to provide AI literacy education that helped researchers understand the capabilities and limitations of generative AI and use it effectively and responsibly.

The educational content covered the basic concepts and operating characteristics of generative AI, its applications across different stages of research, the verification of AI-generated outputs, and ethical use. AI-generated search terms and search strings were not treated as complete search strategies; instead, participants were instructed to use scholarly databases to verify the appropriateness of the terms, the relevance of the search results, and the retrieval of key studies. They were also advised to use AI-generated references only after verifying bibliographic details, including the title, authors, journal name, publication year, and DOI, against scholarly databases and the full text.

The education addressed key limitations of AI, including the generation of nonexistent references, inaccurate or overly simplified summaries, distortion of context, bias, and hallucinations. Participants were also informed that the currency of AI-generated information may vary depending on the training data, the availability of real-time search functions, and system settings, and that the same question may yield different outputs depending on the prompt and model used.

Publication ethics, research ethics, and information protection were also included as core educational topics. Because generative AI cannot assume responsibility for the content of a manuscript, it cannot be listed as an author. Researchers who used AI were therefore instructed to transparently disclose the tool used, the purpose of its use, and the scope of its application in accordance with the guidelines of the target journal and their affiliated institution. It was also emphasised that human authors retain ultimate responsibility for the accuracy of AI-generated outputs, appropriate source attribution, plagiarism, and copyright issues. These principles are consistent with the recommendations of the ICMJE, COPE, and WAME (Committee on Publication Ethics, 2023; International Committee of Medical Journal Editors, 2026; World Association of Medical Editors, 2023). Participants were also instructed not to enter patient information, personal data, unpublished research data, or internal institutional information into unauthorised external AI services. They were advised to review the service provider's data retention and reuse policies and their institution's information security guidelines and, when necessary, to de-identify data. The WHO has likewise emphasised the importance of transparency, accountability, privacy protection, and appropriate governance in the use of generative AI in healthcare (World Health Organization, 2024b).

AI literacy education was integrated into the library's regularly scheduled education, special lectures for researchers, and systematic literature search education. The medical librarian's role extended beyond teaching how to use AI tools to supporting the structuring of research questions, evaluation of search strategies, verification of evidence sources, and critical appraisal of AI-generated outputs. Accordingly, AI literacy developed into a new area of medical library research support that enables researchers to benefit from the efficiency of generative AI while maintaining the accuracy of evidence, transparency of the search process, confidentiality of data, and researcher accountability.

4. Discussion

4.1. The Evolving Role of Medical Librarians in the Evidence Ecosystem

In this case, systematic search support was delivered as a staged collaborative process encompassing the review of research questions, selection of search terms, preliminary searches, final searches, and update searches. The finding that 73.7% of researchers who received an initial preliminary search proceeded to the Final Search stage, together with the provision of repeated support for the same research topic, indicates that the role of medical librarians has expanded beyond simply providing search strategies. Their role now includes translating research questions into searchable concepts and supporting the transparency and reproducibility of search strategies. This interpretation is consistent with previous studies reporting that greater involvement of medical librarians is associated with more complete reporting of search methods in systematic reviews (Pawliuk et al., 2024; Whitney et al., 2024). However, the number of service instances, progression to the Final Search stage, and recognition through coauthorship or acknowledgments are operational indicators of the scope and continuity of collaboration and should not be interpreted as evidence of a causal effect on research quality or outcomes.

Analysing the purposes of submitted research topics can help identify researchers' information needs and establish priorities for service development and professional competency building. Medical librarians therefore need to continuously strengthen the relevant expertise.

Research education similarly expanded beyond instruction in databases used to support the structuring of research questions and the development of search strategies, while needs that could not be adequately addressed through education alone were referred to individual consultations or systematic search collaboration. This indicates the need for a tiered support system that integrates education with specialised search support according to researchers' experience and stage of research (Lauseng et al., 2021).

AI literacy can be viewed as an extension of medical librarians' established expertise in source verification, validation of search results, and critical appraisal into the generative AI environment. Medical librarians therefore need to verify AI-generated search terms and references against actual databases and support researchers in complying with privacy requirements, research ethics, and publication guidelines (World Health Organization, 2024a).

Taken together, systematic search collaboration, research education, and AI literacy formed an interconnected research support structure responsive to researchers' information needs rather than operating as separate services. Needs identified through education led to consultation and systematic search collaboration, while recurring issues identified during search collaboration were incorporated into subsequent educational content. These linkages demonstrate that medical

librarians function within the institutional evidence ecosystem as search specialists, educators, and professionals who support the critical use of emerging research technologies.

4.2. Practical Implications, Limitations, and Future Directions

This case highlights the need to provide information search education, individual consultation, and systematic search collaboration in a staged and coordinated manner according to researchers' stages of research and support needs. Basic education can strengthen researchers' ability to conduct literature searches independently, whereas complex research questions and evidence synthesis projects can be referred to specialised consultation and systematic search collaboration. Regular analysis of service-use patterns and submitted research topics can also help establish priorities for educational content, professional development, information resources, and consultation services. AI literacy should extend beyond instruction in tool use by integrating the verification of AI-generated outputs, source checking, privacy protection, and data security into existing education. Accessible consultation pathways are also needed so that researchers can obtain support when required. An online application system for one-on-one information search consultations could serve as a point of access linking information needs identified through education with individual consultation and systematic search collaboration.

This study was based on retrospective operational records from a single institution, limiting the direct generalisability of its findings to other medical libraries. The total of 749 service instances represents the separate counting of support provided at each stage for the same research topic and does not indicate service effectiveness. Similarly, the numbers of education sessions and participant attendances do not measure changes in participants' actual search competencies or research outcomes. In addition, classifying each research purpose into a single category may have simplified complex purposes and may have been influenced by the classifier's judgment.

Coauthored publications were identified through research outputs recorded in ORCID, whereas publications acknowledging the medical librarian's contribution were counted based on voluntary reports from researchers. Therefore, publications not registered in ORCID and acknowledgment cases not separately reported by researchers may have been omitted. The time lag to publication and differences among journals in practices for reporting contributions may also have prevented these data from capturing the full extent of medical librarian involvement. In addition, because standardised data on service use and learning outcomes had not been sufficiently accumulated for the AI literacy program, its reach and effectiveness could not be evaluated quantitatively.

Future evaluations should use predefined indicators to assess the quality and reporting completeness of search strategies, changes in search competencies before and after education, research progress following consultations, and learning outcomes from AI literacy education. Although this case study did not directly evaluate service effectiveness, it provides baseline information on the key components of research support services and the areas requiring future assessment. Building on these findings, multicenter comparative studies examining institutional differences in service structures, staffing, information resources, and other operational conditions could more clearly establish the applicability and sustainability of medical librarian–led research support models.

5. Conclusion and Recommendations

This case demonstrates that research support services at a university medical library evolved toward an integrated model linking systematic search collaboration, research education, and AI literacy. Medical librarians structured research questions into searchable concepts, supported the development of reproducible search strategies, and provided education and consultation intended to support researchers' information-searching competencies and critical evaluation of AI-generated outputs. Going forward, service procedures should be systematised so that education, individual consultation, and systematic search collaboration can be provided as a continuum according to researchers' experience and stage of research.

The continued development of these services cannot rely solely on the experience and capacity of individual medical libraries. Internationally, competency-based curricula have been developed for librarians providing systematic review services (Farris et al., 2024), while the need to expand research support, instructional design, consultation, and online professional education has also been identified in Korea (Rhee, 2023). The education programs, workshops, and academic conferences organised by the Korean Medical Library Association can therefore provide a foundation for sharing institutional experiences and establishing common competencies and service standards. At the professional community level, standardised service procedures, documentation templates, performance indicators, and practice-oriented curricula should be developed collaboratively to establish a foundation for a sustainable medical library research support system.

Declaration of Generative AI Use

The author used ChatGPT (OpenAI) for English translation and language editing. All AI-assisted content was reviewed and revised by the author, who takes full responsibility for the final manuscript.

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Refining Medical Libraries in the Digital Libraries Ecosystem: A Narrative Review of Transformations, Challenges, and Emerging Paradigms

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Abstract

The intersection of digital technologies and health sciences librarianship has catalysed a need for a new definition for medical libraries. No longer only physical institutions with printed materials, medical libraries have evolved into digital entities where users expect electronic resource management, open access, clinical decision support, and evidence-based practice tools. However, there is a dearth of systematic synthesis on what is known on the role that medical libraries serve in the ecosystem of digital libraries. Thus, the aim of this review is to explore the published literature on the role that medical libraries play in the ecosystem of digital libraries, identify the themes, gaps, and future trends in this area, and provide a foundation for research, policy, and practice. A systematic search in PubMed, LISTA, Embase, Web of Science, and Scopus databases was conducted using an approach developed by Arksey and O'Malley (2005) and revised and updated by Levac, Colquhoun, and O'Brien (2010) based on a preferred reporting items for systematic reviews and meta-analysis extension for scoping reviews (PRISMA-ScR). Peer-reviewed articles, grey literature, and professional organisation publications between 2005 and 2024 were screend and charted thematically using criteria established based on the objectives of the study. The synthesis identified six major thematic areas: digital collection development and management; clinical integration and embedded librarianship; health information literacy and user education; open access, institutional repositories, and research data management; artificial intelligence and emerging technologies; and equity, access, and the global digital divide. The included studies demonstrated considerable heterogeneity in methodology, study setting, and how "digital medical library" was defined. Digital medical libraries are experiencing fundamental structural and functional transformations within the broader digital library landscape. Priority should be given to continued investment in interoperable technological infrastructure, personnel development, and access policies that promote equity, as well as governance frameworks for the ethical use of artificial intelligence (AI). Findings can be utilised to facilitate evidence-based strategic planning across all health sciences library settings globally.

Keywords: Digital libraries ecosystem; Health sciences librarianship; Clinical librarianship; Health information literacy; Artificial intelligence in libraries

1. Introduction

Medical and academic health sciences libraries have been redefining their roles in the past two decades, which is evident in the number of position statements, symposia reports, and editorials published by the field. They all signal a transformation in library practice from an emphasis on collections to a greater focus on methods, processes, and more recently, the emergence of artificial intelligence. This trend has appeared to be overwhelmingly supported at least up until the mid-2000s. Kronenfeld (2005) called the emerging institution a "knowledge nexus." Lindberg and Humphreys (2005), writing from within the National Library of Medicine, described a coming era of multimedia digital libraries accessible anywhere. Lynn, FitzSimmons, and Robinson (2011) documented libraries converting stack space into simulation labs and collaborative learning zones. McGowan (2012) was less certain about where this all led, framing the field's future as a fork between evolution, revolution, and obsolescence. More recent work by Murphy (2022) and by Lund, Khan, and Yuvaraj (2024) has pushed the same conversation outward, into cross-national comparison and generative AI.

What's harder to find in this literature is anyone testing it. Read the corpus closely and a pattern emerges: heavy on interviews, conference synthesis, and single-author reflection, and light on anything resembling a controlled comparison. Authors agree that libraries are changing. They do not agree, and rarely even attempt to check, on what that change actually produces — whether physical space still matters to users, whether new professional roles pay off, or whether the AI tools libraries are adopting help some institutions more than others. That last question has become harder to ignore as generative AI tools spread unevenly across institutions with very different budgets.

2. Literature Review

Paper	Core Methodology	Main Finding	Remaining Gap
Kronenfeld (2005)	Multi-site, semi-structured interviews with academic health sciences library directors (qualitative).11.	Identified seven trends marking a shift from a facility-oriented, print-dominated model to a digitally networked "knowledge nexus."	No outcome measures reported; the conceptual model is never tested against institutional performance data.
Lindberg & Humphreys (2005)	Strategic-foresight commentary written from within National Library of Medicine leadership (non-empirical).	Projected libraries becoming "multimedia digital libraries" offering constant access to electronic resources.	A projection, not a measurement; the forecast is never checked against what actually happened.

Paper	Core Methodology	Main Finding	Remaining Gap
Lynn, FitzSimmons, & Robinson (2011)	Reconstruction of a national symposium through conference documentation and survey data.	Institutions repurposing shrinking stack space into simulation centers and collaborative learning zones within an "experience-based economy"; identifies informationist and embedded-librarian roles as emerging.	No utilisation rates, satisfaction figures, or learning-outcome data reported for the space redesigns described.
Oliveira & Martins (2011)	Literature review of firm-level information technology adoption models.	Synthesises competing adoption models and argues single-theory frameworks tend to fall short when a phenomenon spans individual, organisational, and structural levels at once.	Firm-level focus, not library-specific; supports the rationale for multi-theory integration adopted here but does not test library outcomes directly.
McGowan (2012)	Literature synthesis and commentary, incorporating TAIGA Group predictions.	Frames the profession's future as a fork between evolution, revolution, and obsolescence; warns of staffing and resource erosion without deliberate role reengineering.	Speculative framing never tested against career-outcome or institutional data; reads the same AAHSL budget trend Kronenfeld (2023) cites as success as a risk signal instead.
Schoening (2014)	Observational, first-person descriptive commentary.	Describes the changing nature of academic health sciences libraries as they shift toward digital, collaborative models.	Single-author reflection with no comparative, quantitative, or outcome-based data.
Bryman (2016)	Research methods textbook (5th ed.),	Lays out the comparative strengths and limits of	A general methodological

Paper	Core Methodology	Main Finding	Remaining Gap
	covering qualitative and quantitative design.	narrative, case-based, and quantitative designs for adjudicating competing empirical claims.	reference, not library-specific; used here to justify moving past purely narrative designs rather than to supply findings.
Aguinis, Ramani, & Alabduljader (2018)	Conceptual and methodological article on transparency practices in management research.	Argues for enhanced methodological transparency and reporting standards in empirical management scholarship.	Not applied to library science specifically; cited here for its transparency standard rather than for any substantive finding about libraries.
Cohen, Manion, & Morrison (2018)	Research methods in education textbook (8th ed.), including ex post facto and causal-comparative design.	Establishes the logic and statistical controls appropriate to causal-comparative designs where group assignment cannot be manipulated.	General education-research methods source; supplies design justification for the present study rather than library-specific evidence.
van Dijk (2020)	Theoretical and conceptual text on digital-divide and technology-equity theory.	Frames digital-divide effects as a structural, self-reinforcing pattern of access inequality rather than an isolated resource shortfall.	A general societal framework not previously applied to LMIC medical library funding and adoption disparities specifically.
Murphy (2022)	Synthesis of seven national case reports	Broadly optimistic account of technology	The near-uniform success

Paper	Core Methodology	Main Finding	Remaining Gap
	(Australia, Bangladesh, China, England, Germany, Sweden, United States).	enabling new and enhanced library services across differing national contexts; only one of seven countries reported implementation difficulty.	rate is at least as consistent with reporting bias as with genuine ease of adoption; no LMIC-specific comparative data included.
Kronenfeld (2023)	Invited lecture (Janet Doe Lecture) synthesising NLM strategic-plan milestones and AAHSL budget data.	Electronic-materials spending rose from 5.75% into double digits of acquisition budgets, read as evidence that institutional adaptation is already succeeding.	Budget trend interpreted as success without testing against staffing, career, or return-on-investment outcomes; McGowan (2012) reads comparable data as a warning sign instead.
Lund, Khan, & Yuvaraj (2024)	Integrative review; screened 166 records down to 29 included studies on generative AI in libraries.	Identifies concrete opportunities for ChatGPT-class tools in reference service, query answering, and resource navigation, alongside accuracy, bias, and ethical risks requiring librarian mediation.	Reviews early-stage, conceptual literature only; offers no primary data on AI tool performance or user outcomes in an operating medical library.
Wattanapisit (2025)	Single-site, first-person reflective account spanning a 20-year period at a Thai medical school.	Physical book collections now occupy under a quarter of their former footprint; licensing costs for digital resources flagged as a persistent barrier in LMIC settings; speculates that AI will further disrupt library form and function.	A single-site reflection cannot establish whether this LMIC experience generalises across the field; no primary data on AI tool performance.

2.1 The Research Gap

Three specific gaps run through this literature, and each maps onto a real disagreement between named authors rather than a vague absence of data. The first concerns physical space. Kronenfeld (2005), Lindberg and Humphreys (2005), and Lynn et al. (2011) treat the library-as-place as durable, something that survives digitisation by becoming a different kind of useful space. McGowan (2012), relying on the TAIGA Group's commentary, presents a significantly more pessimistic scenario than Murphy et al. (2022). According to the Group's data, the library buildings are expected to disappear as places with a particular identity. However, neither of the authors could provide the evidence of actual use or user satisfaction, as well as a comparative analysis with other institutions. The only piece of research used by Wattanapisit (2025) in support of his point is the indication that the physical books in a Thai medical university take less than a quarter of the space they used to years ago. Kronenfeld (2023), analysing the same AAHSL dataset on spending on electronic materials, suggests that the relative decrease in spending indicates the threat to the library profession, while McGowan (2012) uses the same figures to argue in favor of a need to rethinking the roles of librarians. Various adaptation frameworks (informationist, embedded librarian, knowledge manager) continue to be suggested in scholarly literature, but without any research into the actual impact such a shift would make on either the librarian's professional trajectory or institutional prestige.

Finally, the most common contradiction found in peer reviews is related to the question of equity. While Murphy et al.'s (2022) international benchmarking study provides mainly positive conclusions about the library systems' adaptation to new technologies worldwide, Wattanapisit's (2025) work highlights the financial challenges low- and middle-income countries face when subscribing to any electronic resources. The difference in evidence provided may suggest that the initial access disparities between different universities and countries would remain visible in the context of digitisation, and that they may even become aggravated. Lund, Khan, and Yuvaraj (2024) agree with Wattanapisit (2025) that generative artificial intelligence (AI) is a double-edged tool, but neither of the two could provide any empirical evidence beyond general observations. In fact, while both works strongly favor the potential of using generative AI, none of them could demonstrate practical examples of such technology in use.

2.2 Objective

This review was conducted to empirically establish, rather than postulate, the state of the art in medical library transformations. The paper's argument is that despite a wealth of theorising on the subject, the literature contains surprisingly few studies that attempt to understand the relative value and impact of these transformations on the basis of actual experience. The review concludes by identifying research designs that have the potential to contribute to a more evidence-based understanding of the forces driving the transition of medical libraries from traditional institutions to distributed systems of information access and control.

3. Methodology

The review is based on an anchor corpus of published position papers, symposium reports, integrative reviews, and single-site reflections published between 2005 and 2025, organised around three themes: spatial and infrastructural transformations, professional roles and competencies, and technologies-enabled equity of care, including the role of artificial intelligence. Unlike a traditional narrative literature review, individual works were not summarised or

synthesised in isolation from each other. Instead, emphasis was placed on the ways in which different authors interpreted comparable findings and drew different conclusions from them.

Three alternative designs were considered and dismissed. A purely narrative or single-site case study design, which dominates the corpus, can generate interesting concepts but is limited in its ability to test theories or evaluate competing claims. A purely bibliometric design, while productive at certain levels, would miss out on the opportunity to operationalise constructs such as staff attitudes toward AI-driven recommendations. A randomised or quasi-experimental design was ruled out because transformation status is not something a researcher can ethically or practically assign; libraries arrive at their current state through years of institutional history, not experimental allocation. The design specified instead is ex post facto and causal-comparative, treating naturally occurring variation in transformation and AI-adoption status as the variable of interest, analysed under statistical controls. Three theoretical frameworks are mapped onto this design: Diffusion of Innovation theory for adoption-outcome relationships, the Technology-Organisation-Environment framework for AI-service uptake, and digital-divide theory for the cross-national equity comparison.

4. Results and Findings

What the review itself does produce is a mapped set of findings from the existing scholarship, and those findings are less tidy than the field's own narrative suggests.

First, the space-transformation literature contains a genuine contradiction, not a matter of emphasis. One camp of sources treats the physical library as an asset that survives digitisation by becoming social and experiential space. Another treats it as a transitional structure heading toward obsolescence. No comparative data exists anywhere in the corpus to settle which camp is closer to right.

Second, the professional-identity literature shows two authors reading identical institutional data in opposite directions.

Third, and most consequentially, the equity literature is thin exactly where it matters most. Global claims about how well technology travels rest on seven country cases, only one of which reported difficulty, a pattern that looks at least as consistent with reporting bias as with genuine ease of adoption. The LMIC perspective, meanwhile, is represented by essentially one reflective essay. A field making confident claims about equalising or stratifying effects has, so far, built that confidence on very little direct evidence from the settings where the stakes are highest.

5. Conclusion

The two decades of literature on medical library restructuring are characterised by a general consensus about the direction in which things are going but a lack of agreement, often very pointed, about the details. It is these disagreements that have framed the issues for this review, which attempted to follow them up in three areas: the desirability or otherwise of physical space in the postdigitisation environment, the worth of new professional roles, and the ability of digital and artificial intelligence solutions to equalise the playing field for big and small institutions. Not one of these issues has been laid to rest by the research, which mostly took the form of position statements, case analyses, and, in one instance, conflicting interpretations of the same data set. The reason for choosing the causal-comparative design was precisely because such a study would go

beyond reports and directly address the disparities, both real and perceived, in the capacity of different types of institutions to navigate the changes.

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Sub-Theme 2: Medical Librarians as Partners in Clinical Research, and Policy Support

Chair:
Faten Farhana Mohamad Taib
RCSI & UCD Malaysia Campus

Beyond Information Retrieval: Medical Librarians as Clinical Research Partners in the Age of AI

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Abstract

Systematic reviews and other forms of evidence synthesis are increasingly used across disciplines, creating growing demand for advanced librarian support beyond one-off search consultations. This paper examines how HKU Libraries transformed its systematic review support from a mainly consultation and training-based service into a tiered model that includes general research consultation, advisory support, and embedded research partnership. Drawing on service experience, consultation patterns, user feedback, and selected collaboration cases, the paper discusses how the model responds to increasingly complex research needs while clarifying service boundaries and librarian roles. The model supports researchers at different stages of the review process, including research question refinement, database selection, search strategy development, search documentation, deduplication, screening support, data extraction, and risk-of-bias assessment. It also incorporates human-supervised artificial intelligence (AI) workflows for selected screening and extraction tasks, with AI outputs treated as provisional and subject to librarian and researcher verification. User feedback indicates strong appreciation for librarian responsiveness, subject knowledge, tailored guidance, and practical support in improving search strategies and research techniques. The experience highlights the value of tiered service design in making librarian labour more visible, supporting appropriate recognition, and promoting sustainable evidence synthesis services. This work contributes a practical model for medical and academic libraries seeking to expand research partnership roles in the age of AI.

Keywords: Systematic review; Medical librarianship; Evidence synthesis; AI-assisted screening; Research support

Medical Librarian as a Strategic Partner in Clinical Research and Health Policy: A Narrative Review from an Evidence-Based Research Data Excellence Perspective

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Abstract

The role of the medical library has undergone significant changes over the past 20 years, evolving from custodians of print collections to indispensable strategic partners in clinical research ecosystems and health policy formulation. This narrative review synthesises published evidence and conceptual frameworks from 2005 to 2024 to examine the empirical and theoretical basis for this role expansion. A narrative review methodology was employed, drawing on purposive and snowball sampling of peer-reviewed literature, grey literature, professional reports, and policy documents. Databases consulted included MEDLINE, LISTA, Embase, Scopus and Cochrane library. Thematic synthesis guided the organisation of findings into key domains of librarian practice. Published evidence consistently demonstrates that embedded medical librarians improve systematic review quality, accelerate clinical trial initiation by reducing literature review time and contribute measurably to health technology assessments. Librarian-led data management training programs have been associated with improvement in research data quality scores across participating institutions. Medical librarians, when strategically integrated into multidisciplinary research and policy teams, deliver quantifiable improvements in evidence quality, research efficiency, and health information governance. Institutional investment in librarian expertise represents a high-value, low-cost intervention for health research excellence.

Keywords: Medical librarian; Evidence-based librarianship; Embedded librarianship; Research data management

1. Introduction

The threshold for acceptable evidence in both clinical research and health policy is rising steeply. The biomedical literature is expanding exponentially; databases are proliferating and becoming more specialised; and there is increasing demand for, as well as scrutiny of, systematic reviews and clinical practice guidelines. Evidence-based practice increasingly requires knowledge retrieval capabilities and critical appraisal skills in order to meet the threshold of acceptability in both the scientific literature and the relevant policy and clinical practice arenas. The sheer volume of biomedical literature now being produced far exceeds the capacity for any individual scholar to navigate these vast repositories effectively and efficiently (without significant opportunity for bias to enter the evidentiary decision-making process). In response, policy makers and regulators, as well as academic medical centres, have embraced the idea of enhanced evidence synthesis as a mechanism to improve the capacity to formulate treatment guidelines, to make resource allocation decisions, and to support clinicians in the performance of their daily work.

It is therefore not surprising that the medical librarian, long thought of as an ancillary or support provider, is now being tasked with responsibilities that extend far beyond simple information retrieval. In particular, the suite of guidelines and standards for reporting and conducting systematic reviews, including PRISMA and Cochrane, have recognised the critical role played by information specialists in the design of effective search strategies, thus embedding these professionals within the broader scholarly and policy-relevant research data lifecycle. The recognition of the librarian's role within the wider research data governance lifecycle has created an intellectual conundrum for both practitioners and researchers, which has led to a series of descriptive studies seeking to characterise the role of the librarian in clinical, health, and policy-related settings.

The existing scholarly literature on the librarian's role in clinical and health research settings is therefore highly descriptive in nature and largely limited to specific examples of individual contributions, rather than an explicit delineation of broader themes that might help guide future studies of the librarian's role and impact in different types of clinical and health policy settings. Individual studies have identified opportunities for the librarian to contribute to research, including through membership on influential guideline panels. However, there has been little work to date to explicitly characterise the role of the librarian in terms of influencing downstream research data governance and stewardship processes, including through systematic review methods. Moreover, most prior work has focused on the limited contribution that librarians can make in terms of individual searches and the associated bibliographic yields, without attempting to explicitly characterise the nature and extent of their role within the broader systematic evidence synthesis process. As a result, confusion persists about the role of the librarian, with many continuing to view these professionals as mere auxiliaries, despite their contributions to knowledge synthesis and evidence generation. What is missing, then, is a consolidated synthesis built around a real framework, one organised around data integrity, methodological transparency, and reproducibility as the guiding principles of evidence-based practice, rather than treating information retrieval as a task that simply ends once the search is done.

This review tries to close that gap. It synthesises the existing literature on medical librarian involvement in clinical research and health policy, organised around what we are calling an evidence-based research data excellence framework.

2. Research Objectives and Hypotheses

Primary Objective

To synthesise and critically evaluate the existing evidence on medical librarian involvement in clinical research and health policy, in order to work out under what conditions that involvement actually produces measurable gains in research data quality, reproducibility, and evidence-informed decision-making.

Specific Sub-Objectives

SO1: Quantify the relationship between medical librarian involvement and reported systematic review methodological quality, across cross-sectional, retrospective, and experimental study designs.

SO2: Look at the structural and procedural conditions, particularly the timing of involvement (pre-review co-authorship versus post-hoc peer review) and how much positional authority the librarian holds within the workflow, and how these moderate the effect of librarian participation on review outcomes.

SO3: Map out the outcome measures used across the literature on librarian contributions to policy engagement, open science, and clinical or organisational impact, with an eye toward spotting where documented participation gets substituted for demonstrated impact.

This review covers literature on librarian involvement across three areas: systematic and scoping review methodology, clinical research data management, and health policy evidence synthesis, drawn from sources indexed in major biomedical and library science databases.

3. Literature Review

2000-2004: Clinical librarian services and early evaluation

The early 2000s research question and its background essay

The early 2000s literature raised the research question of whether clinical librarian programs were effective in supporting clinicians in their information-related needs. Winning and Beverley performed a systematic review in 2003 concluding that clinical librarianship aimed to facilitate clinical decision-making, but the evidence was largely based on descriptive studies and needed more comparative investigations. Similarly, Wagner and Byrd's 2004 study concluded that while clinical librarian programs showed promise, the field required standardised outcome measures. The relevance of this research lies in recognising the role of the clinical librarian as an information partner in point-of-care settings rather than a strategic agent in designing studies and policies.

2005-2010: Toward evidence-based medicine support

Brettle et al. (2011) found that the librarian's role was becoming more tightly linked to evidence-based medicine and clinical decision support during this stretch. The emphasis shifted from simply describing services toward the quality of search strategies, knowledge retrieval, and support for putting evidence into practice. A 2017 systematic review by Mojgan and Abdlorasoul of clinical librarian services found that structured librarian participation improved research and critical appraisal skills among librarians themselves, and it also offered practical guidance for evaluating service impact. This stage shows the beginning of a more methods-oriented role: the librarian is no longer just handing over articles, but shaping how evidence gets found and assessed in the first place.

2011-2017: Health literacy and broader partnership models

By the 2010s, Whitney et al. (2017) noted that the literature searched beyond clinical areas and into the realms of health literacy and partnership-building informational practices. The article demonstrated the importance of libraries and librarians in health literacy research and practice due to their positioning in the community and their competencies. This ties into the topic of discussion because health literacy is one of the ways through which librarians could influence policy, patients' education, and population health. The findings from this study further diversified the role of a librarian from an information specialist to a community partner in health.

2018-2020: Evidence synthesis and reproducibility

By the end of the decade, the role of a librarian is increasingly seen in terms of expertise in evidence synthesis and reproducible search. Ghezzi-Kopel et al. (2021) contended that collaboration with a librarian should be the default in evidence synthesis because of their methodological knowledge that enhances transparency and reproducibility. Concurrently, the literature increasingly attempted to relate the role and expertise of the librarian to broader issues of research, not restricted to individual evidence reviews. Such a turn is significant for the current review, as it conceptualises the role of the librarian at the level of the research infrastructure, beyond their immediate contribution to individual clinical inquiries.

2021-2022: Open science and expanding research support

Giustini et al. (2021) documented a major expansion into open science and researcher support in the early 2020s. A related scoping review (Whitney et al., 2024) of health sciences librarians' engagement in open science found that librarians contribute through open access, open data, open education, and similar support services, mostly using descriptive or survey-based designs. That review concluded that librarians are active worldwide in advancing openness and transparency, though it also called for stronger outcome studies. This period is particularly useful for the present framework, since open science aligns closely with the idea of evidence-based research data excellence.

2023-2025: Strategic partnership in systematic reviews, policy, and peer review

The most recent literature makes the strategic-partner argument directly. Rethlefsen et al. (2025) ran a cross-sectional survey that found librarian involvement in systematic reviews was associated with a 15.4% higher search-method quality score, and the authors called explicitly for more advocacy and policy-level change. Pawliuk et al. (2024) showed that librarian contribution to systematic reviews is recorded inconsistently, with plenty of cases where librarians are mentioned in the body of a review but never credited as co-authors, or not acknowledged at all. Whitney et al. (2024) looked specifically at otolaryngology reviews and found librarian involvement associated with better reporting quality and stronger search strategy quality. Meanwhile, a randomised trial from Rethlefsen et al. (2025) found that adding librarians as methodological peer reviewers did not clearly improve first-revision reporting quality, a reminder that impact depends on where in the workflow the librarian sits, not just whether they are involved at all. Taken together, these recent studies support the idea that librarians do the most good when they are embedded early and visibly in the research process.

Interpretive summary

Interpretation of the 2000-2025 timeline presented below reveals a complex developmental pattern of clinical service provider, evidence-based medicine advocate, evidence-synthesis expert, and strategic partner in research and policy. The most convincing evidence for the librarian’s role in systematic reviews, open science, and evidence translation into practice. At the same time, the current level of understanding says little about the librarian’s role in patient outcomes, policy outputs, and standardised impact assessment, which define the novelty of this review. The review’s thesis is that medical librarians are key players in the evidence infrastructure in which trusted clinical research and health policy are produced.

The most relevant recent studies cluster around librarian involvement improving search quality, evidence synthesis rigor, and institutional policy support, though gaps in outcome measurement and causal attribution persist (Carlyle, 2024).

Most relevant recent papers

Paper	Core methodology	Main finding	Remaining gap
Librarian involvement in systematic reviews was associated with higher quality of reported search methods (Pawliuk et al., 2024)	Cross-sectional survey of 191 systematic reviews	Librarian co-authorship was linked to a higher search-methods quality score	Cannot prove causality; many teams still did not involve librarians because they thought it was unnecessary
Effect of librarian collaboration on otolaryngology systematic review and meta-analysis quality (Whitney et al., 2024)	Retrospective cross-sectional analysis of 505 reviews/meta-analyses	Librarian involvement was associated with better reporting quality, more databases searched, and more reproducible strategies	Specialty-specific evidence; still limited on downstream patient or policy outcomes
Improving peer review of systematic reviews involving librarians as methodological peer reviewers (Rethlefsen et al., 2025)	Randomised controlled trial	Adding librarian peer reviewers did not improve first-revision reporting or risk of bias, though rejection rates were higher	Shows reviewer status alone is not enough; timing and authority in the workflow may matter
Health sciences librarians' support of researchers and engagement in open science: a scoping review (Giustini et al., 2022)	Scoping review of 54 studies using 5 databases plus hand searching	Librarians play key roles in open access, open data, and other open science themes	Impact studies are still largely descriptive; more rigorous evaluation is needed
Policy work as a health librarianship role (Carlyle, 2024)	Perspective/editorial grounded in professional practice	Librarians and knowledge specialists are well placed to contribute to policy development and consultation	Calls for stronger implementation evidence and clearer role boundaries
A scoping review of librarian involvement in competency-based medical education (Cyrus et al., 2025)	Scoping review	Librarians are present in competency-based education work	Few studies use validated outcomes or measure behaviour change
Librarians' support in improving health literacy (Vassilakaki &	Review article	Librarian support is relevant to health literacy and information access	The field still lacks strong comparative designs

Paper	Core methodology	Main finding	Remaining gap
Moniarou-Papaconstaninou, 2022)			
A systematic review of librarian-provided services delivered in healthcare settings (Stovold, 2015)	Systematic review with narrative synthesis	Training and search services usually help clinicians and students	Little evidence on direct patient or researcher outcomes; many studies at mid/high risk of bias
The impact of clinical librarian services on patients and health care organisations (Brettle et al., 2016)	Questionnaire and interviews	Clinical librarians contributed to diagnosis, intervention choice, decision-making, and cost savings	Largely observational and organisation-specific; broad generalisation remains difficult

4. Research Methodology

4.1 Research Design and Justification

This study employed a narrative review methodology involving purposive and snowball sampling of the peer-reviewed, grey literature, reports, and policy documents.

The rationale for selecting the narrative review as the preferred approach was dictated by pragmatic considerations stemming from the very nature of the research question and the state of the relevant scholarly literature. Systematic reviews and meta-analyses are typically appropriate when there is a homogeneous set of quantitative studies with comparable outcome measures amenable to pooling and statistical synthesis (Gough, Oliver, & Thomas, 2017). The literature base identified for this study does not appear to meet these criteria, as evidenced by the diversity of methodological approaches represented in the final sample of articles and reports (cross-sectional surveys, RCTs, scoping reviews, reports on professional perspectives) as well as the differences in outcome domains (searches quality, policy, clinical impact). Within the context of such heterogeneity, the narrative review appears to be the option best suited to address the research question by synthesising the diverse bodies of evidence using interpretative methods while simultaneously acknowledging the differences between the primary studies (Baumeister & Leary, 1997; Grant & Booth, 2009). The selected review type is also consistent with the most common practice in the literature, with narrative reviews being recognised as distinct but legitimate alternatives to their systematic counterparts. Both types of reviews serve unique purposes, with narrative ones focusing on conceptual integration and emphasising the underlying mechanisms while systematic ones aim to provide a quantitative overview of the state of the evidence (Green, Johnson, & Adams, 2006).

4.2 Theoretical Framework

The review was undertaken under the framework of what we have conceptualised as an evidence-based research data excellence paradigm. In order to explicate the nature of information specialists' contribution, this framework uses the tripartite distinction of methodological rigor, replicability of findings, and evidence governance to discuss the role of information specialists in supporting evidence-informed policymaking.

Based on the foundational frameworks of evidence-based practice (Sackett et al., 1996) and the PRISMA recognition of the role of information specialists in systematic reviews (Page et al., 2021), this study's conceptualisation builds upon these prior frameworks by extending the discussion to institutional research and policymaking contexts. The framework guided our thematic synthesis of the included studies. The resulting themes were used to classify the items included in the review according to the three conceptual categories introduced above.

4.3 Data Sources and Search Strategy

The databases searched for literature were MEDLINE because it covers biomedical, library, and information science, and evidence-synthesis literature. The strategy for sampling was purposive to identify reports addressing the role of medical librarians in clinical research or health policy. In addition, a snowball search of references and citing articles was done to ensure the inclusion of literature missed by the initial search strategy. There was also a need to consult grey literature, professional reports, and policy literature because the type of writing typically associated with the practice of librarianship is not easily found in traditional resources. This approach is typical of narrative reviews that seek to engage the emerging or multidisciplinary professional roles (Sukhera, 2022).

Methodological patterns

Across the included studies, the general trend is toward cross-sectional surveys, scoping reviews, retrospective analyses, and service evaluations. There is a dearth of randomised studies, which means that the preponderance of evidence concerns associations and feasibility, with limited capacity to infer causation. For a narrative review, that is a critical consideration in the context of the tendency to overstate the evidence in favour of the intervention under study (Rethlefsen et al., 2025).

Conflicting arguments

One line of evidence indicated that librarian involvement was associated with improved search, reporting, and reproducibility in systematic reviews; therefore, librarians should be embedded early in review teams and journal editorial processes to maximise impact. By contrast, one study suggested that the mere addition of a librarian as a peer reviewer made little difference to first reporting, implying that the influence of librarians depends on their role, timing, and degree of integration. Another tension concerned the emphasis on the professional role of librarians for policy research: although the literature supports their involvement in evidence synthesis, the evidence base is predominantly reflective rather than evaluative in nature (Martin et al., 2026).

Best-use angle

The figure emerging from the literature indicates librarians as facilitators of evidence quality, transparency, and search rigor, not just providers of services. The literature most strongly supports the role of librarians in systematic reviews, evidence synthesis, and evidence-based organisational support, if not their downstream clinical and policy impact (Pawliuk et al., 2024).

4.4 Data Collection and Sampling

4.4.1 Target population and unit of analysis

The target population for this review was peer-reviewed and grey-literature publications addressing medical librarian involvement in clinical research, systematic review methodology, data curation, and knowledge translation, published in English and indexed in MEDLINE via PubMed. The unit of analysis was the individual publication, article, report, or policy document, rather than the individual librarian or institution, which is standard practice in narrative and scoping review methodology (Munn et al., 2018). No temporal restriction narrower than the 2020-2025 window was applied up front, in order to favour current evidence while still leaving room for foundational sources turned up through snowball sampling.

4.4.2 Sampling technique

A two-stage, non-probability sampling strategy combined purposive database sampling with snowball sampling, following recommended practice for narrative reviews dealing with interdisciplinary and unevenly indexed professional literatures (Greenhalgh & Peacock, 2005). In the first stage, structured Boolean search strings combining controlled vocabulary (MeSH terms such as "Information Specialists," "Systematic Reviews as Topic," and "Health Policy") with free-text keywords ("medical librarian," "clinical librarian," "evidence synthesis," "data curation," "knowledge translation") were applied independently across the databases. In the second stage, reference lists and citing-article records of all included sources were hand-searched to pick up additional relevant publications that primary indexing terms had missed, a step made necessary by the well-known indexing inconsistency of library and information science literature within biomedical databases (Koffel, 2015).

Non-probability purposive sampling was chosen over random or stratified probability sampling because the sampling frame, the full corpus of relevant literature, is neither finite nor fully enumerable in advance. Narrative review methodology, unlike survey-based primary research, is not after statistical representativeness. It is after conceptual saturation and thematic comprehensiveness across the domain (Suri, 2011).

4.4.3 Inclusion and exclusion criteria

Inclusion criteria:

- The publication addresses librarian or information-specialist involvement in at least one of four operational domains: search strategy design, systematic review methodology, data curation, or knowledge translation.
- The publication reports an identifiable methodology (empirical, scoping, or systematic), or amounts to a substantive professional or policy perspective grounded in practice evidence.
- The publication is available in English, in full text.
- The publication date falls within Jan 2020-May 2026, or it is a seminal source identified through snowball sampling and kept for its foundational or theoretical relevance.

Exclusion criteria:

- Editorials, conference abstracts without accompanying full-text reporting, or non-peer-reviewed opinion pieces that lack methodological or evidentiary grounding.
- Publications addressing library services unrelated to clinical, research, or policy contexts, such as general public library services.
- Duplicate records across databases, retained under a single primary citation.
- Publications whose full text could not be retrieved through institutional access, interlibrary loan, or author contact within the review timeframe.

4.4.4 Screening procedure and yield

Records retrieved from the database were exported to a reference-management platform, and automated de-duplication was run before title and abstract screening began. Screening proceeded in two stages, title/abstract review followed by full-text review, against the inclusion and exclusion criteria above. A full PRISMA systematic review protocol was not adopted, given the narrative design, though the screening funnel, including counts of records identified, duplicates removed, records excluded at each stage with reasons, and sources ultimately included, was tracked throughout.

4.4.5 Handling of missing data and unretrievable sources

Where full-text access could not be obtained through institutional subscriptions, open-access repositories, or direct author correspondence, the record was logged as unretrievable and excluded. Where a publication reported incomplete methodological detail, an unspecified sample size or missing database list, for instance, the source was kept for thematic synthesis but flagged as low-information-density in the coding matrix, and excluded from any quantitative cross-tabulation for which the missing detail was actually required. This follows a complete-case handling principle for structured coding variables, while still preserving qualitative inclusion where thematic relevance does not depend on the missing metric (Newman, 2014).

4.4.6 Validity and reliability controls

Content validity of the search strategy was established through pilot testing against a known set of benchmark publications identified through expert consultation with a health sciences librarian, which confirmed that the finalised search string retrieved every benchmark record before full execution began. Construct validity of the thematic coding scheme (search strategy design, systematic review methodology, data curation, knowledge translation) was checked against the domain taxonomy already established in prior scoping review literature on librarian roles, to keep the coding aligned with an externally validated classification rather than an ad hoc one built for this study alone.

5. Results and Discussion

Pillar 1: Librarian involvement and the methodological quality of systematic reviews

The most empirically developed strand of this literature looks at the relationship between librarian involvement and the reported quality of systematic review search methods. Cross-sectional evidence converges here: a survey of 191 systematic reviews found that librarian co-authorship corresponded with a 15.4% increase in search-methods quality scores (Pawliuk et al., 2024), and a larger retrospective analysis of 505 otolaryngology reviews and meta-analyses reported that librarian collaboration was associated with more databases searched and more reproducible search strategies (Whitney et al., 2017). Read side by side, the two studies suggest a certain degree of

consistency between mostly independent studies and areas of specialism, which grants the reported association a degree of external validity rarely found in this kind of literature.

That being said, the strength of the association is undercut by the results of one particular experiment. The findings of a randomised control trial (RCT) assessing the effect of librarian inclusion as methodological peer-reviewers failed to demonstrate a similar improvement in the reporting quality of the revised studies or reductions in bias, despite showing an increase in rejection rates (Giustini et al., 2021). The inconsistency demonstrated by the two findings can be explained by the difference in the position of librarians within the production of research outputs. The cross-sectional studies equate librarian inclusion to co-authorship, which effectively places them before the peer-review process begins, whereas the RCT assesses their inclusion as peer-reviewers, which puts them at the very end of the writing process. In effect, the benefits of involving domain experts in the research creation process depend on both their position relative to the peer-reviewer and the extent of their involvement in it, an insight rarely captured by any of the reviewed studies, as they fail to distinguish between different aspects of collaboration. All things considered, the inclusion of librarians as methodological peer-reviewers does appear to benefit the quality of reporting and reduce the risks of biases, but demonstrating such benefits requires further research. Whether it is librarian presence or librarian positioning that drives quality gains is still an open question, and it is exactly the kind of question a study organised around a research data excellence framework, rather than a co-authorship or peer-review framework alone, is built to address.

Pillar 2: Librarians as enablers of policy engagement and open science

A second pillar concerns the librarian's function beyond the individual review, extending into institutional policy development and the wider open science agenda. Perspective-based professional literature argues that librarians and knowledge specialists are well placed to contribute to policy development and consultation, pointing to their command of evidence structures and information governance (Winning & Beverley, 2003). The first finding is supported by a scoping review of 54 studies that found that librarians were positioned as key players in open access/open data/open science initiatives (Wagner & Byrd, 2004) and that systematic reviews had linked librarian involvement (usually at the community/population level) with improved health literacy and information access (Whitney et al., 2017). Taken together, these findings suggest that the lack of librarian inclusion as policymakers was less due to their absence as policy shapers and more due to their role as enablers of policy processes at different levels being unrecognised. While policy-engagement studies typically rely on editorial/commentary articles to make their points (Winning & Beverley, 2003), the open science and health literacy literatures are predominantly descriptive in nature; thus, mostly presenting scoping/editorial reviews on the role of librarians in enabling policy-related activities without directly addressing their contribution to policy outcomes. (Wagner & Byrd, 2004; Whitney et al., 2017). No study in this pillar uses a design capable of testing whether librarian involvement changes the content, uptake, or quality of a policy decision, as opposed to simply documenting that librarians show up in policy-relevant processes. The pillar therefore shows a literature more confident in asserting the librarian's strategic relevance than its study designs can actually back up, which is exactly the tension a review grounded in a research data excellence perspective is meant to surface, by separating documented participation from demonstrated impact.

Pillar 3: Downstream clinical, organisational, and educational impact

The third pillar asks whether librarian involvement translates into measurable effects beyond the research or policy artefact itself, into clinical decision-making, organisational outcomes, or educational competency. Survey-based evaluation of a hospital literature search service reported that librarian-mediated searches supported clinical practice, policy development, and patient care (Brettle et al., 2010), and questionnaire and interview data on clinical librarian services described contributions to diagnosis, intervention choice, decision-making, and cost savings (Whitney et al., 2024). A systematic review with narrative synthesis of librarian-provided healthcare services reached a similar conclusion, that training and search services generally benefited clinicians and students (Ghezzi-Kopel et al., 2021). A scoping review of librarian involvement in competency-based medical education found that while librarians were embedded in the educational design process, there was no evidence of behavioural or competency change as a result of their involvement. (Mojgan & Abdlorasoul, 2017).

Synthesis across pillars

Put the three pillars together and a certain pattern emerges: directionally coherent though underspecified. Associational and descriptive designs dominate with one RCT challenging the status quo and outcome measures becoming progressively less rigorous as the object of investigation shifts from search-method quality (pillar 1) to policy and practice (pillars 2 and 3). A graduated loss of methodological precision is thus central to the argument advanced here – the very reason why the study was undertaken. Rather than contributing yet another descriptive cross-sectional exercise to the literature on library participation, this review applies a data excellence lens to examine where exactly the evidence falls short relative to the claims being made. In particular, the role of librarians is contextualised within specific informational work processes – their timing, degree of authority, and the operationalisation of outcomes are all scrutinised to identify the conditions under which librarian participation inscribes the greatest influence on research data quality and reproducibility.

The study’s objective was to determine these conditions. The evidence gathered here suggests that involvement is neither uniformly beneficial nor uniformly useless. It depends on where the librarian sits structurally within the research workflow. Participation embedded at the pre-review, co-authorship stage was consistently linked to higher search-methods quality and greater reproducibility across independent samples, while involvement introduced later, at the peer-review stage, did not demonstrably improve reporting quality. At the same time, the rigor of the underlying evidence base declined fairly systematically as the outcome under study moved from proximal, technical measures (search quality) toward distal, consequential measures (policy uptake, clinical impact), where claims of policy and clinical "impact" leaned disproportionately on participation and perceived-value indicators rather than validated outcome measures. Taken together, these findings suggest that the medical librarian's strategic value is real and empirically traceable, but is currently better evidenced as a methodological input than as a demonstrated determinant of downstream research or policy outcomes.

6. Conclusion and Recommendations

Implications

These findings carry some real theoretical and practical weight for the international evidence-synthesis and health-policy community. Theoretically, the review advances the evidence-based research data excellence framework as a way to tell documented professional participation apart from demonstrated empirical impact, a distinction that existing librarianship and evidence-synthesis literature has mostly glossed over. Practically, the findings give research institutions, journal editorial boards, and systematic review governance bodies, including PRISMA-aligned consortia, a direct reason to formalise librarian involvement at the protocol-design stage rather than the manuscript-review stage. That means treating information specialists as embedded co-investigators in research data governance, not as a final quality-control checkpoint. For health policy bodies, the review suggests that librarian contributions to policy-relevant evidence synthesis deserve the same standard of outcome accountability that other categories of research input already face, rather than being taken on faith through professional consensus alone.

Limitations and future research

Two limitations of this study are worth stating plainly. First, the review corpus, though drawn from MEDLINE, was limited to English-language publications, which likely excluded relevant evidence from non-Anglophone health systems and therefore limits how far the conclusions here generalise geographically and linguistically. Second, since this is a narrative rather than systematic review, it did not apply formal meta-analytic pooling or standardised risk-of-bias instruments (ROBINS-I, GRADE) across the full corpus. That means the rigor-gradient and outcome-substitution findings, while consistent as a pattern, remain descriptive rather than statistically inferential.

Future research might usefully pursue two paths. First, a prospective, multi-site controlled study could directly test the timing-dependence hypothesis raised here, randomising librarian involvement to either the protocol-design stage or the post-draft peer-review stage across a matched sample of systematic reviews, with search-methods quality and reproducibility scored by blinded assessors. Second, researchers should work on developing and validating a standardised outcome-measurement instrument for librarian-attributed policy and clinical impact, something along the lines of existing GRADE or AMSTAR-2 instruments, capable of replacing the self-report and perceived-value indicators found in this review with objectively verifiable metrics of policy uptake, clinical decision change, or cost outcome. Closing that outcome-substitution gap is, on the evidence gathered here, the field's most consequential remaining weakness.

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Living Evidence Synthesis and AI-Enabled Evidence Surveillance

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Abstract

Continual evidence surveillance is a key feature of living evidence, enabling reviews and guidelines to be continually updated as new evidence is identified. This paper contrasts living and conventional approaches to evidence synthesis and discusses how the broader research environment (burgeoning research output, research integrity) and rise of artificial intelligence (AI) are impacting the way evidence syntheses are being conducted, challenging fundamental principles of rigour and transparency and prompting changes to the role of librarians. Will information specialists be supplanted in a world of autonomous literature synthesis or will human-in-the-loop approaches prevail? While the rapid evolution and uptake of AI-enabled synthesis threaten to undermine the traditional role and agency of information specialists, empirical research casts doubt on the reliability and reproducibility of fully autonomous systems, particularly for searching. These and other issues affecting librarians who support evidence synthesis will be explored using recent evaluation studies as well as examples from clinical guidelines led by the Australian Living Evidence Collaboration. Our challenge in this new AI-enabled era of evidence synthesis is to be inquisitive, open-minded and willing to continually learn.

Keywords: Living evidence; Evidence surveillance; Evidence synthesis; Artificial intelligence

1. Introduction

In the 1990s systematic reviews emerged as a powerful tool in health care to inform clinical and policy decisions by synthesising evidence across multiple studies. Initially these reviews focused on quantitatively estimating the benefits and harms of interventions. In the intervening years, the concept has been applied to an expanding range of healthcare questions (prevalence, diagnosis, prognosis, etc.) and purposes, notably qualitative systematic reviews that seek to enhance our understanding of people's experiences and behaviours. Alongside this evolution has been the broader expansion of evidence synthesis to encompass differences in approach or purpose. Reviews variously described as scoping, rapid, mapping or living are now widespread. Indeed, such has been the acceleration in the adoption of systematic reviews and the development of synthesis methods that over a thousand unique terms have been identified to describe a type of evidence synthesis (Pollock et al., 2025).

Traditional systematic reviews, whereby evidence from a one-off search is synthesised and published without any ongoing commitment to maintain its currency, are still the dominant type of publication. Authors might conduct these reviews to address a specific purpose (e.g. to inform a clinical decision or guideline recommendation) or for personal reasons (e.g. to bolster publications for academic progression). Irrespective of the reason, there are implications for users

resulting from the enthusiastic embrace of evidence synthesis witnessed over the last 30 years. For example, guideline developers often rely on evidence from systematic reviews to inform their recommendations, obviating the need to expend valuable time and resources conducting their own reviews of the evidence.

Before looking in detail at living evidence and the role of information specialists, three trends impacting the feasibility and efficiency of evidence synthesis are worth noting: 1) increase in research output, 2) concerns over research integrity, and 3) the rise of automation and generative artificial intelligence (AI).

2. Current Issues in Evidence Synthesis

2.1 Increasing Research Output Leads to Redundancy and Waste

Scientific output continues to grow rapidly. In the life sciences, the number of publications is estimated to increase five per cent a year, equivalent to a doubling of global scientific output every 14 years (Bornmann et al., 2021). However, this rate of growth pales in significance compared with the acceleration in the number of systematic reviews. In the last 10 years, the number of reviews registered in PROSPERO has gone from 30,000 to 460,000, a 15-fold increase. Over 87,000 reviews were registered in 2025 alone. In PubMed, 29,000 records were indexed as systematic reviews in 2019. By 2025 this had doubled to over 58,000.

Box 1: Systematic reviews of remdesivir for COVID-19

The usefulness of published systematic reviews of remdesivir (an antiviral medicine) was evaluated for guiding clinical recommendations during COVID-19. Five randomised trials reported results between April 2020 and May 2021. Over the same period, 38 systematic reviews (in 45 reports) of remdesivir were published at a rate of one new publication every nine days. Half the reviews were out of date at the time of publication, and 11 reviews that were up to date when published had a median survival time of 10 days (range 4-57).

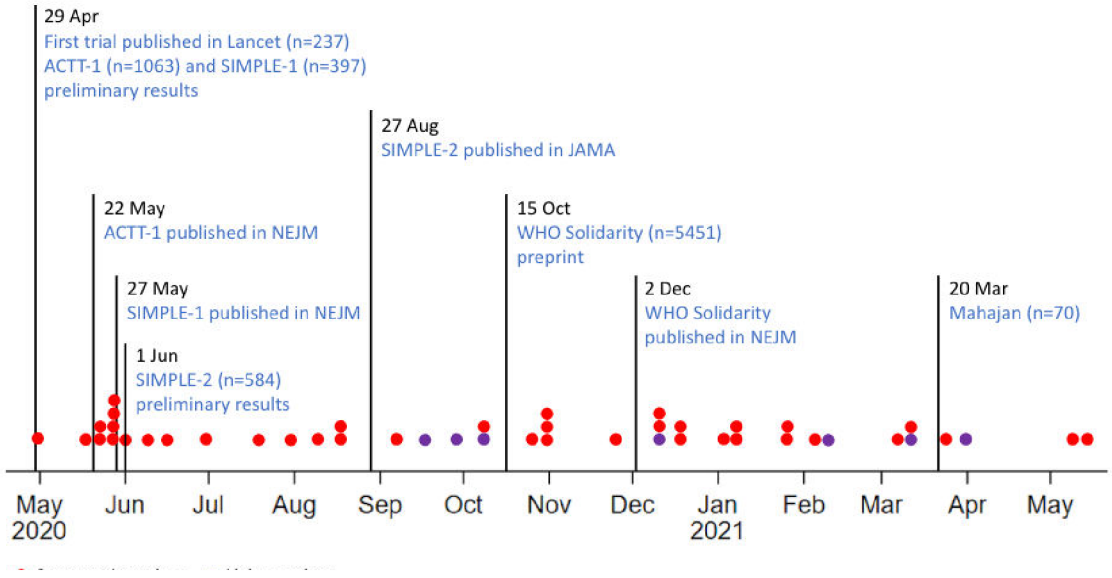


Figure 1: Randomised trials and systematic reviews of remdesivir for COVID-19

The example of remdesivir for COVID-19 illustrates the limited utility of traditional systematic reviews in areas where the evidence base is rapidly evolving (McDonald et al., 2022) (Box 1, Figure 1). The duplication and redundancy shown by this example are widespread and persistent problems in evidence synthesis, leading to research waste and calling into question the value of traditional systematic reviews, especially in situations where the evidence base is rapidly developing. The susceptibility of reviews to becoming out of date has helped drive the adoption of living evidence approaches.

The collective effort of producing systematic reviews during the COVID-19 pandemic epitomised the scale of duplication, redundancy and waste that has become an unwelcome hallmark of the current state of evidence synthesis. Even before the recent surge in systematic reviews, the prominent scientist and meta-researcher John Ioannides wrote that "production of systematic reviews and meta-analyses has reached epidemic proportions" (Ioannidis, 2016). The implications for users of systematic reviews are not simply limited to coping with the sheer volume of reviews but also the possibility, as Ioannidis asserts, that the "the large majority … are unnecessary, misleading, and/or conflicted."

2.2 Research Integrity Threatens to Undermine Trust in Evidence Synthesis

Upholding core principles of the ethical and rigorous conduct of research is essential for producing reliable and trustworthy science (Armond et al., 2024). However, confidence has been undermined in recent years by growing concerns around research integrity, as seen by the increase in retracted publications. A recent preprint estimates that at least 10,000 publications are retracted every year, and many of these retractions are associated with AI-generated content (Zhou et al., 2025).

Two aspects of research integrity are particularly worrying: 1) fabrication – invention of entire studies as if they were real, and 2) falsification – manipulating data to generate inaccurate or false results. Furthermore, predatory journals and paper mills (organisations that produce and sell fabricated papers) are now a permanent feature of academic publishing. A recent study of retracted publications showed that among 1071 retracted systematic reviews in the Retraction Watch database, 191 were associated with paper mills (Begagic et al., 2026). Given the long lead-time in retracting papers, it is likely that the scale of the problem is bigger and will only worsen with the widespread adoption of AI.

Unsurprisingly, research integrity and how to detect problematic studies are hot topics in evidence synthesis. The indiscriminate inclusion of such studies has the potential to undermine the reliability of systematic reviews and guidelines (Weeks et al., 2023). A striking example of this is the Cochrane review of vitamin D supplementation for women during pregnancy (Palacios et al., 2024). An earlier version of the review included 30 studies and concluded that supplementation with vitamin D alone during pregnancy probably reduced the risk of preeclampsia, gestational diabetes and low birthweight. In the latest update, the authors removed 21 of these studies after applying a trustworthiness assessment tool and concluded that the evidence on the effect of vitamin D supplementation was now very uncertain.

Widespread concerns about research integrity have resulted in several tools and checklists to help systematic reviewers identify potentially problematic studies and has led Cochrane to recommend that authors routinely assess studies for trustworthiness, especially in clinical areas known to be susceptible to research misconduct (Wilkinson et al., 2025).

2.3 Rise of Automation and AI-enabled Evidence Synthesis

Machine learning

Automation in evidence synthesis is not new but has been turbo-charged by the advent of generative AI, especially large language models (LLMs). The use of text mining and machine learning classifiers to expedite individual evidence syntheses have been around for 15 to 20 years (Shemilt et al., 2014; Stansfield et al., 2022). However, their routine adoption by information specialists has been limited as both approaches rely on having large numbers of records on which to train, calibrate and evaluate performance.

Machine classifiers learn from records that have been manually labelled ("include" or "exclude") and are then deployed to score unscreened records according to how likely the records are to meet the inclusion criteria. During COVID-19, machine classifiers were widely used by organisations responsible for maintaining study registers and living evidence syntheses. For example, machine learning reduced the title/abstract screening workload by 25% for the Cochrane COVID-19 Study Register while still achieving a recall of 98.9% (Shemilt et al., 2021).

Machine learning has two distinct advantages compared with newer generative AI approaches. First is the ability to accurately calibrate classifiers at different recall thresholds (e.g. 90% or 99%). The higher the desired recall, the more records the classifier will label as "include". Second, the performance of the classifier is consistent across different sets of records, and so is ideal for living evidence where the underlying search is the same.

The Cochrane RCT Classifier is a widely used machine classifier that can be used by reviewers in Covidence. Built on training data from several hundred thousand manual screening decisions, the RCT Classifier automatically excludes records that are highly unlikely to be reports of randomised trials (calibrated to achieve a recall of 99%) (Thomas et al., 2021). Even when using a precision-maximising RCT filter for a living systematic review of medications for adults with type 2 diabetes, the classifier reduces screening workload by around 18% (Nong et al., 2025).

Generative AI

Generative AI promises to deliver greater efficiencies, not just in screening records but at each stage of the systematic review process, including search strategy development and searching. LLMs are a subset of generative AI that use training data derived from vast amounts of information to recognise patterns in data that users interrogate using natural-language prompts. A recent paper for a schematic of the AI landscape by O'Keefe et al. (2026)shows where LLMs sit within layers of AI

The Living Evidence Map for Automation of Systematic Reviews (LEMASyR)[1] maintained by Farhad Shokraneh contains over 1500 records (as of July 2026), with auto-alerts generating around 20 new records every week (Shokraneh, 2026). Figure 2 shows that searching (n=326) and screening (n=486) are two steps of the review process that have been the focus of most evaluations.

[1] Nested Knowledge https://nested-knowledge.com/nest/21035

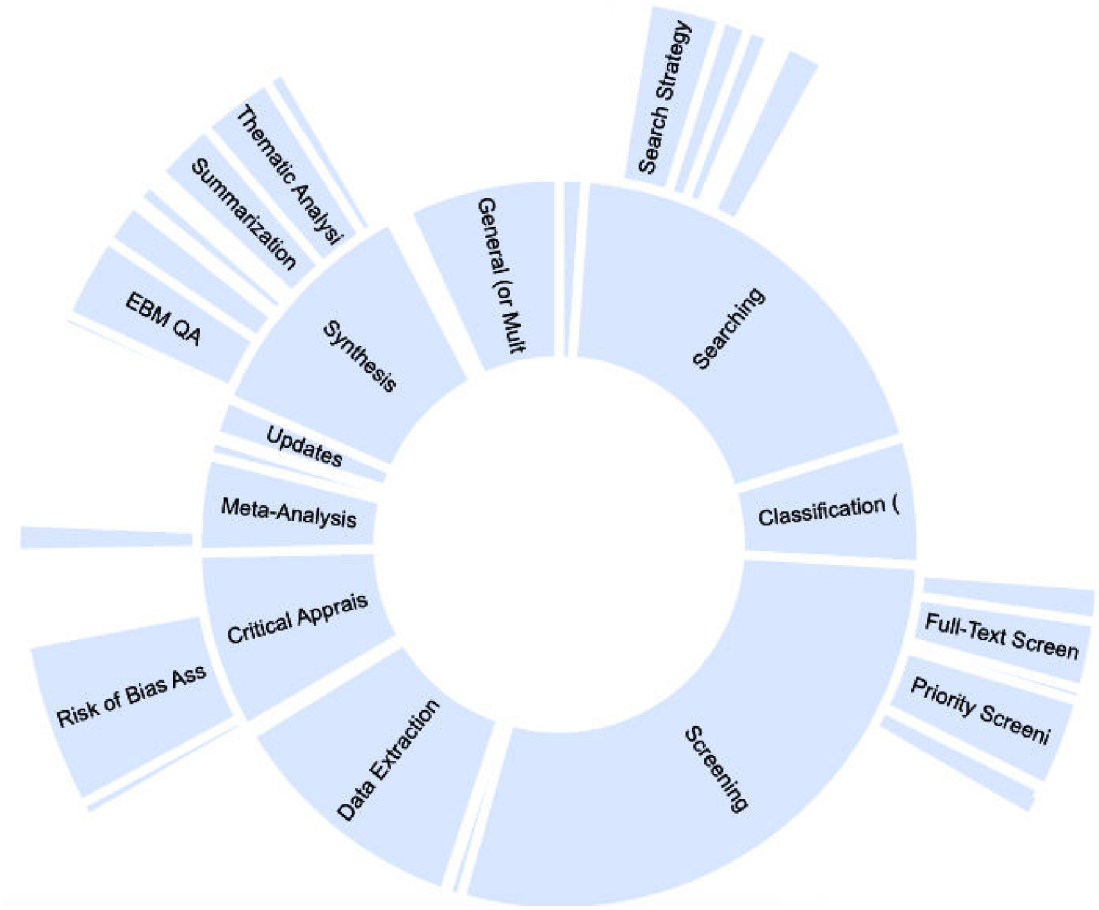


Figure 2: Living Evidence Map for Automation of Systematic Reviews (LEMASyR) – systematic review steps targeted by semi-automation

What do we know about the performance of LLMs for searching and screening?

Several systematic reviews have attempted to quantify the performance and workload savings of LLMs. A widely cited scoping review included 37 evaluations of LLMs for conducting systematic reviews (search date February 2024) (Lieberum et al., 2025). The use of LLMs for the searching step was categorised as "non-promising" and for screening as "promising". A more recent systematic review of LLMs for screening (search date June 2026) included 18 studies and found the pooled sensitivity was 92% with workload reductions ranging from 50% to 99% (Xie et al., 2026). There is a consensus that the high recall achieved by these models can substantially reduce manual screening burden and are acceptable for automated screening, provided there is human involvement or oversight.

The use of generative AI for literature searching remains less certain. A recent systematic review showed that relying on generative AI for searching missed 68% to 96% of studies (Clark et al., 2025). A more recent analysis of the utility of LLMs for generating search strings in PubMed for systematic reviews in anaesthesiology concluded that librarian-generated search strings had far superior retrieval (De Cassai et al., 2026).

Other studies have compared AI tools for both searching and screening. Lau and Golder (2025) concluded that Elicit searches have high precision but are not sensitive enough for systematic review. A comparison of Lens.org, SpiderCite and Microsoft Copilot also confirmed that AI search tools have inconsistent and variable performance (Featherstone et al., 2025). The assessment from O'Keefe et al. (2026) that LLMs are not yet suitable to replace manual search methods is hard to argue against.

3. Rise of Living Evidence Synthesis

Living evidence may seem a relatively recent innovation but its origins lie in the pre-digital era. Forty years ago, Chalmers (1986) wrote about the Oxford Database of Perinatal Trials, a precursor to the Cochrane Library, describing it as a "library of trial overviews which will be updated when new data become available". However, it is only in the last 10 years that living evidence has become part of the landscape of research synthesis, prompted in part by an influential paper published in 2014 (Elliott et al., 2014). Living evidence is an attractive concept – patients, carers, clinicians and policymakers all want the latest and most reliable evidence to inform their decisions.

Whether reviews or guidelines are suitable for living mode depends on several criteria (Box 2). The first three of these are well-established: priority for decision-making, uncertainty in the evidence, and new studies expected. A fourth criterion, relevant to living guideline recommendations, has recently been proposed that addresses changes to the environment in which care is delivered (e.g. licencing and availability of drugs).

Box 2. Criteria to determine suitability of living evidence

1. Is the question considered a priority by patients, clinicians and/or policymakers?
2. Is there uncertainty in the evidence (e.g. strength or direction of effect)?
3. Is there a pipeline of new studies likely to be published in the near future?
4. Could changes in the healthcare environment impact the applicability or implementability of the evidence?

The first steps towards realising the promise of living evidence began with guidelines and systematic reviews in the areas of stroke and traumatic brain injury in the mid-to-late 2010s. Figure 3 shows how using a living evidence approach for the Australian Stroke Foundation guidelines transformed how new evidence was incorporated. Instead of waiting up to seven years for a new edition of the guideline, regular updates are published whenever new evidence leads to changes in recommendations (Elliott et al., 2021).

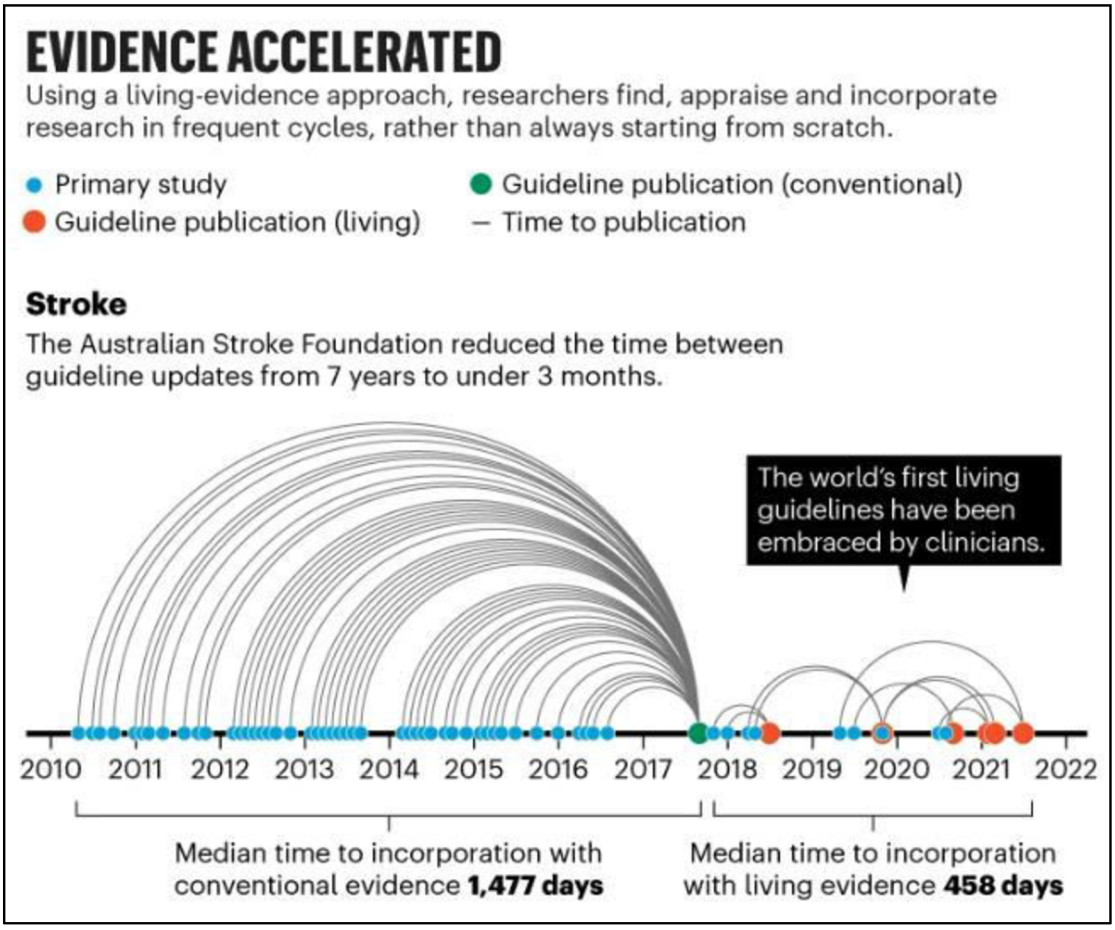


Figure 3: Australian Stroke Foundation guidelines
(Source: Elliott et al., 2021)

Accelerated by COVID-19, interest in living evidence has never been higher. The approach has now been applied to many different synthesis types, including systematic reviews, guidelines, evidence summaries and maps. The continual process of identifying, appraising, synthesising and publishing evidence updates requires efficient systems and processes, as well as adequate resources and personnel.

4. Implications of Living Evidence for Librarians and Information Specialists

4.1 Continual Evidence Surveillance

Continual evidence surveillance is what differentiates living from traditional evidence synthesis and is the responsibility of medical librarians to establish and manage. Figure 4 illustrates the process of continual evidence surveillance when applied to clinical practice guidelines (McDonald et al., 2023). All these steps – search frequency, selection of sources, search approach, automation, reporting, evaluation – require the expertise and skills of librarians and information specialists.



Figure 4: Considerations for continual evidence surveillance

Selection of sources to search

In contrast to one-off evidence synthesis, living evidence provides a real-life laboratory in which to test, evaluate and optimise the performance of search methods, and is where librarians' traditional skills can be deployed. For example, when looking to transition the International Polycystic Ovary Syndrome guidelines to living mode, *PubMed*, *Embase*, *OpenAlex* and *Semantic Scholar* were compared for retrieving studies included in the 2023 edition of the guidelines (Rajit et al., 2025). Forty-eight new and updated systematic reviews comprising 1249 articles were conducted for the 2023 guidelines, following comprehensive searches of 12 databases (Figure 5). *OpenAlex* had the best overall coverage at 98.6% (n=1232) and *PubMed* the lowest coverage at 93.0% (n=1163). There was a high degree of overlap in retrieved articles across databases, with 90.5% (n=1130) of all articles being retrievable from all four databases. Based on this evaluation, *OpenAlex* has been selected as the principal source of studies for the living guideline, supplemented by a search of *Embase*.

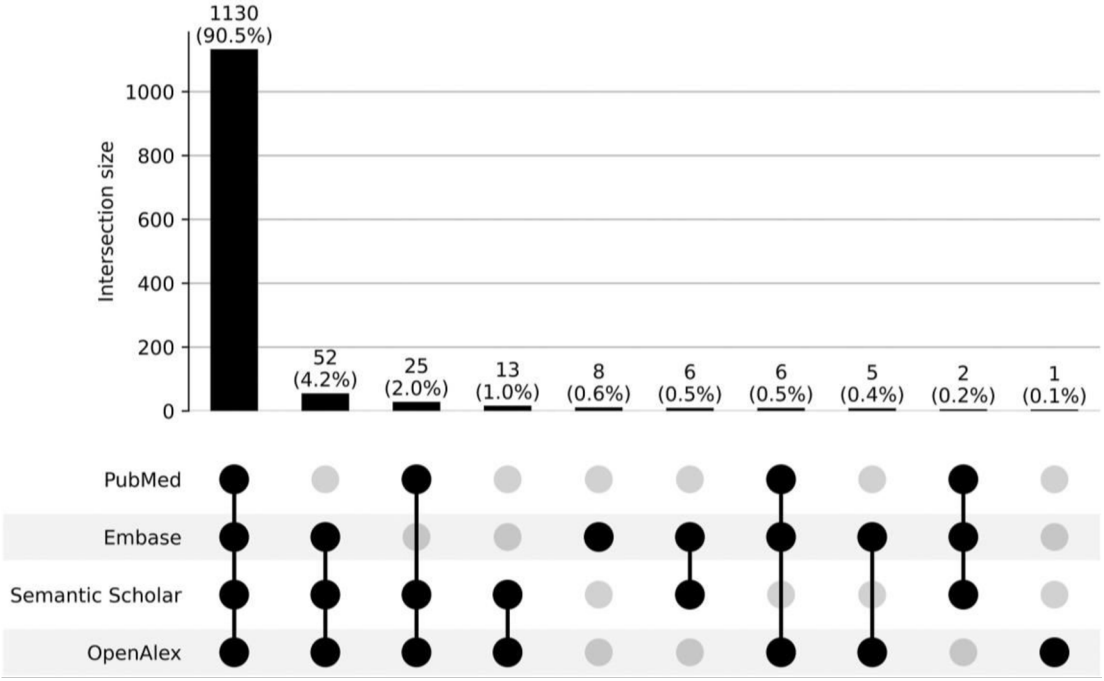


Figure 5: Coverage overlap between databases as visualised by an UpSet diagram
The lower matrix displays different database combinations, with black circles indicating the presence of articles in each database. Vertical lines connecting black circles represent overlap between multiple databases, with the upper bar chart indicating the proportion (%, n) of articles retrieved for each combination.

Single versus multiple searches

Another consideration, especially for living guidelines, is whether a single, overarching search is feasible to cover all topics. For the Stroke guidelines, because new evidence is limited to systematic reviews and randomised trials, a single, automated monthly search of *PubMed* that covers all topics (generating about 600 records) is feasible and requires minimal resources to maintain. By contrast the Australian Pregnancy and Postnatal Care guidelines comprises 15 separate surveillance searches corresponding to different topics with varying study designs and search frequencies. For the Polycystic Ovary Syndrome guidelines, moving from multiple, topic-specific searches to a single, overarching search is estimated to reduce screening workload by up to 70% (Rajit et al., 2026).

4.2 New-generation Search Tools

The growth in scientific output and concerns around research integrity discussed above and the challenges both pose for producers of evidence synthesis more broadly are potentially being compounded by new ways of accessing the scientific literature. For many decades the conventional approach to searching has relied on bibliographic databases. Since databases have different coverage of topics and journals, it has been standard practice in evidence synthesis to search several databases, with all the attendant issues this involves (identifying and translating search terms, navigating different platforms, managing duplicates, etc.).

The prospect of a single-source search is a step closer to reality with the advent of open platforms like OpenAlex and Semantic Scholar. OpenAlex is a mega research repository of over 450 million scholarly documents (articles, books, datasets, preprints and theses) but its relatively

unsophisticated search interface has been a barrier to its potential replacement of traditional database searches (although continual refinements and new features means it may soon rival alternative platforms like *PubMed* or *Ovid*) (Stansfield et al., 2025).

However, as search specialists we need to be vigilant to sudden changes in content, major publishers such as Elsevier and Springer Nature have recently limited the availability of tens of thousands of closed-access abstracts on open platforms like OpenAlex, preventing these abstracts from being fully harvested or displayed.[2] Furthermore, having easier access to more of the world's literature may have unintended consequences. Producers of database like *MEDLINE* and *Embase* have selection criteria for indexing journals which, theoretically, should minimise access to fabricated or falsified research; however, no such safeguards exist with open platforms like OpenAlex. Is our ability to identify more (lower value) research going to be a help or a hindrance for conducting evidence synthesis?

4.3 AI-enabled Searching and Screening

As discussed earlier, the use of generative AI in evidence synthesis, especially for screening records, is becoming more widespread and it's conceivable that in the not-too-distant future LLMs will be routinely used when conducting evidence synthesis. For searching, although LLMs are not yet suitable to replace manual methods, agentic AI tools like Perplexity and Undermind can help with exploratory or scoping searches by identifying potential search terms and seed papers. Agentic AI tools are already proving valuable for the Australian Living Evidence Collaboration guidelines in identifying papers that address topics where systematic searching is less critical (e.g. patient, preferences and values; feasibility and implementability of interventions) but which are notoriously challenging to search without retrieving large numbers of records.

To take advantage of these AI developments, information specialists will need to explore prompt engineering. Terms like zero, one-shot and few-shot prompting may soon become as familiar as "proximity searching" or "medical subject headings". In a recent paper, O'Keefe et al. discuss prompt engineering, context engineering and vibing, and anticipate how these skills will be part of information specialists' expanded role (O'Keefe et al., 2026).

The integration of AI tools in evidence synthesis is rapidly evolving and often subject to wildly outlandish claims, *Systematic reviews in minutes to hours using artificial intelligence* (Bakker et al., 2026). Whether considering using AI in your own systematic reviews or evaluating if its use is justified in published systematic reviews, the RAISE guidance[3] offers practical advice (Box 3) (Thomas et al., 2024). As is the case when any new tool is deployed, review authors remain ultimately responsible for the evidence synthesis and must demonstrate that use of AI tools is justified and does not compromise the integrity of the review.

[2] https://aarontay.substack.com/p/the-petrol-tank-for-ai-discovery
[3] https://osf.io/fwaud/overview

Box 3. Responsible use of AI in evidence Synthesis (RAISE) Guidance

1. An author is accountable for the content, methods and findings of their evidence synthesis, including the decision to use AI, how it is used, and its impact on the synthesis.
2. When considering using an AI system or tool, be critical of its evaluations, to understand whether it does what it states to an adequate level, as well as its limitations and whether it can be applied to the context of the specific synthesis.
3. Use of AI should be justified and should involve demonstrating that the tools are methodologically sound, that they do not undermine the trustworthiness or reliability of the synthesis or its conclusions, and that it is appropriate to use a specific AI system or tool in the context of the specific evidence synthesis.

In practice this involves testing prompts on a set of known included studies until recall is 100%, (or close to 100% depending on the purpose of the synthesis) and evaluating its performance on a sample of unscreened records that are also manually screened for comparison. The extent to which an LLM will then replace human screening entirely or act as a second screener alongside a human will depend on the context of evidence synthesis (complexity of the topic, type of synthesis, etc.). There are good examples of how prompts have been integrated in living evidence synthesis (Homiar et al., 2025). Finally, AI use in evidence synthesis manuscripts needs to be reported transparently.

5. Conclusion

Evidence synthesis is a vital part of clinical and policy decision-making, characterised by rapid developments in methods and tools. For librarians and information specialists it is a vibrant and rewarding professional space. This paper has outlined some of threats posed to the utility of systematic reviews from the global growth in research output, the unwelcome influence of research misconduct, and the inexorable rise of artificial intelligence. While the importance of a good search has always been a foundation of evidence synthesis, the advent of living evidence has further enhanced the value of information specialists. As AI-enabled evidence synthesis evolves and, it is incumbent on us as search specialists to be inquisitive, learn new skills and embrace opportunities that will ensure we remain essential for years to come.

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An Exploratory Study of the Role of Medical Librarians in Systematic Review Research: Experiences from Several Major Hospital Libraries in Taiwan

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Abstract

The primary mission of hospital libraries is to provide healthcare professionals within their parent institutions with the information and services needed for clinical practice, teaching, and research. In recent years, the role of professional medical librarians has shifted from traditional reader services to author services that support research, with increasing involvement in systematic review (SR)-related services and collaboration with healthcare professionals in producing SR articles. Using a qualitative research design with semi-structured interviews, the researcher interviewed library directors and librarians from six medical centres in northern, central, and southern Taiwan to explore the origins of SR services in these benchmarked hospital libraries, their relationship with institutional evidence-based medicine (EBM) centres, their main user groups, and their service delivery methods. The study also examined librarians' continuing education, their roles in SR publications, and the impact of providing SR services on librarians' status within their institutions. The findings present the experiences of these medical librarians as research partners for healthcare professionals and may serve as a reference for other libraries interested in developing similar services.

Keywords: Systematic review; Research support services; Roles of medical librarians; Hospital libraries; Taiwan

1. Introduction

The primary mission of hospital libraries is to provide healthcare professionals in their parent institutions with the information and services required for clinical practice, teaching, and research. In recent years, the role of professional medical librarians has gradually shifted from traditional reader services toward author services that support research. Librarians have increasingly devoted themselves to SR-related services and have become partners of healthcare professionals in publishing SR articles.

This paper presents part of the findings of the National Science and Technology Council research project, "A Study of Research Support Services in Academic Medical Libraries," conducted by the researcher from 2023 to 2024. In the first stage, a questionnaire survey of 28 large academic medical libraries in Taiwan was conducted to investigate the research support services they currently provided and planned to provide in the future (Chiu & Siao, May 2024). Among the 26 responding libraries, only eight (31%) reported that they are currently providing SR services: Taipei Medical University, National Cheng Kung University, Chung Shan Medical University Hospital, MacKay Memorial Hospital in Tamsui, Changhua Christian Hospital, National Yang

Ming Chiao Tung University, Linkou Chang Gung Memorial Hospital, and the National Health Research Institutes. In the second stage, a website content analysis focused on medical schools and medical centre libraries. Among 26 libraries, only five stated on their websites that they provide SR services: Taipei Medical University, National Cheng Kung University, MacKay Memorial Hospital, Linkou Chang Gung Memorial Hospital, and Taichung Veterans General Hospital (Chiu, 2024). In the third stage, the researcher invited 33 directors and librarians from 16 large medical libraries in Taiwan to participate in semi-structured interviews. Participants from six libraries discussed SR services in great depth. This paper analyses and synthesises the interview data and, through the service experiences and professional journeys shared by the interviewees, explores the roles played by professional medical librarians in hospital-based SR research.

2. Literature Review

2.1 Medical Librarians in Taiwan as Collaborators on SR Articles

In order to understand the extent to which medical librarians in Taiwan have served as co-authors of SR articles, the researcher asked her reference librarian to conduct literature searches in June 2026. The terms “medical library,” “hospital library,” “medical university library,” and “Taiwan” were searched in the author affiliation, country, and related fields of *PubMed*, *Web of Science* (WOS), and *Scopus* (Appendix 1 for the search strategies). Manual review of the results identified 83 *PubMed* records, 181 *WOS* records, and four *Scopus* records authored by medical librarians. The records were imported into EndNote and deduplicated.

Table 1. Distribution of articles by publication year

Publication Year	Number of Articles	Publication Year	Number of Articles
2015	1	2021	8
2016	0	2022	9
2017	4	2023	8
2018	6	2024	6
2019	7	2025	15
2020	5	2026	4

Table 2. Medical librarian authors and number of articles

Name	Number of Articles	Library
Fang, Ching-Ju	33	National Cheng Kung University Medical Library
Liu, Shu-Jung	24	MacKay Memorial Hospital, Tamsui
Tai, Cheng-Chen	9	Linkou Chang Gung Memorial Hospital
Huang, Yu-Ting	3	Taipei Medical University–Wanfang Hospital
Chien, Li-Ting	2	Taipei Medical University Hospital
Li, Ya Jhen	2	National Cheng Kung University Medical Library

The resulting bibliographic records were then imported into NotebookLM to screen for SR-type articles, followed by a final manual check. A total of 73 articles were identified. Six medical librarian authors from four libraries were represented: two from National Cheng Kung University, two from Taipei Medical University Hospital/Wanfang Hospital, one from MacKay Memorial Hospital in Tamsui, and one from Linkou Chang Gung Memorial Hospital. The annual distribution is shown in Table 1, and the number of articles attributed to each librarian is shown in Table 2.

2.2 Related International Literature

Using the Veterans Evidence-Based Research Dissemination and Implementation Center (VERDICT) in Texas, United States, as a case, Harris (2005) described librarians' roles in the systematic review process. He indicated that librarians perform multiple roles throughout the process, including those of expert searcher, organiser, and analyst, and are indispensable to the Cochrane Collaboration's conduct of systematic reviews. Dudden and Protzko (2011) discussed librarians' contributions to systematic reviews, including communicating methods for the SR process; working with the research team to define research questions and exclusion criteria; developing search strategies across multiple databases; documenting the search process; preserving records; and writing the search methods. They also addressed challenges and responses, including irregular scheduling, education and training, communication and coordination, and the need to learn new technologies.

Spencer and Eldredge (2018) conducted a scoping review of librarians' roles in SRs. They collected 310 articles, book chapters, papers, and posters from PubMed, LISTA, and CINAHL; articles published in the Journal of the European Association for Health Information and Libraries, Evidence Based Library and Information Practice, Journal of the Canadian Health Libraries Association, and Hypothesis; and posters and paper abstracts from Medical Library Association annual meetings. From these materials, they identified 18 distinct roles performed by library and information professionals in systematic reviews. They concluded that librarians play central roles on systematic review teams and that their contributions extend well beyond searching.

Librarians are regarded as important partners on systematic review teams; consequently, systematic review competencies are essential for many health sciences library positions. The Medical Library Association (MLA) therefore developed the Systematic Review Services Specialization (SRSS) Certificate, which was formally launched in 2022. One required course was jointly developed by Farris, Lebo, and Price (2024) to construct a curriculum that would provide librarians working in evidence synthesis with the necessary searching skills. Their case report explained the framework used to design a new course for MLA's SRSS. Through eleven course offerings between 2022 and 2024, they successfully developed and delivered a comprehensive curriculum.

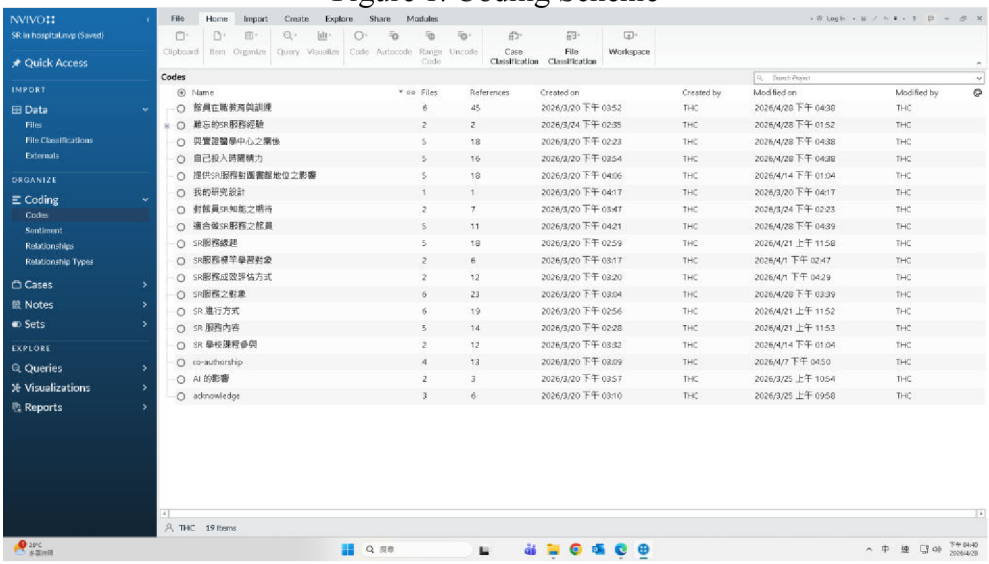
Zhang (2025) shared ten years of experience providing systematic review services. From 2015 to 2025, through consultation and collaboration, she provided extensive support to health sciences researchers, faculty, students, and staff at a large research university, helping them conduct systematic and scoping reviews. She described the roles she assumed, the practice guidelines she followed, the information sources she frequently searched, the systematic review tools she used, the challenges she encountered, and the lessons learned from these experiences. She subsequently selected 163 academic health sciences libraries in the United States and collected data from their websites to examine the current provision of systematic review and evidence synthesis (SR-ES) services. Major findings included the following: 68% offered SR services; 49% provided request forms through which users could apply for services; half offered tiered services; Covidence was the most frequently used SR tool; AI tools had not yet been widely adopted to support ES services; and although generative AI tools were developing rapidly, librarians were still exploring and testing them and were not yet prepared to implement them in practice, particularly because of ethical and legal concerns (Zhang, May 2026).

Zhang and Parrott (May 2026) conducted a nationwide online survey of medical librarians in the United States from May to June 2025 and received 136 responses. About 93% of respondents reported that their libraries provided ES services; 34.4% had provided such services for five to ten years, and 31.7% for one to five years. In addition, 68% reported that their libraries' ES services were delivered by a team of trained librarians, whereas 15% indicated that the service was the responsibility of a single librarian. When asked how users requested services, with multiple responses permitted, 73% selected submission of an online request form and 72% selected sending an email to a librarian. The three leading causes of burnout were librarians' numerous other responsibilities, study teams' lack of familiarity with ES, and excessive numbers of requests. Regarding the influence of AI on these services, 60.8% of respondents were either using or experimenting with AI or AI-powered SR tools. Nevertheless, 35% to 51% believed that AI might not produce useful information or that such tools generated inaccuracies. The authors concluded that the study provided a current snapshot of ES service practices and could inform the future development of more efficient ES support in health sciences libraries. They also emphasised the need to identify and evaluate effective and reliable AI assistants for ES projects and to train librarians to use such tools to improve service efficiency.

3. Research Methodology

This study adopted a qualitative research method using semi-structured interviews. Participants were invited to interviews from late 2023 to early 2024. Before the interviews, all participants signed informed consent forms approved by the Institutional Review Board (IRB) of the researcher's institution. The researcher personally conducted the interviews according to an interview outline provided to participants in advance. With the participants' consent, each interview was audio-recorded in full. The recordings were subsequently transcribed into Chinese using Sogou AI Recorder, after which research assistants checked and corrected the transcripts. The transcripts were then imported into NVivo 14 qualitative data analysis software, and the researcher personally conducted the subsequent coding (Figure 1). Since the interviews were conducted in Chinese, the researcher first organised the Chinese interview content according to the themes under investigation. Selected excerpts were then translated into English using ChatGPT 5.5, reviewed and revised by the researcher, and presented in Section 4.

Figure 1. Coding Scheme



As shown in Table 3, the six participants came from different medical libraries. Three were administrators and three were librarians responsible for SR services. Half of the six medical libraries were hospital libraries in medical centres; two (Participants B and F) were medical university libraries that also served users from their universities' affiliated hospitals; and one (Participant A) was the library of a medical university-affiliated hospital. The regional distribution was also balanced, with two libraries each in northern, central, and southern Taiwan. The six interviews lasted 60 to 77 minutes, and the transcripts ranged from 974 to 1,672 lines, demonstrating the richness of the qualitative textual data collected in this study.

Table 3: Participant information

Code	Position	Medical Library Type	Region	Interview Date	Duration (Min)	Transcript Lines
A	Section Chief	Medical university-affiliated hospital	Central	2023-08-01	68	1124
B	Librarian	Medical university-affiliated hospital	Northern	2023-08-11	60	1093
C	Library Director	Medical center	Central	2023-09-11	77	1158
D	Section Chief	Medical center	Northern	2023-11-02	66	1094
E	Librarian	Medical university-affiliated hospital	Southern	2023-12-01	62	974
F	Librarian	Medical center	Southern	2024-01-25	62	1672

4. Results and Discussion

4.1 Systematic Review Services

4.1.1 Origins of SR services

Top-down

Some hospital libraries initially began providing SR services because the library director or a senior administrator in another hospital department believed that the library could assume this role. Participant A stated that the director at the time believed that the library should become involved in evidence-based medicine, *"At that time, other libraries did not seem to have this concept yet. Our library director at the time … was, in my view, very forward-looking. The director felt that we might face a crisis, but that the crisis could actually become an opportunity. Therefore, the director led us into the field of evidence-based medicine and spent a great deal of time training us in the relevant [knowledge and skills]."*

Participant B stated that a supervisor in the hospital's Department of Nursing was a board member of the Taiwan Evidence-Based Medicine Association. She strongly encouraged nursing staff to publish SR articles and frequently referred staff members with questions to the librarian, *"Perhaps*

I helped her and she thought the assistance was good, so she told the members under her that they could come to me whenever they had questions. ... It gradually spread by word of mouth." Since the librarian's initial services were well received, a collaborative relationship gradually developed, *"They trusted me. Perhaps they thought what I provided the first time was good. ... For example, the Research Department is offering a series of meta-analysis courses this time, led by Dr. OOO, and they asked me to teach the searching component."*

Bottom-up

In other cases, librarians recognised users' need for SR services through their daily work, gradually strengthened their own relevant knowledge and skills, and independently began offering related services. Participant D stated that the hospital placed considerable emphasis on publication requirements, "f*or example, a certain proportion of nurses might be expected to publish a specified number of papers. To support research, the librarians began providing in-depth services, and unexpectedly, as we continued, the work developed into SR services.*"

Participant E, who worked in a medical university library, stated that "*frontline service staff should all be aware that there is a need for SR.*" She explained, *"While staffing the reference desk, we found that both local and international students frequently asked questions about SR searching. Even if you taught them the method, the consultations still required several rounds of discussion and a great deal of time. Our colleagues later discussed the situation internally and changed to a model of regularly scheduled classes. ... We observed that the high volume of reference consultations had become more than we could manage. Therefore, we first taught users in classes; if they still had questions, they could consult us during the practical exercise period. We hoped this would reduce the reference consultation workload somewhat."*

4.1.2 Relationships with hospital evidence-based medicine centers

Becoming a member of the hospital EBM team

Participant A was both the head of the hospital library and the deputy director of the hospital's EBM center. Within this organisational structure, many library operations were coordinated with the needs of the EBM center. She stated that "*For example, education and training activities are always jointly presented under the names of both units; the two units co-organise and conduct them together.*" She further explained, *"I served as deputy director of the EBM center from the very beginning. This was because evidence-based medicine has five steps, and the second step is clearly literature searching. The hospital therefore intuitively regarded it as part of the library's work."*

Participant D also stated that she was a member of the hospital's EBM team, *"I am very grateful that our physicians and administrators place such strong trust in the library's professional expertise. ... After all, different professions have different areas of specialisation. Physicians understand their own fields, and we understand librarianship. In this respect, the hospital came to feel that the librarians were quite capable. Database searching is one of the 5A steps in evidence-based medicine. To be honest, during the first year, physicians taught the searching component. Later, I had an opportunity to speak at a major international event. From that point onward, all searching instruction was delivered by librarians."*

A collaborative model centered on database search instruction

More commonly, libraries were invited to arrange or teach educational courses on relevant concepts and resources. Participant B stated that "*Our most frequent collaboration involves courses. They currently offer EBM courses throughout the year, and I arrange the database component and contact the instructors.*" Participant C likewise indicated that the library's main roles were training and consultation related to information resources, *"Our hospital's current promotion of evidence-based practice focuses more strongly on teaching. It organises workshops and encourages staff to participate in competitions. Therefore, the library's collaboration with the evidence-based practice group currently centers mainly on instruction in information searching."*

Participant F stated that, within the division of responsibilities, she taught basic concepts, *"I explain the levels of evidence and how to interpret them. For the subsequent appraisal and judgment components, users need to attend advanced courses. Our evidence-based practice group provides that instruction, because the library's staffing does not allow me to teach to that level."* Some users also reported that courses taught by external instructors invited by the EBM center were too difficult, *"They said they could not understand. Some people attend that course and still cannot understand it. Therefore, I teach them the [basic course] first. When they subsequently attend the advanced course, they are better able to follow it."*

4.1.3 Main user groups

Because producing an SR article does not require laboratory work and an article can be generated from the literature, healthcare professionals from many occupational categories within hospitals may wish to publish SR articles. Consequently, the user groups are highly diverse.

Participant A stated that *"They truly come from all professional categories. Some people who come to me to learn meta-analysis are studying at university and need to complete a master's degree. That is one group. Others are genuinely interested in the topic themselves. I have encountered pharmacists and respiratory therapists who were personally interested in writing this type of article. … Some physicians are also very willing to learn; they seriously work through the PICO and keywords with you."*

Participant B stated that "*Later, it included every R [resident physician], and we even extended the course to PGY trainees. … I provide services to all of them."* Participant D identified the leading groups among the fifteen major healthcare professions as *"nurses, pharmacists, respiratory therapists, physical therapists, occupational therapists, medical technologists, and radiologic technologists*."

Several participants indicated that nursing users constituted the principal group receiving their SR services. Participant C stated that "*The people who discuss these issues with us most frequently are probably nurses*." Participant D explained, *"The nurses at our hospital are extremely diligent. Many are enrolled in graduate programs, and they also have clinical needs. For example, they may need to conduct evidence-based nursing. … Even a single sentence on a patient education leaflet must be supported by evidence, because evidence is ultimately applied in clinical practice. All of these various questions therefore return to the library."* Participant E stated that "*Graduate students at our university, especially those in nursing, attach great importance to SR*." Participant F also explained, *"I asked the Department of Nursing, and they said that staff submit research proposals every year. The people selected to attend this type of course are, first, those who are interested and, second, those who may need it for promotion. … Nursing staff and interns are*

included. Because our medical center has an educational responsibility, I believe students, nurses, and these professional groups need such services."

4.1.4 Service delivery methods

Zhang (May 2026) reviewed the websites of academic health sciences libraries in the United States and found that 49% provided request forms for SR services. In her subsequent survey, 73% of respondents reported that users submitted an online request form, and 72% reported that users emailed a librarian with their questions (Zhang & Parrott, May 2026). The situation in Taiwan differed. Participant A stated that "*Most people first make an appointment and say that they want to conduct a meta-analysis, and then we arrange a time to discuss it*." When the researcher asked whether an application form had to be completed in advance, she replied, *"We also have this kind of form, but there is no standard operating procedure requiring strict compliance. Users can first come and talk with me and complete the form afterward. However, what we discuss is approximately the same as the content of the form."*

Determining search keywords is an important part of service delivery. Participant A stated that "*We follow a standard process to discuss the PICO and keywords*." Participant B noted that "*I ask users to give me their topic and keywords, and then I conduct a preliminary search so that I can understand how the subsequent keywords should be combined*." Since users requesting SR services differ in their level of knowledge, librarians adjust their support accordingly. Participant E stated that *"Based on our own experience, we try to understand the consultee's level and needs and then provide the corresponding service as quickly as possible using a method appropriate for that person."* Participant A similarly explained, "*It depends on their level. If they truly understand nothing at all, I suggest specific courses on the learning platform that they should listen to first*."

Participant D described her approach to SR consultations in detail, *"When users ask us questions, we do not simply answer one question with one answer. After giving them the answer they requested, we usually offer additional suggestions. ... If they still have time and are willing, I can give them more. ... They tell me the topic, and after we discuss it, I use my professional knowledge to help identify all relevant keyword variants, including MeSH terms, entry terms, and synonyms. We identify all of them. Then users tell me approximately how many databases they plan to search. If they cannot decide, we recommend which databases to use according to their topic and ultimate purpose."*

4.2 Medical Librarians

4.2.1 Continuing education for librarians

During the interviews, participants described many channels through which they strengthened their SR-related knowledge and skills, including courses and workshops, participation in internal hospital journal clubs, self-directed learning, accumulation of experience, exchange of experience, and knowledge transfer.

Courses and workshops were the most frequently mentioned channels for acquiring SR-related knowledge and skills through continuing education. Several participants indicated that their hospitals were willing to provide funding for them to attend external training. Participant A, an administrator, stated that "*Whenever there is a relevant course, I think librarians should attend it. If the hospital or university is willing to pay for it, then go*." Participant B stated that *"I attended courses offered by the Taiwan Evidence-Based Medicine Association. They were divided into introductory and advanced levels. The introductory course began with PICO and taught*

participants how to write an SR. The advanced course focused more on how we could teach others to understand it. At that time, we also conducted practice teaching by drawing topics and teaching them."

Participant C, also an administrator, stated that *"We encourage [librarians] to participate in relevant workshops. ... If necessary, I also think it is acceptable for them to take relevant university courses. ... If they truly need to pay for related tools in order to learn, that is also acceptable."* Participant D stated that "*When external courses are available, our applications to attend are usually approved*." Participant F said, "*We try to attend courses organised by the association [TMLA] whenever possible*."

Hospitals also organised their own EBM/SR-related activities, and participants believed that librarians could attend these activities to enhance their knowledge. Participant A stated that "*Sometimes I think that if we have the capacity to organise an event and invite an instructor to speak here, would that not be more convenient? Therefore, I organise many similar activities*." Participant D stated that "*At the beginning, we attended external courses two or three times. Our hospital was also very smart: after we returned from those courses, the physicians began offering courses internally*." Participant F noted, "*For other courses, such as those taught by database vendors, our librarians also attend.*" Participation in journal clubs for healthcare professionals was highly beneficial to Participant B, "*I participated in the hospital's journal club, and I gained a great deal from it because I learned how they conduct critical appraisal and interpret forest plots*."

In addition to formal courses, some participants mentioned self-directed learning, for which the Internet was an important channel. They sometimes visited other medical library websites to learn about their practices and sometimes learned from online audiovisual materials. Participant D stated that "*I am a self-directed learner. ... I use websites to see what overseas libraries are currently doing*." Participant E stated, "*I use Google to search for distinctive services or libraries*." Participant F remarked, "*I think learning today depends on the individual. ... Database vendors have many YouTube videos, and I have watched them as well*." Participant E also mentioned, "*making an individual effort and spending more time learning SR searching ... studying different topics and search methods to continuously improve*."

Participants further regarded the accumulation of experience as essential. Participant D stated that "*SR work requires a great deal of accumulated experience in addition to skills*." Participant E, who worked in a university medical library, explained, *"Because we receive so many inquiries, we can learn frequently. ... The volume of cases enables everyone to engage actively with this work and requires us to build the necessary abilities rapidly within a short time."*

When individual experience can be exchanged or transferred to new staff members, learning becomes substantially more efficient. Participant D stated that*"Those who came before us passed on their experience. We gave all our teaching materials to the [new librarian], so the time required for exploration was much shorter than it had been for us. ... I am continuously carrying out this [knowledge-transfer] work. We have a LINE group through which we can contact one another at any time. Whenever the new librarian has a question, I share everything I know and pass on all of my experience."* Participant D also stated that *"After a novice begins working at the reference desk, any question can be passed to more experienced reference librarians. Through this form of observational learning, novices can see how senior librarians respond."*

4.2.2 Roles in published SR works

As noted above, only six librarians from four medical libraries in Taiwan had been listed as co-authors of SR publications produced by researchers at their institutions. Three of these librarians, participants B, D, and E, were interviewed in the present study.

Co-authorship

When medical librarians provide SR consultation services, they may spend substantial amounts of time engaging in repeated discussions with users and may even help formulate search strategies and conduct information searches. Nevertheless, librarians are generally in a passive position regarding whether they are listed as co-authors. Participant B stated that *"Regarding being listed as an author … I was actually very surprised that Dr. OOO from the Department of Dermatology included my name, because I had not known about it. … Some people remember and ask me, but later they may not include my name after all."* She also stated modestly that "*I feel somewhat awkward about being listed as an author because I do not know whether they would think my contribution was sufficient to justify being listed alongside that group of physicians*."

Participant E reported that, in her experience, researchers usually initiated the offer, *"Honestly, given the volume of our consultations, the number of topics is extraordinarily large. However, only approximately ten to twenty ultimately became papers or included me as a co-author. … I rarely take the initiative [to ask]. Usually, the other party raises it, perhaps halfway through or one-third of the way through the project, and asks, 'Could we invite you to be a collaborating author? Could you conduct the literature search for us, or review it after we finish?' In some cases, I conduct the search; in others, they only consult me. Sometimes my level of participation is not very high, but they are still willing to include me as a co-author."* Once this collaborative model had been established, it gradually became a pattern, *"They generally indicate at an early stage that they intend to invite me to be a co-author. … After the manuscript is accepted, they ask me to sign the copyright or authorisation form. … A team may ask me about the first paper, but with the second paper, for example, another team member may contact me and they may no longer ask explicitly. [Later], I simply receive notice and wonder how another paper appeared."*

A larger proportion of studies, however, did not include contributing librarians among the authors. Participant A was the head of a hospital library and also held an adjunct faculty appointment, but she stated that *"Because I am not under pressure to seek promotion, and I do not have a strong desire to be promoted, I do not specifically raise the issue. … Most consultations involve explaining how to proceed and answering questions when problems arise. Whether they ultimately list me among the authors is up to them."*

Acknowledgement

Healthcare professionals may regard literature searching assistance and SR services as part of medical librarians' routine work. Consequently, according to participants' experiences, authors at their institutions rarely acknowledged the librarians who had assisted them after their SR articles were published. Participant A stated that "*There is rarely any formal acknowledgement. … Perhaps [the author] simply thinks that this is the library's job*." Participant B stated that *"At first, I did not expect them to acknowledge me. Professor OOO wrote the acknowledgement, and I think that was because the professor personally felt that thanks should be expressed. Otherwise, apart from Professor OOO, other people generally do not write anything in particular."*

4.2.3 Impact of SR services on librarians' status within their parent institutions

Several participants stated that when librarians' professional expertise becomes visible, they receive recognition from institutional administrators. Administrators no longer regard librarians' work as limited to checking books in and out and begin assigning them additional responsibilities and tasks.

Participant B stated that, because of the SR services, healthcare professionals at the hospital even praised the librarians to friends working at other hospitals, *"Providing SR services allows administrators to understand that our library does more than check books in and out. ... We can also contribute by supporting research. ... Some head nurses whom I know well have told me that their friends at other hospitals think that our [hospital librarians] are very capable. I once told a physician I knew at [another] hospital that the physician could ask that hospital's librarian. The physician replied, 'No, no, they cannot help. I asked them, and they did not know anything.'"* Participant C likewise stated that *"People who have received our various services all feel that we are highly professional. ... When they have more advanced academic needs, they interact with us more often and feel that we have helped them a great deal."*

Participant D also shared her experience, *"As I mentioned earlier, the hospital places considerable trust in our library. To be honest, at the beginning, our supervisors did not fully understand librarians' work. First, they may not have understood it very well; second, they may have thought that we were not cutting corners or merely going through the motions. They felt it was acceptable as long as we could provide whatever the physicians needed. That was the hospital's initial understanding. ... [Later], after our librarians became involved in evidence-based work, they discovered that librarians can do more than check books in and out. ... We can make broader contributions."* She therefore emphasised, *"We must remain committed to our professional expertise. We must make others understand where our professional value lies. At least so far, the hospital has affirmed this expertise. The librarian's role is therefore no longer limited to checking books in and out; the role has changed. The current change is that when hospital projects need support, they require assistance from the [library]. When they encounter these issues, they do not think of anyone else; they come directly to us."*

5. Conclusion

Using a qualitative research design with semi-structured interviews, the researcher interviewed library directors and librarians from six medical centers in northern, central, and southern Taiwan to explore the origins of SR services in these benchmarked hospital libraries, their relationship with institutional EBM centers, their main user groups, and their service delivery methods. The study also examined librarians' continuing education, their roles in SR publications, and the impact of providing SR services on librarians' status within their institutions. The findings present the experiences of these medical librarians as research partners for healthcare professionals and may serve as a reference for other libraries interested in developing similar services.

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Appendix 1

PubMed: 107 records retrieved
((("Medical Library"[Affiliation]) OR ("hospital library"[Affiliation])) OR ("medical university library"[Affiliation])) AND (Taiwan[Affiliation])

Web of Science: 221 records retrieved
"Med Lib" (Address) or "hosp. lib" (Address) or "med univ lib" (Address) and TAIWAN (Countries/Regions)

Scopus: 4 records retrieved
(AFFILCOUNTRY ("Medical Library") OR AFFIL ("hospital Library") OR TITLE-ABS-KEY ("medical university library")) AND (LIMIT-TO (AFFILCOUNTRY , "Taiwan"))

Sub-Theme 3: Bridging Health Information Gaps in Diverse and Underserved Communities

Chair:
Rosyidah Taju Rahim
Dar Al-Hikmah Library,
International Islamic University Malaysia (Kuantan)

Bridging Health Information Gaps Through Community Empowerment: Lessons from NORA® and MeMoSA® in Malaysia

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Abstract

Health information gaps remain a major contributor to inequities in cancer outcomes, particularly among rural, underserved, and socioeconomically disadvantaged communities. While access to reliable health information is essential, information alone rarely changes behaviour or improves outcomes. The challenge is ensuring that knowledge is translated into action through trusted relationships, local ownership, and sustained community engagement. This paper shares lessons from Cancer Research Malaysia's NORA® (Navigation, Outreach and Resource Access) programme and the MeMoSA® (Mobile Mouth Screening Anywhere) initiative, demonstrating how knowledge transfer and capacity building can extend the reach of healthcare services far beyond traditional clinical settings. Through NORA®, local "Agents of Change" are trained in breast cancer awareness and breast self-examination (BSE), enabling them to teach and support women within their own communities. Through MeMoSA, community health volunteers use a mobile health platform to facilitate oral cancer screening and connect individuals in remote and underserved areas to specialist care. Although addressing different cancers, both programmes are built on a common principle: sustainable change occurs when communities are equipped with the knowledge, skills, and tools to become part of the solution themselves. This paper will share lessons learned from implementing these initiatives across diverse Malaysian communities and highlight the role of trust, local ownership, and knowledge transfer in overcoming barriers to early detection of cancer. It will reflect on how community members, when equipped with relevant knowledge, practical skills, and a clear sense of purpose, can become powerful partners in improving health outcomes. Ultimately, bridging health information gaps is not simply about providing information, but about enabling communities to use that information to take action.

Keywords: Health information; Information gaps; Community empowerment; NORA; MeMoSA; Malaysia

Win-Win-Win: The Bargain Experience of VHCNet (Veterans Hospital Cooperation Network) in Taiwan

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Abstract

In order to bridge the medical information gap, the Veterans Hospital Cooperation Network (VHCNet) in Taiwan established a collaborative procurement model integrating resources across general hospitals and their branch hospitals. This paper highlights VHCNet's highly successful "Win-Win-Win" bargain experience, addressing budget constraints through strategic consortium negotiations. This collaborative model creates three major winners. First, for the vendors, extending resource access to multiple branch hospitals significantly boost platform usage rates and user dependency. This robust engagement maximises the platform's value, effectively preventing subscription cancellations during hospital budget reviews. Second, for the main libraries (general hospitals), the consortium approach allows them to share subscription expenses with branches and leverage collective bargaining power. This reduces their financial burden, resolving the crisis of stagnant budgets following organisational restructuring. Third, for the branch hospitals, contributing only a minimal shared cost unlocks premium medical centre-level resources. Ultimately, VHCNet's innovative integration maximises resource efficiency, ensuring that all stakeholders thrive while fulfilling the ultimate goal of translating high-quality medical information into improved patient safety.

Keywords: VHCNet; Consortium negotiations; Collaborative acquisitions; Bargaining power; Budget constraints

1. Introduction

1.1 Disparities in Healthcare Information Access

In the contemporary healthcare ecosystem, timely and equitable access to high-quality medical information is essential for evidence-based clinical practice, research, education, and patient safety. However, substantial disparities in access to digital scholarly resources and clinical knowledge tools persist across healthcare institutions. In many healthcare systems, major medical centres generally possess stronger acquisition budgets and more comprehensive collections of electronic resources, whereas branch hospitals and smaller regional institutions often lack the financial capacity to maintain comparable access. Such differences in institutional scale, budget allocation, and collection development capacity contribute to unequal access to medical evidence and may ultimately affect the quality of clinical decision-making and professional learning.

1.2 Institutional Restructuring and Information Gaps in Taiwan's Veterans Healthcare System

In Taiwan, this challenge has been particularly evident within the veterans hospital system. General hospitals, as major teaching medical centres, typically have greater access to electronic journals, databases, and clinical decision-support tools, while branch hospitals often face tighter financial and staffing constraints. In order to address this information gap, the Veterans Affairs Council commissioned the Taipei Veterans General Hospital Library to lead in the establishment of the Veterans Hospital Cooperation Network (VHCNet) in 2003. At that time, the branch hospitals were still directly under the Veterans Affairs Council, so VHCNet was created to facilitate resource sharing and collaborative procurement across the entire veterans hospital system.

Beginning in 2011, the Veterans Affairs Council gradually reorganised the system by placing branch hospitals under the administrative jurisdiction of the general veterans hospitals. With Pingtung Veterans General Hospital upgraded to a general-hospital status in 2022, Taiwan now has four general veterans hospitals. Taipei Veterans General Hospital, for example, oversees a healthcare network that includes seven branch hospitals in northern and eastern Taiwan. This multi-site structure makes coordinated library and information services essential for ensuring equitable access to medical resources across the entire network.

1.3 Financial Challenges and the VHCNet Collaborative Acquisition Framework

Following this organisational integration, the challenge of providing equitable access to electronic resources became even more pronounced under continuing healthcare budget constraints. Medical libraries were increasingly confronted with stagnant or declining acquisition budgets alongside persistent price inflation from international scientific, technical, and medical (STM) publishers. Under these conditions, maintaining equitable access to essential electronic resources through independent hospital-level subscriptions became progressively unsustainable. In response, VHCNet developed a collaborative acquisition framework to support consortium-based bargaining across general hospitals and their branch hospitals.

1.4 The Flexible Opt-In Mechanism and Collective Bargaining

Rather than requiring all member hospitals to participate in the same subscription package, VHCNet allows each hospital to decide whether to join a specific consortium-negotiated resource according to its service needs, user demand, and budget capacity. Through this flexible opt-in mechanism, participating hospitals can benefit from collective bargaining power and more favourable pricing while retaining autonomy in local collection decisions. The strategic logic of this arrangement aligns closely with international practices where health sciences libraries support multi-site affiliated hospitals through negotiated access to licensed materials (Allison et al., 2020), as well as the implementation of flexible subscription and cost-sharing models within library consortia to navigate financial constraints (Anglada & Comellas, 2002; Hosoi, 2020; Zervas & Haraki, 2017). In this way, VHCNet broadens access to electronic resources, distributes costs more fairly, and improves the long-term sustainability of medical library subscriptions across the network. In fact, the proportion of branch hospitals choosing consortium procurement has steadily increased year by year.

1.5 Objectives and Contributions of the Study

Now, one might ask: why should a major medical centre care if a small branch hospital lacks access to a specialised medical database?

In our system, the answer is critical. General hospitals and branch hospitals do not operate in isolation. Under institutional guidelines, senior physicians, specialist consultants, resident doctors, nurses, and pharmacists from general veterans hospitals are routinely assigned to branch hospitals for rotational service, specialist outreach, clinical support, and teaching.

The purpose of this paper is threefold. First, it documents the institutional background and operational logic of VHCNet's collaborative procurement mechanism. Second, it analyses how the bargaining model creates value for different stakeholders, including vendors, general hospitals, and branch libraries, under budget constraints. Third, it discusses the broader implications of this model for bridging health information gaps and enhancing information equity in diverse healthcare communities (De Leon, 2025). By presenting this case, the paper argues that medical libraries do not merely support units for resource acquisition; they are also strategic coordinators capable of shaping equitable information infrastructures across hospital networks.

2. Literature Review

2.1 Consortium Purchasing as a Library Strategy

Consortium purchasing has emerged as a core strategy for academic and health sciences libraries to address the "serial crisis," which is characterised by soaring subscription costs and the monopolisation of the academic publishing market (Anglada & Comellas, 2002; Pan & Fong, 2010). By forming consortia, institutions leverage economies of scale to enhance their bargaining power and expand access to electronic resources (Perry, 2009). However, commercial publishers often offer the "Big Deal", a comprehensive bundling of journals, which poses long-term risks, such as the loss of local collection autonomy and the "librarians' dilemma," where libraries are forced into inflexible, all-or-nothing agreements (Frazier, 2001; Parmar, 2024). Despite these risks, consortium models remain highly attractive, particularly for smaller or non-academic institutions. For these smaller libraries, consortium participation often generates an exceptionally high return on investment (ROI), allowing them to access extensive databases that would be impossible to afford on local budgets alone (Zervas & Haraki, 2017). In the context of healthcare systems, collaborative purchasing not only resolves financial constraints but also strengthens system-wide professional standards by ensuring that all affiliated hospitals operate from a comparable and standardised knowledge base (Pereira & Franco, 2020).

2.2 Bargaining Power, Sustainability, and Vendor-Library Relationships

The economics of electronic resource licensing frequently place individual libraries in a structurally weak negotiating position, especially when dealing with multinational publishers or specialised medical database vendors (Van Schaik & Moore, 2011). Rising subscription prices, currency fluctuations, and flat institutional budgets pose significant challenges to long-term sustainability (Anglada & Comellas, 2002). Under these circumstances, collective bargaining power becomes a critical determinant in collection development strategies (Beimborn et al., 2007). Collaborative negotiation rebalances this dynamic by transforming individual purchasing into network-based partnerships, striving for a "win-win" outcome. For vendors, consortial agreements provide greater market stability, broader institutional reach, and reduced administrative and communication costs (Anglada & Comellas, 2002). Conversely, libraries benefit not only from favorable price negotiations and expanded access rights but also from the ability to justify

expenditures through high aggregate usage across multiple sites. Consequently, negotiation is no longer merely a cost-reduction tool; it redefines the value proposition of resources within a broader healthcare system and fosters a healthy relationship between vendors and libraries that creates "shared value" (Hosoi, 2020).

2.3 The Research Gap

Although the value of consortium purchasing is widely recognised, existing literature predominantly focuses on academic library consortia, national licensing initiatives, or broad regional alliances, such as the University of California System (Hosoi, 2020), the Cyprus Academic Library Consortium (Zervas & Haraki, 2017), or the NOCEI Consortium in the Philippines (De Leon, 2025). Few studies have examined how collaborative acquisition operates within a vertically integrated hospital system, where one or more flagship medical centres support multiple branch hospitals with varying resource capacities. Furthermore, there is limited discussion on framing the consortium model not solely as a cost-saving mechanism, but as an equity-oriented strategy designed to bridge health information gaps within healthcare delivery systems. This paper addresses this research gap by presenting the VHCNet in Taiwan as a practice-based case study. Rather than treating procurement as a purely technical or administrative process, this study situates collaborative acquisition within a broader framework of health information equity, inter-institutional solidarity, and patient safety. Ultimately, it provides a novel model for understanding how medical libraries can strategically employ negotiation to create shared value across a hospital network.

3. Research Methodology

3.1 Research Design: A Practice-Based Longitudinal Case Study

This paper adopts a practice-based, longitudinal case study design to examine the collaborative acquisition and negotiation framework of VHCNet in Taiwan. Rather than testing a deductive hypothesis through experimental control, the study analyses a real-world medical library consortium as an institutional case embedded in a public healthcare system. A case study approach is particularly suitable for investigating complex organisational processes, policy implementation, and inter-institutional coordination within their real-life context (Crowe et al., 2011; Yin, 2017). It is also appropriate for examining how library consortia respond to budget constraints, uneven resource distribution, and the need for coordinated access to electronic resources across multiple healthcare institutions (Anglada & Comellas, 2002; Beimborn et al., 2007).

The present study is practice-based in that it is grounded in the author's direct professional engagement with consortium operations, resource planning, and procurement coordination. At the same time, it is longitudinal because it traces the development of VHCNet over time, from its establishment in 2004 through the 2023-2025 strategic planning cycle. This design enables the study to capture the gradual evolution of VHCNet from fragmented, hospital-level purchasing towards a more integrated, consortium-based bargaining model. Following Yin (2017), the case is treated as a bounded organisational system, while the analysis also draws on Stake's (1995) emphasis on contextual interpretation and the value of case-based understanding in applied settings.

3.2 Data Sources and Collection Methods

In order to ensure empirical depth and institutional validity, this practice-based case study draws on multiple forms of documentary and administrative evidence generated during the operation of VHCNet. Case study research commonly relies on multiple sources of evidence in order to strengthen contextual interpretation and improve the credibility of findings through triangulation (Crowe et al., 2011; Yin, 2017). In addition, document analysis is an appropriate method for examining organisational records, policy documents, and administrative communications that capture decision-making processes and institutional change over time (Bowen, 2009).

The data corpus for this study spans from VHCNet's inception in 2004 through the 2023-2025 strategic planning cycle and includes four main categories of materials:

a. Meeting minutes of VHCNet committees and inter-hospital coordination meetings were used to identify procurement priorities, negotiation decisions, and policy deliberations.
b. Annual work plans and strategic planning documents were used to trace changes in consortium objectives, resource allocation principles, and long-term service planning.
c. Procurement and financial records, including subscription proposals, cost-sharing arrangements, renewal decisions, and selected budgetary summaries were used to examine bargaining practices and the financial structure of collaborative acquisition.
d. Administrative documentation, such as memoranda, internal correspondence, implementation guidelines, and other operational records, was used to reconstruct the governance logic and procedural mechanisms of the consortium.

These materials were collected from internal institutional records maintained by the Executive Library and relevant administrative units involved in VHCNet operations. Since the study focuses on organisational practice rather than individual human subjects, the primary unit of analysis is the consortium and its procurement processes rather than the perceptions of individual users or librarians.

3.3 Scope and Limitations

This paper should be understood as a practice paper and institutional case analysis rather than a formal outcome evaluation study. Its primary contribution lies in documenting the structure, rationale, and operational benefits of the VHCNet model, rather than in testing a causal intervention effect through statistical comparison. Although the study draws on longitudinal administrative evidence, some quantitative indicators, such as exact subscription prices, hospital-specific budget allocations, negotiated discounts, and detailed usage counts, are commercially sensitive or institutionally restricted and therefore cannot be reported comprehensively.

In addition, because the study is based primarily on documentary and administrative sources from a single healthcare network, its findings are not intended to be statistically generalised. Instead, the value of the paper lies in providing an analytically grounded and transferable account of collaborative procurement practice in a public medical library network. In this sense, the case offers a model of practice-based evidence that may inform other hospital library systems facing similar challenges of budget pressure, unequal resource distribution, and the need for sustainable access to electronic medical information.

4. Results and Discussions

4.1 Background: Why VHCNet Needed a Collaborative Procurement Model

The VHCNet Collaborative Procurement Model did not emerge simply as an administrative convenience or budget constraint; rather, it developed in response to a structural challenge within the veterans hospital system. General hospitals typically serve as the primary centres for teaching, research, specialist training, and advanced clinical care, and therefore tend to maintain richer library collections and stronger information support. Branch hospitals, by contrast, often operate with more limited budgets and leaner staffing structures, making it difficult to sustain the same level of access to electronic journals, bibliographic databases, and clinical decision-support tools. However, the information gap between general hospitals and branch hospitals cannot be understood solely as a difference in local institutional capacity. Within the veterans hospital system, general hospitals, and branch hospitals function as an interconnected clinical service network rather than as isolated institutions. According to the *Operational Guidelines for the Veterans Affairs Commission Medical System Support Operations*, medical personnel from general hospitals are frequently assigned to branch hospitals for rotational service, specialist outreach, clinical support, teaching, and collaborative care. As a result, the information environment of branch hospitals directly affects not only branch-based staff but also general-hospital physicians, nurses, pharmacists, and other professionals working across sites. If branch hospitals lack adequate access to high-quality medical information resources, the ability of rotating or supporting personnel from general hospitals to deliver evidence-based care, maintain teaching quality, and sustain their own professional competence, may also be compromised. In this sense, reducing resource disparities between general hospitals and branch hospitals is not merely a matter of supporting peripheral institutions; it is also a strategy for maintaining the circulation of personnel, knowledge, and clinical capability across the entire veterans healthcare network.

4.2 The VHCNet Bargaining Mechanism

The VHCNet Model can be understood as a collaborative acquisition and cost-sharing mechanism led by main libraries in general hospitals and extended to branch hospitals. Its core operational logic includes the following elements:

4.2.1 Resource identification and network demand matching

Each year, VHCNet begins its consortium planning process in the second half of the year in preparation for the Annual Members' Meeting, which serves as the principal forum for discussing resource renewal and new subscription proposals (Veterans Hospital Cooperation Network [VHCNet], 2003-2025a). Prior to the meeting, the Executive Library conducts a network-wide survey among member hospitals to collect recommendations regarding both the renewal of existing electronic resources and the potential subscription of new products (VHCNet, 2019-2025c). This survey process allows participating hospitals to express their service needs, identify high-demand resources, and indicate preliminary interest in joining a consortium-negotiated package.

In order to support informed decision-making at the Annual Member's Meeting, the Executive Library also completes preliminary market inquiries and budget simulations in advance (VHCNet, 2019-2025c). Market inquiries are used to gather current pricing information, package options, and possible consortium terms from vendors, while budget simulations estimate the financial implications of different participation scenarios and cost-sharing arrangements across hospitals. By combining demand survey results with advance pricing and budget analysis, VHCNet is able to present member hospitals with a more concrete basis for discussion when evaluating whether a

resource should be renewed, newly introduced, or negotiated through the consortium model. This preparatory process helps align resource selection with actual network demand while improving the feasibility and transparency of subsequent bargaining and procurement decisions (VHCNet, 2009-2025b).

4.2.2 Cost-sharing between general hospitals and branch hospitals

Once a network-level subscription framework is established, VHCNet develops cost-sharing proposals for discussion among member hospitals. The cost-sharing model is not fixed to a single formula; rather, multiple allocation options may be prepared depending on the nature of the resource, the size of participating hospitals, and the financial feasibility for branch institutions. In most cases, the Executive Library first calculates a baseline proposal based on full-time equivalent (FTE) figures, as this provides a relatively standardised method for estimating institutional scale and potential usage. However, if the resulting branch hospital's contribution is considered too burdensome, additional alternatives are prepared for deliberation.

In practice, a second or even third cost-sharing scenario may be developed to ensure that branch participation remains financially feasible. A key principle in this process is that the total cost borne by the network should not exceed the amount that a general hospital would have paid if it had subscribed independently. Within that ceiling, VHCNet seeks to design a cost-sharing arrangement that reduces the burden on the general hospital while keeping branch contributions at a manageable level. These alternative schemes are then presented at the VHCNet Annual Members' Meeting for discussion. Because each cost-sharing proposal is discussed in detail and voted on individually on a case-by-case basis, the Annual Members' Meeting typically requires a half-day to a full day to complete.

Once a cost-sharing proposal is approved through the VHCNet decision-making process, the resolution is brought back to the library committee of each participating hospital for internal review and formal approval. In practice, however, hospital library committees generally respect and follow the consortium decision reached through VHCNet, reflecting the network's established governance mechanism and the high level of trust placed in its collective bargaining process. As a result, the cost-sharing arrangement functions not only as a financial mechanism, but also as a form of coordinated governance that balances affordability, participation, and institutional consensus across the veterans hospital network.

4.2.3 Coordinated implementation and access management

After the agreement is finalised, access is extended across participating institutions through coordinated technical and administrative management. This may include IP authorisation, user training, promotional activities, and service support from the main library. This collaborative operational phase is critical, as the long-term success and perceived effectiveness of a library consortium depend heavily on active user training, continuous promotion, and cross-institutional technical coordination to resolve accessibility issues (De Leon, 2025).

In this sense, the model is not only about negotiating price but also about ensuring that access is actually activated, used, and integrated into local practice. Such post-negotiation infrastructure and administrative alignment mirror the institutional practices observed in international academic consortia, where coordinated promotion, hands-on training, and localised support are systematically implemented to fully realise the strategic impacts and operational benefits of joint resource sharing frameworks (Zervas & Haraki, 2017). By bridging the gap between contractual

procurement and practical utilisation, the network maximises the return on its collaborative investment and embedded electronic resources.

4.3 The Win-Win-Win Model of VHCNet

VHCNet negotiates with vendors not on behalf of a single hospital, but based on an expanded user network that includes both general hospitals and participating branch hospitals. This broader service scope fundamentally reshapes the negotiation context.

4.3.1The first “win”: value for vendors

From the vendors’ perspective, VHCNet offers more than a larger contract size. It provides deeper market penetration within a coherent healthcare network. When a vendor extends access from a single flagship hospital to multiple branch hospitals, the platform reaches a wider professional audience across different regions and care settings. This increases the number of potential users, diversifies use scenarios, and strengthens the visibility of the product within the veterans healthcare system. This strategy aligns with commercial publishers' broader objectives to balance their commercial interests with the institutional demands and technical reach of libraries by expanding collective access to a larger pool of users (Anglada & Comellas, 2002).

A key advantage for vendors is the growth of platform usage and institutional dependence. Once clinicians, nurses, and educators across several hospitals begin using the same resource, the platform becomes more deeply embedded in evidence-based care, teaching, and continuing education. Higher usage can generate stronger renewal justification, making the subscription less vulnerable during annual budget reviews. Within the scholarly information marketplace, this mechanism leverages the structural advantage of the "Big Deal" or network-wide aggregation model; by bundling access and embedding products into daily user workflows, publishers effectively increase institutional dependency, which stabilises future revenue and significantly minimises the likelihood of localised library cancellations during financial downturns (Frazier, 2001). In other words, broader access can stabilise future revenue by transforming a product from a “library subscription” into a “network-wide working tool.”

The VHCNet experience suggests that vendors are more willing to discuss favorable terms when the proposal is framed as a long-term institutional relationship rather than a single-site transaction. In this respect, the consortium model creates a mutually beneficial business case for vendors: reduced risk of cancellation, stronger product visibility, and wider clinical integration.

4.3.2 The second “win”: Value for main libraries in general hospitals

For main libraries, the VHCNet model directly addresses one of the most persistent problems in medical librarianship: how to sustain high-cost electronic resources under stagnant budgets. Major hospitals often face the expectation of maintaining comprehensive collections, yet budget growth rarely keeps pace with annual price increases from publishers and database vendors. This financial dilemma directly reflects systemic scholarly marketplace strains, particularly the rigid commercial subscription models that threaten localised library collections during periods of organisational or institutional budget constraints (Anglada & Comellas, 2002; Frazier, 2001).

Under VHCNet, the main library no longer bears the full burden of supporting high-value resources alone. By incorporating branch hospitals into the subscription structure, the main library can share costs while simultaneously strengthening its negotiating position. This dual advantage is central to the “win-win-win” logic. Cost-sharing reduces immediate financial pressure, while

network-based bargaining increases leverage in vendor negotiations (Hosoi, 2020). Instead of asking for a lower price as a single buyer, the library can negotiate as the representative of a multi-hospital system, effectively utilising collective bargaining power to secure more viable pricing terms.

Equally important, the main library's role evolves from purchaser to strategic coordinator of network information access. The library is not merely buying content; it is designing a sustainable access model for an entire healthcare system. This repositioning enhances the professional value of the medical library by demonstrating its contribution to organisational efficiency, equitable resource provision, and inter-hospital collaboration. It reinforces the view that modern library networks function as proactive strategic partners capable of overcoming financial limitations through structured multi-site cooperation and optimised resource coordination (De Leon, 2025).

4.3.3 The third "win": Value for branch hospitals

The benefits to branch hospitals are the most directly aligned with the conference theme of bridging health information gaps in diverse communities. Branch hospitals often face a difficult reality: their clinicians need access to current evidence, but their local budgets may not support subscription to expensive specialist databases or journal platforms. As a result, staff in peripheral institutions may work with fewer information resources than their counterparts in medical centres, despite serving patient populations with equally complex needs.

Through VHCNet, branch hospitals can contribute a relatively small, shared cost and gain access to resources that would otherwise be unattainable through independent purchasing. This represents a significant improvement in information equity. The model effectively lowers the entry barrier to premium medical information resources and allows branch hospitals to benefit from the scale and negotiating power of the broader network, a collaborative approach recognised as a crucial mechanism for individual libraries to overcome profound financial and resource limitations (De Leon, 2025). Additionally, since its establishment in 2004, VHCNet has maintained a dedicated portal that serves as a centralised access point for consortium resources, enabling healthcare professionals across member hospitals to retrieve subscribed databases, journals, and other digital resources through a shared platform. This common entry infrastructure further strengthens the practical accessibility and visibility of network-wide resources, particularly for branch hospitals with more limited local library systems. Such unified technological frameworks directly mirror global trends where academic and medical consortia utilise consolidated digital environments and shared portals to enhance research visibility, facilitate systematic material evaluation, and ensure seamless delivery to remote or cross-site organisational users (Nche Che et al., 2022; Zervas & Haraki, 2017).

The impact of this access extends beyond convenience. Better access to literature and evidence tools can strengthen continuing education, support clinical inquiry, improve research and teaching capacity, and reinforce evidence-based decision-making at the point of care. For branch hospitals, therefore, the VHCNet model is not only a financial arrangement but also a professional empowerment mechanism.

4.4 Beyond Cost Reduction: Collaborative Acquisition as an Equity Strategy

One of the most important insights from the VHCNet case is that collaborative acquisition should not be viewed only as a cost-saving exercise. Although financial sustainability is a central driver, the deeper value of the model lies in its capacity to function as an equity-oriented information strategy. It transforms the paradigm of collaborative purchasing from a defensive budgetary maneuver into a proactive tool for shaping a more balanced access infrastructure across unevenly funded environments (Anglada & Comellas, 2002).

By integrating branch hospitals into the subscription ecosystem, VHCNet reduces the divide between centre and periphery. It acknowledges that access to medical knowledge should not be determined solely by local purchasing power, especially within a healthcare system that aims to provide coordinated, high-quality care across multiple regions. In this sense, consortium negotiation becomes a mechanism for redistributing informational opportunities and mitigating resource constraints at smaller institutions through structured cooperation (De Leon, 2025).

This model also reinforces the social and professional role of the medical library. Rather than passively responding to rising prices, the library actively redesigns the acquisition framework to better align with institutional mission, network structure, and user need. Such work positions the library as a broker of equity, a negotiator of value, and a contributor to patient safety. This structural repositioning supports international findings that when libraries unite through shared technological platforms and strategic consortia, they move past isolated operational boundaries to establish sustainable long-term information equity within the broader organisational framework (Zervas & Haraki, 2017).

5. Conclusion and Recommendations

Despite its strengths, the VHCNet model also involves practical challenges. Negotiating across multiple institutions requires significant time, administrative coordination, and consensus-building. Branch hospitals may vary in size, specialty profile, and actual resource needs, making it difficult to apply a uniform cost-sharing formula. This complexity directly mirrors international challenges in consortium management, where navigating the diverse and often conflicting priorities of member institutions, metaphorically described as "herding cats", requires substantial interpersonal and structural effort to achieve cooperative financial models (Hosoi, 2020). Furthermore, library consortia frequently encounter operational obstacles rooted in a prominent lack of coordination and communication among member libraries (De Leon, 2025). In addition, vendors may differ in their willingness to extend network licenses or offer flexible pricing structures.

Another challenge lies in demonstrating value. For collaborative procurement to remain sustainable, participating hospitals need clear evidence that the model improves access and justifies their local institutional investment. Gathering comprehensive usage data, collecting user feedback, and showcasing examples of clinical or educational benefit can help maintain long-term institutional support. Therefore, future development of the VHCNet model may benefit from more systematic outcome tracking, including resource usage trends, cost avoidance estimates, and user impact narratives. This reliance on structured assessment aligns with established consortia practices, where systematic resource evaluation, continuous usage tracking, and targeted promotional methods must be rigorously applied by librarians to justify ongoing collaborative expenditures and prove the practical benefits of shared electronic agreements (Zervas & Haraki, 2017).

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Trust, Tech, and Translation: Closing the Health Literacy Gap in Indigenous Populations

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Abstract

Health information gaps in diverse and underserved communities significantly drive health disparities and poor medical outcomes. Structural inequalities, cultural-linguistic barriers, and limited health literacy collectively impede marginalised populations from accessing vital healthcare services and information. Academic and public libraries serve as trusted, vital hubs for disseminating accessible health assets and executing tailored literacy programs. Effective health communication relies heavily on audience segmentation, tailored messaging, and cultural competence. While digital health innovations like telemedicine and mobile health (mHealth) offer powerful tools to bypass geographic barriers, their efficacy is constrained by infrastructure deficits and demographic variations in eHealth literacy. To counter this, community-driven outreach including narrative storytelling and workshops are essential for building trust among indigenous communities. Although localised digital tools, targeted communication, and institutional partnerships are critical components of success, they cannot solve health disparities in isolation. Achieving long-term health information equity requires comprehensive policy reforms that directly dismantle the underlying structural inequalities and systemic discrimination within healthcare systems. The presenter will synthesise contemporary research to examine a multifaceted approach to bridging these information gaps, focusing on the intersection of cultural competence, digital technology, community engagement, and institutional support. He will share his experience engaging the indigenous communities.

Keywords: Health information; Information gap; Diverse communities; Underserved communities; Libraries

Beyond the Digital Divide: Delivering Trusted Health Information to Remote and Indigenous Communities in Borneo

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Abstract

Access to reliable health information is fundamental to health equity, yet remote and Indigenous communities in Borneo continue to experience significant barriers to timely, relevant and trustworthy health information. Geographical isolation, limited digital connectivity, language diversity, cultural differences, health literacy challenges and unequal access to digital technologies can widen the information divide and contribute to disparities in health outcomes. Medical libraries and health information professionals have an important role in addressing these challenges by moving beyond conventional models of information delivery and developing approaches that are community-centred, culturally responsive and locally sustainable. Practical strategies for delivering trusted health information through blended approaches, including mobile and offline resources, community health workers, local partnerships, multilingual and culturally appropriate materials, and digital health literacy initiative are in dire need. Particular attention is given to the importance of understanding Indigenous knowledge systems and community information-seeking behaviours while maintaining the principles of evidence-based health information. The medical libraries to become active partners in health equity rather than merely repositories of information. Health information services can become more accessible, trusted and meaningful via strengthening collaboration among libraries, healthcare providers, Indigenous communities, educational institutions and policymakers. Bridging the digital divide is not simply about providing connectivity, ensuring that every community, regardless of geography or socioeconomic circumstances, can access health information that is trusted, understandable, culturally relevant and actionable.

Keywords: Digital divide; Health information; Indigenous communities; Health literacy; Medical libraries

1. Introduction

Equitable access to trustworthy health information supports informed decisions, timely help seeking and participation in care. In remote and Indigenous settings, however, access depends on more than connectivity language, cultural meanings, trust, health literacy, digital skills, distance and communication quality determine whether information can be found, understood and acted upon. Indigenous studies repeatedly identify the value of local-language communication, community knowledge and culturally grounded information pathways (Cueva et al., 2016; Geana et al., 2012; Kerrigan et al., 2025; Mitchell et al., 2021; Smylie et al., 2009).

Borneo presents these challenges in a distinctive combination of dispersed settlements, difficult terrain and cultural and linguistic diversity. Sarawak evidence links rural access to geography and service constraints, while local studies identify health literacy, digital capability, cultural beliefs and information availability as important influences on health behaviour (Froze et al., 2019; Hee et al., 2026; Kang & Lian, 2025; Lim et al., 2025; Msh et al., 2026). The digital divide is therefore treated here as a multidimensional information-equity problem rather than only a connectivity deficit.

This systematic literature review examines barriers to trusted health information, delivery strategies, the effects of language/culture/Indigenous knowledge/health literacy/connectivity, the roles of libraries and community intermediaries, evidence on outcomes, and research gaps relevant to Borneo. Comparable Indigenous settings are included to identify transferable lessons while keeping Borneo as the focal context.

2. Literature Review

2.1 Digital Divide, Health Literacy and Trusted Information

In Indigenous and remote settings, health literacy is relational and context dependent. Medical jargon, power imbalances and culturally unfamiliar explanations can reduce understanding and trust, whereas yarning, plain language, visual materials and community educators can improve communication (Lambert et al., 2014; Rempel et al., 2016; Rheault et al., 2021; Smith et al., 2020; Stanford et al., 2019; Treloar et al., 2013). Reviews and practice studies also show that health-literacy concepts and resources require contextual and cultural adaptation (Brown et al., 2026; MacAskill et al., 2022; Milroy et al., 2025; Webkamigad et al., 2020).

2.2 Culture, Language, Indigenous Knowledge and Co-design

Trusted information is shaped by who produces it, the language and medium used, and whether communities recognise their knowledge and priorities within it. Co design and participatory approaches allow Indigenous communities to influence terminology, images, metaphors and delivery channels (Binks, Ross, et al., 2024; Binks, Venkatesan, et al., 2024; Good et al., 2024; Hendayani et al., 2026; Laveaux et al., 2018; Lowell et al., 2021; Peake et al., 2021; Verbiest et al., 2019). Participatory film and regional public health communication provide complementary examples of culturally recognisable media and community ownership (Fagan et al., 2015; Wahlang & Vemula, 2023; Zemits et al., 2015).

2.3 Digital, Mobile and Blended Delivery

Digital platforms can extend reach however do not automatically reduce inequity. Indigenous mHealth and telehealth studies show that uptake depends on digital literacy, cultural relevance, trust, privacy, affordability, provider relationships and organisational capacity (Carroll et al., 2011; Goodman et al., 2023; Henson et al., 2022; Ishaque et al., 2025; Maar et al., 2010; Maar et al., 2016; Perkes, Bonevski, et al., 2023; Perkes, Huntriss, et al., 2023; Umaefulam & Premkumar, 2020; Umaefulam et al., 2022). These findings favour blended digital, offline and interpersonal delivery.

2.4 Libraries and Community Information Infrastructure

Libraries can serve as access points, conveners and evidence intermediaries. Indigenous focused outreach literature describes roles in health-information literacy, rural access and partnership building, but the evidence is concentrated outside Borneo and often evaluates implementation rather than long term health outcomes (Chakma & Ahammad, 2026; Cruise et al., 2023; Grabeel & Wilson, 2024; King, 2024; Luo, 2024; McKay & Bjartmarsdottir, 2025; Wood et al., 2003; Yesmin et al., 2023). This creates a clear opportunity for Borneo-specific research on medical-library involvement.

3. Research Methodology

This systematic literature review (SLR) used structured evidence mapping and narrative synthesis and was reported in line with PRISMA 2020 (Page et al., 2021). Scopus and Web of Science were searched on 21 September 2026 using four complementary strategies: A1 (Borneo health information), A2 (Borneo digital divide/delivery), B1 (comparative Indigenous evidence) and C1 (medical libraries/information professionals). Searches covered 2000–2026 English-language records.

Table 1. Search and screening profile

Database	A1	A2	B1	C1	Total
Scopus	31	36	293	45	405
Web of Science	20	21	50	14	105
Total	51	57	343	59	510

Eligible sources addressed Indigenous, remote, rural or underserved communities and examined health-information access, seeking, literacy, communication, digital inclusion, mHealth/telehealth, culturally responsive delivery, community intermediaries or library outreach. Peer-reviewed journal articles and directly relevant reviews or practice/context papers were eligible. Conference papers, protocols, errata, purely clinical studies without an information component and unrelated technology/library studies were excluded. DOI and normalized title matching removed 60 duplicates from 510 records, leaving 450 for title/abstract screening. Ninety-four CORE records underwent detailed eligibility assessment using indexed records, abstracts, document type, DOI/publisher information and accessible full text information where available. Fifty-five sources were included; 39 were excluded for insufficient directness (n=23), source-type/scope mismatch (n=10), publication type (n=4) or population/context mismatch (n=2).

Table 2. PRISMA-style study selection and eligibility flow

Selection stage	n	Decision
Records identified from Scopus and WoS	510	A1/A2/B1/C1 across both databases
Duplicates removed	60	DOI + normalised-title deduplication
Unique records screened	450	Title/abstract screening
Records not advanced to detailed eligibility	356	201 outside scope + 155 contextual/lower-priority

CORE records assessed for detailed eligibility	94	Full indexed record + abstract + publisher/available full-text information
Reports excluded after detailed eligibility	39	23 insufficient directness; 10 source-type/scope; 4 publication type; 2 population/context
Sources included in narrative synthesis	55	39 empirical + 6 systematic/scoping reviews + 10 practice/context papers

Table 3. Profile of the 55-source included evidence set

Evidence characteristic	n
Core empirical studies	39
Systematic/scoping reviews	6
Practice/context papers	10
Qualitative/case studies	23
Program/intervention evaluations	7
Mixed methods	5
Cross-sectional studies	3
Cohort/longitudinal studies	1
Other empirical/conceptual	10

A standardised matrix charted source type, geography, population, design, barriers, delivery strategies, outcomes, context and research-question alignment. The 55 sources comprised 39 empirical studies, six systematic/scoping reviews and 10 practice/context papers; empirical studies formed the primary evidence base, while the other sources supported interpretation. Narrative/thematic synthesis was used because designs and outcomes were heterogeneous. No aggregate risk of bias score was used because the objective was evidence mapping rather than pooled effect estimation interpretation emphasised study design, directness, Borneo relevance and convergence. Screening and coding followed a pre-specified framework but were conducted by one reviewer.

4. Results and Discussion

4.1 Evidence base and the multidimensional information divide

The 55-source included evidence set was dominated by qualitative/case studies and health-literacy research. Non-exclusive coding identified cultural factors in 40 records, health-literacy issues in 31, access barriers in 30, language issues in 14, trust in eight and geographical isolation in six. Connectivity and the phrase digital divide appeared less often, although many papers described related constraints. The evidence therefore frames digital exclusion as an interaction among infrastructure, communication, literacy, culture, trust and service access rather than as internet access alone.

Table 4. Non-exclusive evidence-map coding of recurrent barriers and delivery strategies

Barrier/problem	n	Delivery strategy/enabler	n
Cultural factors	40	Health education	12
Health literacy	31	Outreach	9
Access barriers	30	Co-design	9
Language	14	Community engagement	8
Trust	8	mHealth/mobile health	8
Geographical isolation	6	Library services	8
Connectivity	2	Telemedicine	8
Digital divide	2	Telehealth	7
Socioeconomic factors	2	Cultural safety	6
		Community health workers	2
		Digital health literacy	2

Direct Borneo studies show this interaction clearly. Among 275 elderly Dayak participants, Kang and Lian (2025) found a substantial proportion with low digital health literacy, associated with factors including internet use, perceived ease of use and proximity to health facilities. Froze et al. (2019) linked higher health literacy with disease knowledge and healthy lifestyle practice across Sarawak ethnic groups. Lim et al. (2025) found myths, fatalism and lack of cancer information among rural women, while Hee et al. (2026) and Msh et al. (2026) demonstrate the value of community volunteers and outreach in overcoming rural access constraints.

4.2 Community-centred and culturally responsive delivery

Across comparable Indigenous settings, trusted information is most consistently associated with community participation, local language and culturally safe communication. Aboriginal teachers used home languages and Indigenous knowledge to develop rheumatic-heart-disease education (Mitchell et al., 2021), while Yolŋu-led education integrated local and biomedical knowledge (Lowell et al., 2021). Participatory adaptation of the Hep B Story app and other resources similarly shows that cultural safety is produced through iterative engagement rather than simple translation (Binks, Ross, et al., 2024; Binks, Venkatesan, et al., 2024; Peake et al., 2021). Interpersonal communication remains critical: jargon and power imbalances can damage trust, whereas culturally familiar dialogue supports understanding (Kerrigan et al., 2025; Rheault et al., 2021).

4.3 Digital, mobile, offline and blended approaches

Digital delivery is valuable when embedded in a blended system. Text messages, apps and mobile resources have supported culturally tailored education and behaviour change, but their usefulness depends on access, digital skills, trust and provider support (Henson et al., 2022; Maar et al., 2016; Perkes, Bonevski, et al., 2023; Perkes, Huntriss, et al., 2023; Umaefulam & Premkumar, 2020; Umaefulam et al., 2022). Review evidence identifies cultural relevance, mHealth literacy, privacy/security and organisational capacity as recurring uptake conditions (Goodman et al., 2023; Ishaque et al., 2025). For Borneo, community health worker models, outreach, print/visual

resources and low-bandwidth tools can provide redundancy when connectivity or digital literacy is limited (Cueva et al., 2016; Good et al., 2024; Hee et al., 2026).

4.4 Medical libraries and health information professionals as active partners

Library evidence supports an expanded role for medical and public libraries as community facing information partners. Indigenous outreach programs show potential for evidence curation, health-information literacy, rural access and collaboration (Cruise et al., 2023; King, 2024; Wood et al., 2003). Tribal women expressed interest in receiving health information from libraries even where dedicated services were limited (Yesmin et al., 2023), while rural library initiatives illustrate alternative distribution models (Grabeel & Wilson, 2024; McKay & Bjartmarsdottir, 2025). Related work reinforces library/community engagement during public-health challenges (Chakma & Ahammad, 2026; Luo, 2024). Direct evaluation of medical-library interventions in Borneo, however, remains a major gap.

4.5 Integrated evidence framework and implications for Borneo

The evidence supports an integrated pathway: geography, connectivity, language, literacy, cultural mismatch, socioeconomic constraints and mistrust shape access to information delivery through community health workers, outreach, mobile/telehealth, local-language materials, co design and libraries is strengthened by cultural safety, community ownership and organisational support. Proximal outcomes are access, comprehension, trust, engagement and actionability. Diverse studies of Indigenous technology use, information systems, health literacy and telehealth confirm that these relationships vary by age, gender, place and health condition (Carroll et al., 2011; Johnson, 1998; Lee et al., 2025; Muttiah et al., 2025; Rushing & Stephens, 2011; Wikaire et al., 2022).

4.6 Evidence gaps

Key gaps are the limited volume of direct Borneo research; little Borneo-specific evaluation of medical libraries; few comparisons of online, offline and blended approaches; limited long-term assessment of multilingual resources; and a predominance of qualitative or cross-sectional designs. Indigenous knowledge and community information-seeking are also not consistently built into intervention evaluation. These gaps support locally co-designed longitudinal and implementation research focused on trust, comprehension, sustained use and equity (Brown et al., 2026; Khanal et al., 2026; Milroy et al., 2025).

The KGF is built on a simple premise. Medical libraries should stop defining their value by how much information they can provide and start defining it by how much they can improve the quality of the information environment around them. The four domains draw on competencies that medical librarians already possess, including literature searching, evidence retrieval, search quality assurance, source evaluation, and research data management, as demonstrated in the existing literature (McGowan et al., 2016; Shamseer et al., 2017; Cox et al., 2019). The four domains of the KGF each address one aspect of that environment.

5. Conclusion and Recommendations

The review indicates that the digital divide in remote and Indigenous communities is fundamentally an information equity challenge. Borneo evidence shows that geography, service access, health literacy, digital capability, culture and information availability interact, while comparative Indigenous evidence consistently favours culturally safe communication, community participation and trusted relationships. Connectivity is useful but insufficient on its own.

For Borneo, a blended model is recommended combine mobile/online and offline resources; work through community health workers and local organisations use appropriate languages and formats involve Indigenous communities in co design and governance and develop digital health literacy alongside access. Medical libraries and health information professionals can curate reliable evidence, support plain language and multilingual materials, train intermediaries, build low-bandwidth collections and coordinate partnerships. Future studies should assess trust, comprehension, actionability, sustained use and equity, not technology uptake alone.

The evidence is heterogeneous and comparative studies are concentrated outside Borneo. Single reviewer screening and the absence of aggregate risk of bias scoring are limitations conclusions should therefore be read as a structured evidence map rather than a pooled estimate of effectiveness. Future updates should use independent duplicate screening, design-specific appraisal and more Borneo primary studies.

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Sub-Theme 4: Building Resilient, Collaborative, and Future-Ready Medical Libraries

Chair:
Wan Mazli Wan Razali,
Sarawak State Library

The Role of Kariadi Hospital Library in Building a Resilient and Collaborative Medical Library

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Abstract

Hospital libraries have a strategic role in supporting healthcare services by providing scientific information resources, supporting the education of healthcare professionals, facilitating research and scientific publications, and offering library services to patients. In the face of developments in information technology, the transformation of healthcare services, and the increasing need for evidence-based information, hospital libraries are required to evolve into resilient, adaptive, innovative, and collaborative medical libraries. Kariadi Hospital Library strives to fulfill this role through the development of information services, patient literacy services, and collaboration with various parties. This study aims to describe the role of the Kariadi Hospital Library in realising a resilient and collaborative medical library, particularly in supporting education, research, patient literacy services, and strengthening institutional collaboration networks. This paper employs a descriptive review method to describe the various services and roles of the Kariadi Hospital Library. The Kariadi Hospital Library functions not only as a repository and provider of collections but also serves as a center for medical information resources, an educational partner for healthcare personnel, a research hub, a provider of literacy services for patients and their families, and a network for collaboration with various institutions. These roles are reinforced by the achievements of the Kariadi Hospital Library, which has received an A accreditation, demonstrating a commitment to service quality and the sustainability of the hospital library's role. In supporting education, the Library provides e-resource services, circulation, reference, and literature search services. In supporting research and scientific publications, the Library plays a role through similarity check services, ISBN applications, publication of scientific articles in Medica Hospitalia, and intellectual property rights applications. In supporting patient care, the library has developed POCADI (Pojok Baca Digital), the Garuda Book Corner, Titik Baca, Gerobag Buku, and storytelling sessions for pediatric cancer patients. Collaborative efforts are realised through partnerships with the National Library of Indonesia, the UNDIP Bachelor's Programme in Library Science, the UNDIP Diploma IV Programme in Information and Public Relations, the Semarang Public Health Polytechnic and the Yogyakarta Public Health Polytechnic. The Kariadi Hospital Library plays a strategic role in establishing a resilient and collaborative medical library. The Library's resilience is reflected in its ability to adapt to information needs, service innovations, the achievement of an A accreditation, and its sustained support for education, research, and patient care. The collaborative aspect is evident in the library's engagement with the National Library of Indonesia, universities, polytechnics, healthcare workers, researchers, hospital management, patient care units, and library networks. Thus, hospital libraries can become an important part of a healthcare ecosystem that is evidence-based, responsive, humanistic, collaborative, and ready to face future challenges.

Keywords: Hospital library; Library accreditation; Collaboration; Information services; Patient services

1. Background

Hospital libraries play a strategic role in supporting healthcare services by providing scientific information resources, facilitating research and scientific publications, and offering library services to patients. Hospital libraries must provide quality services and help the hospital community, medical staff, and the public stay informed about the best decision-making methods for knowledge-based practice, research, and lifelong learning, as well as actively participate in social, economic, and political life (Alamsyah, 2024). Libraries should also participate actively in research activities by facilitating access to physical and digital information sources and positioning librarians as research partners. Furthermore, libraries can serve as educational and recreational spaces for patients, their families, and healthcare workers. The presence of a library reflects the hospital's commitment to providing comprehensive services that focus not only on the medical aspects but also on meeting users' psychological and informational needs (Nasrullah et al., 2026).

However, hospital libraries face various challenges in responding to the rapid development of information technology, healthcare service transformations, and the growing need for evidence-based medicine. Medical researchers require a robust information support to design research projects and publish their findings in academic publications. These conditions require hospital libraries to evolve into resilient medical libraries capable of surviving, adapting, and remaining relevant amid changing user needs, technological advancements, and operational and collaborative challenges, while building synergies and collaborative networks with various parties to expand the scope of services and strengthen institutional capacity goals that cannot be achieved independently by a single institution alone (Nurkamilah & Nashihuddin, 2021).

As a concrete response to these demands, the Dr. Kariadi General Hospital (DKGH) Library in Semarang strives to fulfill this strategic role through the development of information services, patient literacy programmes, and collaboration with various stakeholders. This paper aims to describe the role of the DKGH Library in realising a resilient and collaborative medical library, particularly in supporting education, research, patient literacy services, and strengthening institutional collaboration networks. Since there are a limited number of studies specifically describing a model on the role of hospital libraries in Indonesia that simultaneously encompasses all four of these aspects, this paper is pertinent. The success of the DKGH Library in achieving an "A" accreditation, as well as in establishing collaborative networks with the National Library of Indonesia and various educational institutions, makes this library an important model or best practice that can serve as a reference for the development of other hospital libraries in Indonesia.

2. Research Methodology

According to Sugiyono (2019), quantitative research is an approach that has long been used in the field of research and is therefore often referred to as the traditional method. It is also known as the positivist method because it is based on the philosophy of positivism. This approach is categorised as a scientific method because it fulfills many scientific principles, such as being concrete and observable, measurable, logical, and following a systematic process. This approach was chosen because this paper aims to provide an in-depth and contextual description of the various services and roles of the DKGH Library in establishing a resilient and collaborative medical library.

The data in this paper were collected through a documentary study, which is a library-based data collection method involving reading, note-taking, and analysing relevant research materials (Zed, 2008, as cited in Arfrina et al., 2024). Data were also obtained through direct observation of the implementation of various library services. The collected data were then analysed descriptively and qualitatively through the stages of data reduction, data presentation, and drawing conclusions, thereby providing a comprehensive picture of the role of the DKGH Library in realising a resilient and collaborative medical library.

3. Results and Discussion

The role of the DKGH Library in creating a resilient and collaborative medical library underscores the need for modern hospital libraries to meet evidence-based information needs in the digital age. This transformation is supported by the achievements of the DKGH Library, which has earned an accreditation. This accreditation demonstrates the hospital management's strong commitment to service quality, compliance with national quality standards, and the library's continued role within the healthcare ecosystem. The library's resilience is reflected in the integration of three main pillars: education, research, and patient care. In addition to these three pillars, the collaborative aspect further strengthens the library's role through partnerships with various institutions.

3.1 Support for Healthcare Professionals' Education

Healthcare professionals require library services because medical knowledge is constantly evolving, while the knowledge they acquire during formal education can become outdated due to technological advancements and the emergence of new treatment methods. Therefore, access to up-to-date reading materials is essential for healthcare professionals to continue to update their knowledge and skills (Musa & Omopupa, 2024). Gama et al. (2024) reported similar findings in a study of healthcare workers in Malawi, which showed that the primary information needs of healthcare workers are for personal and professional development. At the same time, limited library resources, internet access, and information literacy remain major barriers to healthcare workers' use of the hospital library services.

The DKGH demonstrates its ability to consistently meet user needs, as evidenced by residents' use of the reference collection as a guide for evidence-based clinical practice, a tool for continuing education, a resource for completing academic assignments such as journal reading, and a foundation for clinical decision-making (Ulfa & Pramudyo, 2025). Access to journal portals, such as Medica Hospitalia, Scopus, PubMed, and Clinical Key, further strengthens the library's position as a hub for medical information that supports evidence-based medicine in a way that adapts to information technology advancements (Ulfa & Pramudyo, 2025).

The collaborative aspect of this pillar of education is also evident in the DKGH Library's involvement alongside the Faculty of Medicine at Diponegoro University in supporting the residency training process. The library serves as a learning resource for higher education institutions that provide education within a hospital setting. This type of cross-institutional collaboration expands the scope of educational services that the library could not achieve on its own, while also serving as an example of efforts to realise a collaborative medical library.

Overall, the education pillar demonstrates that the resilience of the DKGH Library is measured not only by the availability of its collections and literature services, but also by its ability to ensure the relevance of learning materials and to support the continuous education of healthcare professionals, including through institutional collaboration with the Faculty of Medicine at Diponegoro University.

3.2 Support for Research and Scientific Publications

The research pillar is a tangible manifestation of the resilience of the DKGH Library in responding to medical staff and hospital researchers' need for evidence-based information. The library supports research through its repository, similarity check services, ISBN applications, publication of scientific articles in Medica Hospitalia, and assistance with intellectual property rights (IPR) applications. These four services show that the library is no longer merely a place for storing collections but has transformed into a comprehensive hub for the entire cycle of scientific knowledge production from the manuscript writing stage and verification of a work's originality to the protection of research-related intellectual property.

This role aligns with Nurkamilah and Nashihuddin's (2021) concept of librarians as research collaborators, emphasising that librarians can provide comprehensive support to researchers, from literature searches to publication. In this context, the DKGH Library positions itself as a facilitator that helps smooth the researchers' path to publication, with an emphasis on technical and administrative services for clinical research, such as similarity checks and the processing of ISBNs and intellectual property rights, which are specific needs of research conducted in a hospital setting.

This role is also aligned with one of the pillars of the hospital library information services identified by Kong et al. (2023) namely, research consulting and training services which position the library as a provider of technical support for healthcare professionals in designing research, accessing literature, and disseminating research findings. Kong et al. (2023) also emphasised that modern hospital libraries must comprehensively expand the scope of their services (a one-stop intelligence service), ranging from the submission of research proposals, monitoring research progress, to the evaluation of published results.

This role aligns with the concept of a clinical medical librarian (Alamsyah, 2024), which emphasises the critical evaluation of medical literature by health sciences librarians to support evidence-based practice. Thus, the support provided by the DKGH Library for the research pillar is not merely administrative in nature but also reflects a shift in the librarian's role towards becoming a strategic partner in the creation of scientific knowledge within the medical field, whilst strengthening the library's position as a vital component of the hospital's research and publication ecosystem.

3.3 Support for Patient Care

The pillar of patient care emphasises that the role of the modern hospital library is no longer limited to healthcare professionals, students, and researchers, but also extends to patients and their families as part of a comprehensive healthcare effort. Patients' need for library services, particularly those undergoing long-term care, has been identified as a need for recreational activities that contribute to healthy habits and increased knowledge (Musa & Omopupa, 2024). It is this need that has prompted the DKGH Library to develop services directly oriented toward patients, in line with findings that specialised libraries within a hospital setting can serve as a means of distracting

patients from the stress of treatment, while also helping to reduce boredom and psychological burden during the recovery period (Nasrullah et al., 2026).

To support patient care, the library has developed the following programmes:

a. POCADI (Digital Reading Corner) is a grant from the National Library of Indonesia that provides both print and digital collections. This programme allows patients and their families to access electronic reading materials without having to carry physical books, while also helping to alleviate boredom while waiting for services.
b. Garuda Book Corner is a reading corner comprising of a collection of printed books that is located in the Hospital's Executive Outpatient Services area to ensure easy access for visitors and patients' families.
c. Titik Baca is a grant from the Central Java Provincial Archives and Library Office. It is situated in the Outpatient Services area and serves as a brief reading space for those waiting in line.
d. Gerobak Buku is a service that brings a collection of reading materials directly to the inpatient rooms of the Executive Ward and is intended for patients whose condition prevents them from visiting the library.
e. Storytelling is an activity designed to provide entertainment and psychosocial support for pediatric patients with cancer in the Oncology Ward Outpatient Service.

These programmes expand the role of libraries from providing scientific information to serving as spaces for education and psychosocial support for patients. This is in line with the broader role of libraries as centers for community literacy development through programmes such as storytelling sessions that foster a love of reading and information literacy (Rohmaniyah & Sari, 2024). This practice aligns with the children services developed by other hospital libraries, which provide reading materials, educational games, and storytelling activities to help pediatric patients stay active and develop a love of reading while undergoing treatment (Nasrullah et al., 2026). The presence of reading stations and book carts that reach out to patients also demonstrates the library's efforts to provide access to information not only within the library itself but also by bringing it directly to patients in their respective care settings.

This is also consistent with the findings that the value of clinical library services cannot be measured directly in terms of clinical decisions, but still has a tangible impact on users' understanding of health information (Steele et al., 2024). Such an impact underscores the success of the patient care pillar is measured not only by clinical indicators but also by its contribution to patients' comfort and health literacy during their treatment.

Overall, the patient care pillar demonstrates that the resilience of the DKGH Library is measured not only by its ability to meet the scientific information needs of medical staff but also by its responsiveness to patients' psychosocial needs, particularly those of pediatric patients with chronic conditions such as cancer. The collaborative aspect is evident in the synergy between the library, grants from various parties, the executive department, the outpatient department, and other parties that support storytelling activities and reading corners. As a result, the library's role has shifted from merely being a provider of scientific information to becoming a hospital's strategic partner in realising holistic, patient-centered, and sustainable healthcare services.

4. Conclusion

The DKGH Library plays a strategic role in establishing a resilient and collaborative medical library. The library's resilience is reflected in its ability to integrate the three main service pillars continously in the education pillar. Resilience is demonstrated through the provision of access to reference collections and journal portals such as Medica Hospitalia, Scopus, PubMed, and Clinical Key which support residents and healthcare professionals in evidence-based clinical practice and continuing education. In the research and scientific publication pillar, resilience is reflected in the library's transformed role from merely storing collections to becoming an integral part of the entire scientific knowledge production cycle through services such as similarity checks, ISBN applications, article publication in Medica Hospitalia, and assistance with IPR applications. In the patient care pillar, resilience is evident in the library's responsiveness to patients' psychosocial needs, particularly through programmes such as the POCADI (Digital Reading Corner), Garuda Book Corner, Titik Baca, Gerobak Buku, and storytelling activities for pediatric cancer patients.

The attainment of an "A" accreditation from the National Library of Indonesia further reinforces this resilience, serving as evidence of the hospital management's commitment to service quality and the library's ongoing role within the healthcare ecosystem. The library's involvement in fostering cross-institutional synergy across every service pillar is evident in the collaborative aspect. Collaboration is realised in the education pillar through a partnership with the Faculty of Medicine at Diponegoro University to support resident education. The role of librarians as strategic partners to researchers in the research pillar, ranging from reference searches to the publication process, reflects collaboration. Collaboration is evident in the synergy between the library and the PCU in supporting storytelling activities and reading corners in the patient care pillar. This collaborative aspect is further expanded through institutional partnerships with the National Library of Indonesia, Central Java Provincial Archives and Library Office, UNDIP Bachelor's Programme in Library Science, UNDIP Diploma IV Programme in Information and Public Relations, Semarang Public Health Polytechnic under the Ministry of Health, and Yogyakarta Public Health Polytechnic under the Ministry of Health.

Thus, the DKGH Library demonstrates that hospital libraries can play a vital role in a healthcare ecosystem that is evidence-based, responsive, humanistic, collaborative, and prepared to face future challenges whether in supporting healthcare professionals' education, research and scientific publications, or providing holistic and sustainable patient care.

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Collaborative Knowledge for Better Care: Medical Libraries as Partners in Evidence-Based Medicine

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Abstract

Evidence-based medicine (EBM) requires timely access to reliable evidence and systems that connect clinical, research, educational, and information expertise. The objective of this paper is to review the evidence on medical libraries as evidence partners and propose a framework for Malaysian health, academic, and research institutions. A narrative review used PubMed, targeted web searches, reference-list checking, and organisational websites. Evidence was selected for relevance to medical-library roles, clinical and research support, education, digital services, and the Malaysian context. Study design, directness, recency, and major limitations were considered qualitatively. The findings indicate that medical librarians contribute most clearly to expert searching, search reporting, evidence-synthesis support, information and evidence literacy, and timely access to relevant information. Reported benefits include professional time saved and perceived influence on decisions, but evidence for direct patient outcomes is heterogeneous and mainly observational or self-reported. Malaysian studies identify variable EBM knowledge and practice, time and access barriers, and limited current workforce data. A five-component framework is proposed: enabling foundations, professional competencies, collaborative services, evidence-use mechanisms, and outcomes. Therefore, medical libraries may strengthen evidence-informed care when services are integrated, governed, adequately resourced, and evaluated using outcomes they can credibly influence. The proposed framework is unvalidated and requires stakeholder co-design, feasibility testing, and prospective evaluation in diverse Malaysian settings.

Keywords: Evidence-based medicine; Medical libraries; Knowledge collaboration; Clinical decision-making; Healthcare information services

1. Introduction

Evidence-based medicine (EBM) integrates the best available research evidence with clinical expertise, patient values, and local circumstances. This requires more than access to publications: evidence must be discoverable, appraised, communicated, and incorporated into decisions through reliable organisational processes (World Health Organization, 2021). Medical libraries may support these processes in universities, teaching and district hospitals, primary-care networks, research units, guideline programmes, and virtual or regional services. International reviews describe an expansion from collection-based functions to expert searching, evidence synthesis, education, informatics, data services, and embedded clinical support (Cooper & Crum, 2013; Ma et al., 2018). Evidence of benefit is strongest for process outcomes, professional time, and perceived effects on decisions; direct patient-outcome evidence remains limited and heterogeneous

(Brettle et al., 2011; Brettle et al., 2016; Divall et al., 2022; Marshall et al., 2013; Perrier et al., 2014; Shannon et al., 2024).

2. Literature Review

Malaysia has established evidence-production and health-reform structures, but four gaps remain relevant to medical-library development. First, clinician studies report variable EBM knowledge and practice and recurring barriers involving time, access, skills, and organisational support (Ahmad Ghaus et al., 2021; Albart & Looi, 2025; Hisham et al., 2016; Zanaridah et al., 2021). Second, national reform priorities include digitalisation, workforce development, research capacity, multidisciplinary cooperation, and equity, but these functions are not assigned specifically to medical libraries (Ministry of Health Malaysia, 2023). Third, the MaHTAS pages and manuals reviewed for this article did not specify routine medical-librarian participation; this documentary absence does not prove that participation does not occur (Ministry of Health Malaysia). Fourth, recent national workforce and competency data for medical librarians are unavailable; the main Malaysian study is from 2007 and cannot represent the current workforce (Santra, 2007).

This review asks three questions: what roles can medical libraries credibly perform as evidence partners; what does the available evidence show about benefits and limitations; and how might these roles be implemented and evaluated in different Malaysian settings? It then proposes the Malaysian Medical Library Evidence-Partnership Framework as a testable, evidence-informed model rather than an established national standard.

3. Methods

3.1 Design and Scope

This paper is a narrative review and framework paper, reported with reference to the Scale for the Assessment of Narrative Review Articles (SANRA) (Baethge et al., 2019). It covers academic and hospital libraries, clinical evidence services, research and evidence-synthesis support, health-professions education, rapid evidence services, data and digital support, and the Malaysian health-system context. It is not a systematic review and does not claim exhaustive study identification.

3.2 Information Sources and Selection

PubMed and targeted web searches were conducted from 1 to 30 June 2026. Search concepts included “medical librarian”, “clinical librarian”, “health sciences library”, “evidence-based medicine”, “evidence synthesis”, “systematic review”, “rapid review”, “knowledge translation”, “artificial intelligence”, and “Malaysia”, alone and in combinations. Reference lists were checked, and organisational websites were searched for guidance and policy from WHO, the Ministry of Health Malaysia and MaHTAS, MOSTI, the Ministry of Higher Education, the Medical Library Association, Cochrane, ICMJE, and NISO. English-language systematic and scoping reviews, empirical studies, standards, competency documents, and policy sources were selected purposively for direct relevance. Priority was given to recent reviews, multisite evaluations, Malaysian evidence, and authoritative guidance. Duplicates and sources without clear relevance to the review questions were excluded.

3.3 Appraisal and Synthesis

Evidence was weighted qualitatively according to study design, sampling, response rate, use of objective or self-reported outcomes, directness to the claim, recency, and relevance to Malaysia. Systematic reviews were considered for search and appraisal methods; surveys for sampling, response, and recall or social-desirability bias; qualitative studies for recruitment and analytical transparency; and policy or competency documents for authority and currency. No formal risk-of-bias score or meta-analysis was used because the source types and outcomes were heterogeneous. The main limitations of representative studies are reported in Table 1. Claims about direct patient or organisational outcomes were treated as lower certainty than evidence on searching, reporting, access, and service processes.

3.4 Framework and Recommendation Development

Recurring findings were grouped into foundations, competencies, services, evidence-use mechanisms, and outcomes. These themes were mapped to complex-intervention and implementation-outcome concepts (Moore et al., 2015; Proctor et al., 2011; Skivington et al., 2021). The author then developed the framework and prioritised actions using expected proximal impact, feasibility, governance needs, equity, workforce readiness, and resource requirements. The framework and priorities were not produced through formal consensus, stakeholder co-design, economic modelling, or empirical validation.

4. Results

4.1 Evidence Base and Certainty

The literature supports an expanded evidence-partner role, but it does not support a simple causal claim that medical-library services improve patient outcomes. Representative findings are summarised in Table 1. The most persuasive evidence concerns provision of relevant information, time saved, search-method reporting, and user-reported effects on decisions. Clinical outcomes, cost savings, and organisational resilience have been examined less consistently and often rely on attribution assumptions (Brettle et al., 2011; Brettle et al., 2016; Divall et al., 2022; Marshall et al., 2013; Shannon et al., 2024).

Table 1: Representative evidence informing the review

Source and design	Setting and sample	Main finding	Main limitation
Perrier et al. (Perrier et al., 2014) Systematic review	25 articles, including 22 primary reports	Services often saved clinicians' time and supplied relevant information.	Heterogeneous services and outcomes; variable study quality; limited causal evidence.
Marshall et al. (Marshall et al., 2013) Multisite survey	16,122 respondents across 118 hospitals	95% reported a better-informed clinical decision; 75% reported handling an aspect of care differently.	Estimated response about 10%; recall and self-report; no untreated comparison.
Albart and Looi (Albart & Looi, 2025)	409 Malaysian doctors	53.8% had moderate knowledge; 67.2% high practice; 67.0% moderate facilitating factors.	Online self-report; category cut-offs; selection and

Source and design	Setting and sample	Main finding	Main limitation
National cross-sectional survey			common-method bias possible.
Zanaridah et al. (Zanaridah et al., 2021) Cross-sectional survey	225 primary-care practitioners in Selangor	32.9% had high knowledge, 12.0% positive attitude, and 0.4% good practice.	One state; self-report; cross-sectional associations; limited generalisability.
Ahmad Ghaus et al. (Ahmad Ghaus et al., 2021) Cross-sectional survey	183 emergency doctors in Kelantan; 91.5% response	49.7% high knowledge, 39.9% positive attitude, and 2.1% good practice.	One state and specialty; self-report; no causal inference.
Hisham et al. (Hisham et al., 2016) Qualitative study	18 rural doctors in two Pahang districts	Time, skills, access, resources, and local applicability were recurring barriers.	Small purposive sample; findings are contextual rather than prevalence estimates.

4.2 Roles With Direct Methodological Support

Core functions such as collection development, reference work, document delivery, and teaching remain necessary. The evidence-partner model adds defined methodological responsibilities. Expert retrieval includes question clarification, controlled vocabulary and free-text terms, source selection, database-specific syntax, grey-literature searching, citation tracking, and reproducible documentation. Professional competencies and evidence-synthesis guidance support medical-librarian involvement in information services, instruction, research, and search-method development (Lefebvre et al., 2024; McGowan et al., 2016; Medical Library Association; Rethlefsen et al., 2021; Spencer & Eldredge, 2018). Observational evidence associates substantive librarian involvement with better reporting of systematic-review searches, but does not show independent improvement in every aspect of review validity (Pawliuk et al., 2024).

Medical librarians may also support protocol development, citation management, deduplication, search updates, methods reporting, publication literacy, and project coordination (Spencer & Eldredge, 2018). Clinical interpretation, eligibility decisions, risk-of-bias assessment, statistical synthesis, and recommendation formulation require the relevant clinical and methodological experts. Advanced evidence-synthesis services are labour intensive; eligibility, scope, timelines, authorship, workload, and referral rules should therefore be agreed at project initiation (Bullers et al., 2018; Lefebvre et al., 2024; McKeown & Ross-White, 2019; Pawliuk et al., 2024; Rethlefsen et al., 2021). ICMJE criteria should determine authorship, while CRediT can document contributor roles (Editors, Updated January 2026; National Information Standards Organization).

4.3 Education, Clinical Support, and Rapid Evidence Services

Information and evidence-literacy education is more defensible when it is longitudinal, assessed, and integrated into clinical cases, coursework, and research projects. Medical librarians can teach question formulation, source selection, searching, citation verification, and publication literacy. Clinicians, epidemiologists, and statisticians should lead advanced appraisal and patient-level interpretation. The instructional literature does not identify one universally superior method; local

programmes should measure demonstrated performance rather than attendance or confidence alone (Sabey & Biddle, 2021; Swanberg et al., 2016).

Embedded or virtual clinical services place retrieval close to patient-care and organisational decisions through consultations, ward or case discussions, current-awareness services, and participation in guideline or quality teams. Newer evaluations continue to report perceived decision effects and service value, but do not remove concerns about self-report and attribution (Brettle et al., 2016; Divall et al., 2022; Shannon et al., 2024). Rapid evidence services may support urgent clinical, managerial, or policy questions when streamlined methods and uncertainty are reported transparently (Tricco et al., 2017). Malaysian participation in an international rapid-review initiative demonstrates relevant national experience, but not equivalent capacity across institutions or routine librarian involvement (Robson et al., 2023).

4.4 Malaysian Context and Digital Governance

The Malaysian studies show variation rather than one national deficit. Results differ by setting, instrument, period, and respondent group (Ahmad Ghaus et al., 2021; Albart & Looi, 2025; Zanaridah et al., 2021). Current service planning should therefore begin with local assessment of demand, staffing, subscriptions, digital readiness, referral pathways, and competencies. Universities, tertiary hospitals, district facilities, and primary-care networks may need different models. Regional or virtual support may be more feasible than a librarian in every facility, particularly when specialist staffing is limited.

Locally relevant evidence is distributed across international databases, MaHTAS, MySitasi, government websites, Malaysian journals, and institutional repositories (Ministry of Health Malaysia; Ministry of Higher Education Malaysia). Medical librarians can improve discoverability through metadata, persistent identifiers, version control, and deliberate searching for Malaysian and regional evidence. Digital and research-data services may include data-management planning, repository guidance, documentation, and referral (Federer et al., 2020). Sensitive health data remain subject to ethics, law, cybersecurity, and institutional information governance.

Artificial intelligence (AI) may assist exploratory terminology generation, query refinement, record prioritisation, summarisation, and surveillance, but large language models can omit concepts, fabricate citations, reproduce bias, and reduce reproducibility (Lieberum et al., 2025; Ministry of Higher Education Malaysia; Organization, 2024). AI-assisted outputs that influence care, research, education, or policy require human verification against authoritative sources, disclosure, privacy protection, and approved risk-based governance (Ministry of Science, 2024; Organization, 2024). Confidential data should not be entered into unapproved systems.

4.5 Proposed Malaysian Framework

The Malaysian Medical Library Evidence-Partnership Framework treats medical-library development as a complex, context-dependent intervention (Moore et al., 2015; Proctor et al., 2011; Skivington et al., 2021). Its five components are shown in Figure 1. The pathway from foundations to outcomes is a hypothesis for testing, not proof of causation. Context affects every component, and evaluation should feed back into workforce development, service design, and investment.

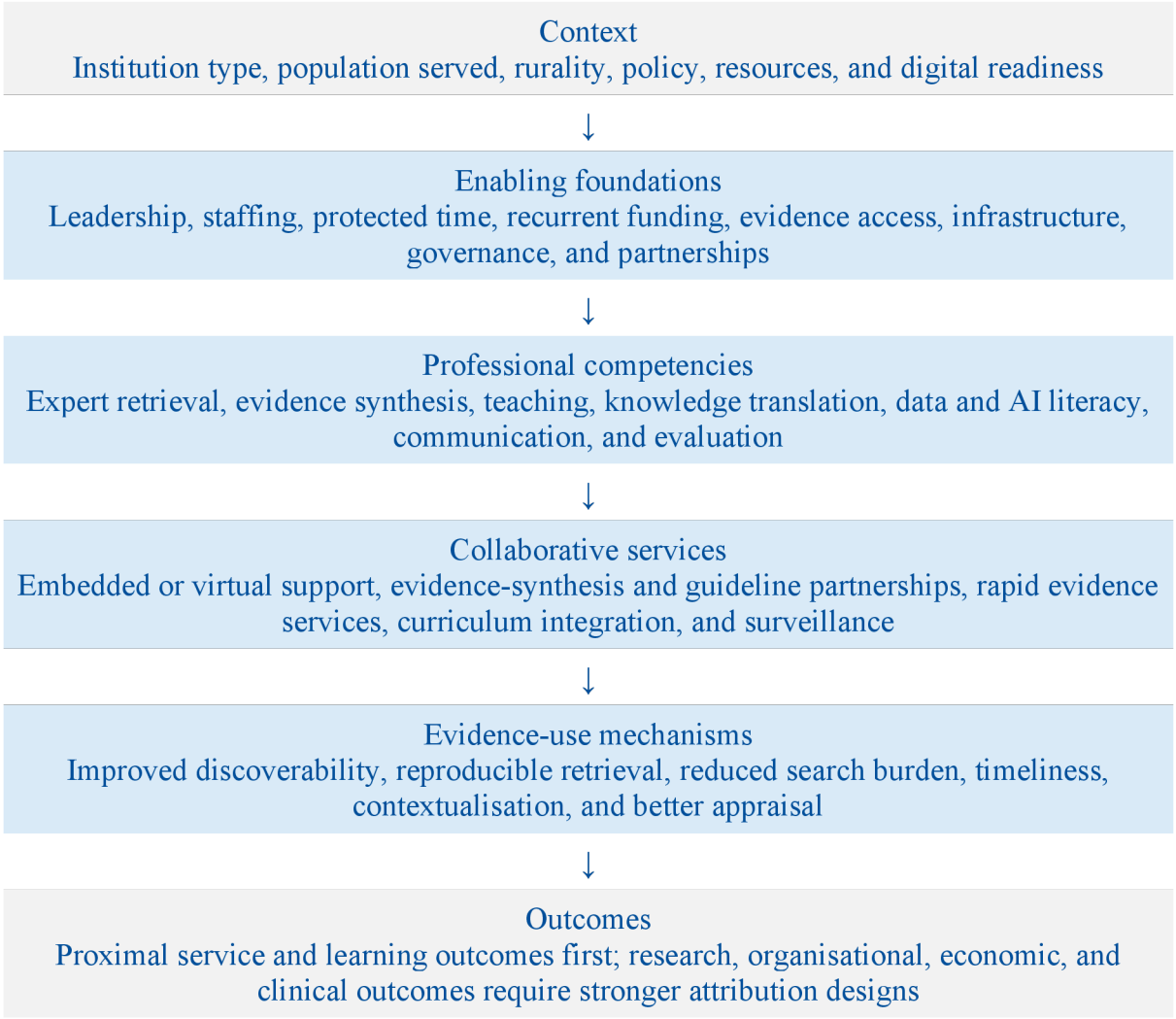


Figure 1: Malaysian Medical Library Evidence-Partnership Framework

Table 2: Illustrative pilot indicators and operational definitions

Domain	Indicator	Operational definition	Data source and interval
Capacity	Protected capacity	Funded librarian hours assigned to advanced evidence services per month.	Roster and budget; quarterly
Competency	Competency achievement	Number meeting agreed competency criteria divided by staff assessed.	Portfolio and peer assessment; 6-monthly
Process	Early referral	Eligible projects referred before the protocol or search method was finalised, divided by all eligible projects.	Request and protocol records; quarterly
Quality	Search reproducibility	Audited searches meeting the local PRISMA-S subset and, when required, PRESS peer review.	Audit checklist; quarterly

Domain	Indicator	Operational definition	Data source and interval
Use	Relevant evidence and use	Products rated at least 4/5 for relevance and documented as used in a decision, protocol, guideline, or teaching activity within 90 days.	Requester survey and decision record; quarterly
Equity	Service reach	Users and requests by institution type, profession, location, and urban or rural service area.	Service log; quarterly
Efficiency	Timeliness and cost	Median business-day turnaround, staff hours, and direct cost per completed product.	Time and finance records; quarterly
Sustainability	Continuation	Service retained for 12 months with approved staffing, budget, governance, and demand above a prespecified threshold.	Annual management review

5. Discussion

5.1 Interpretation

Medical libraries are most likely to add value where evidence work is complex, recurring, time sensitive, or poorly reported. Early collaboration can improve search planning and documentation, while embedded or virtual services may reduce clinicians' search burden. These are credible process pathways, not proof that the service independently improves patient outcomes. The evidence base remains dominated by heterogeneous reviews, surveys, local evaluations, and user perceptions (Brettle et al., 2011; Brettle et al., 2016; Divall et al., 2022; Marshall et al., 2013; Pawliuk et al., 2024; Perrier et al., 2014; Shannon et al., 2024). Direct clinical, economic, and organisational effects should be evaluated with comparison groups, prespecified outcomes, and explicit attribution assumptions where feasible.

The framework is consistent with complex-intervention guidance because effects are expected to depend on context, implementation, and interactions among components (Moore et al., 2015; Proctor et al., 2011; Skivington et al., 2021). A hospital with established guideline teams may prioritise early librarian involvement in searches; a university may prioritise evidence-synthesis and curriculum support; a district or primary-care network may need a regional virtual service. Pilot selection should therefore follow local needs assessment and stakeholder co-design, including rural and district representation.

5.2 Implementation priorities

Implementation should be staged. Short term means within 1 year, medium term means 1-3 years, and long term means more than 3 years. Table 3 separates actions, indicators, and data sources. These are evidence-informed proposals rather than established national policy recommendations.

Table 3: Prioritised actions for Malaysian stakeholders

Responsible group	Time frame	Priority action	Indicator	Data source
Library leaders and medical librarians	Short	Assess needs, competencies, workload, subscriptions, and referral gaps; define service tiers; pilot one high-demand service with approved AI and search-quality procedures (Bullers et al., 2018; Demetres et al., 2023; Lefebvre et al., 2024; McGowan et al., 2016; McKeown & Ross-White, 2019; Medical Library Association; Rethlefsen et al., 2021; Tricco et al., 2017).	Uptake, turnaround, unmet demand, staff time, audited search quality	Service log, time record, audit
Clinicians and researchers	Short	Refer eligible projects before protocols and search methods are fixed; agree roles, authorship, and CRediT contributions (Editors, Updated January 2026; Lefebvre et al., 2024; National Information Standards Organization; Spencer & Eldredge, 2018).	Early-referral proportion; accurate contributor statements	Request dates, protocols, manuscripts
Educators and university leaders	Short to medium	Integrate assessed information and evidence literacy into curricula and recognise advanced library work in workload systems (Bullers et al., 2018; Demetres et al., 2023; McKeown & Ross-White, 2019; Sabey & Biddle, 2021; Swanberg et al., 2016).	Learner performance, skill retention, recognised workload	Assessment and workload records
Hospital and health-service administrators	Medium	Pilot a governed rapid or clinical evidence service for defined priorities, with referral to MaHTAS when national assessment or policy authority is required (Ministry of Health Malaysia; Robson et al., 2023; Tricco et al., 2017).	Timeliness, use in decisions, unresolved questions, cost per product	Service, meeting, and finance records
Professional associations, policymakers, and funders	Medium to long	Develop a current Malaysian workforce and competency profile, shared peer-review and mentoring networks, licensing or referral options, and multi-	Coverage, competency development, equitable reach,	Workforce survey and programme evaluation

Responsible group	Time frame	Priority action	Indicator	Data source
		institutional evaluations (Medical Library Association; Ministry of Health Malaysia, 2023; Ministry of Higher Education Malaysia; Moore et al., 2015; Proctor et al., 2011; Santra, 2007; Skivington et al., 2021).	adoption, sustainability	

5.3 Risks, equity, and governance

Advanced services create opportunity costs. Unfunded evidence-synthesis work can displace core services, produce excessive workloads, or blur professional responsibilities. Subscription inequality may widen gaps between institutions. Clinical and research work may expose confidential information. AI adds risks of false citations, incomplete searching, bias, privacy breaches, and automation over-reliance. Governance should therefore specify eligible services, staffing, referral thresholds, confidentiality, documentation, human verification, and incident review. A single-site economic evaluation reported a positive return on investment, but its assumptions and setting limit generalisability (Hartfiel et al., 2021). Local costing should include staff time, subscriptions, infrastructure, training, and displaced work.

5.4 Strengths and limitations

This review links international evidence with Malaysian clinician studies, policy sources, implementation concepts, operational indicators, and explicit claim limitations. It also separates evidence-supported processes from hypothesised distal outcomes. However, the search was narrative and purposive rather than systematic; relevant studies may have been missed. Source selection and interpretation may reflect confirmation bias. No formal risk-of-bias tool, duplicate screening, or meta-analysis was used. Several influential international reviews are older, and newer evaluations still rely heavily on self-report. Malaysian workforce and service data are sparse, public documentation may not reflect actual practice, and the proposed framework was developed by one author without stakeholder co-design, formal consensus, validation, or economic modelling. Applicability and effects must therefore be tested prospectively.

6. Conclusion and Recommendations

Medical libraries may strengthen evidence-informed care when medical librarians are involved early, given defined responsibilities, supported by appropriate competencies and governance, and evaluated through outcomes they can credibly influence. Malaysian institutions may consider focused, governed pilots matched to local demand and resources, followed by scaling only when evaluation demonstrates quality, feasibility, equity, cost acceptability, adoption, and sustainability. The Malaysian Medical Library Evidence-Partnership Framework should be treated as an unvalidated, testable proposal requiring stakeholder co-design and prospective evaluation in diverse settings.

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From Practice to Innovation: Advancing Resilient and Visionary Medical Libraries Tarumanagara University

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Abstract

Medical libraries occupy a strategic position in the dissemination of knowledge, serving as a bridge between traditional practices and innovative approaches to meet the dynamic needs of healthcare and education. The objective of this research is to examine how resilient medical libraries can adapt to rapid technological transformation while sustaining their mission of accessibility, reliability, and service excellence through the implementation of the Medical Learning Commons (MeLCom). Employing a practice-based approach grounded in more than two decades of professional experience (2005–2026), combined with naturalistic observation and thematic analysis, the analysis highlights collaborative resource management, digital integration, and leadership strategies as effective methods for maintaining relevance in complex environments. Findings reveal that even within spatial constraints (15 m^2), resilience is achieved through the proactive adoption of innovation that inspires academic communities and strengthens medical education. The novelty of this work lies in its integration of long-term professional practice with strategic innovation frameworks, offering a distinctive perspective on how medical libraries can simultaneously preserve stability and pioneer new paradigms. The discussion underscores the necessity of visionary leadership in shaping future directions of medical librarianship, ensuring that libraries evolve as active agents of change rather than passive repositories of information. Ultimately, this contribution demonstrates that medical libraries are uniquely positioned to advance innovation in healthcare education, contributing to SDG 3 (Good Health and Well-being) and providing both continuity and forward-looking vision to support academic and professional growth

Keywords: Resilience; Library innovation; Medical libraries; Library collaboration; Visionary leadership

1. Introduction

The Tarumanagara University Medical Library plays a crucial role in supporting the *Tri Dharma Perguruan Tinggi* (Three Pillars of Higher Education) by providing reliable information access, accelerating research, and fostering continuous professional development (National Library of Medicine, 2023) . Within a dynamic medical education landscape, the library serves as a strategic bridge connecting traditional practices with innovative approaches to meet evolving clinical and academic needs (Bhalerao & Patil, 2025). In the post-pandemic era, this role has become increasingly vital in building health system resilience, defined as the capacity of information systems to anticipate, respond to, and recover from various disruptions to support the achievement of Universal Health Coverage (UHC) and the Sustainable Development Goals (SDGs), specifically SDG 3 (Hanifa & Wicaksono, 2025).

However, massive technological transformation presents significant challenges for libraries to maintain relevant while upholding their core mission of accessibility (Bhalerao & Patil, 2025). In Indonesia, the government has prioritised health data integration through the SATUSEHAT platform, yet implementation still faces substantial physical hurdles, including the digitalisation of millions of paper-based medical records (Nugraha et al., 2025). Furthermore, national library research trends over the past decade (2014-2024) show a drastic shift from manual practices toward the adoption of advanced technologies such as artificial intelligence (AI) and machine learning (Khulzannah et al., 2025). The urgency of this transformation is driven not only by domestic demands but also by Tarumanagara University's commitment to achieving world-class university status. By aligning digital resilience strategies with global standards, as implemented by the National Library of Medicine (NLM) in the United States, the National Health Service (NHS) in the United Kingdom, and the Canadian Federation of Library Associations (CFLA) in Canada, the library plays a strategic role in enhancing the institution's international academic reputation (Bhalerao & Patil, 2025).

The core problem examined here is how the Tarumanagara University (TU) Medical Library can maintain operational stability while proactively adopting ethical digital innovations. The significance of this research lies in the integration of long-term professional practice (spanning over two decades) with a visionary strategic innovation framework. Through a practice-based approach, this paper offers a unique perspective on the librarian's role as a change agent who curates digital resources responsibly. The ultimate goal of this research is to formulate effective adaptation strategies focusing on collaborative resource management, future technology integration, and visionary leadership to realise a future-ready library

2. Literature Review

2.1 The Concept of Resilience in Librarianship

System resilience is defined as an organisation's capacity to anticipate, respond to, and recover from various disruptions, such as pandemics, natural disasters, or economic crises, while maintaining the continuity of essential services (Wasir et al., 2025). Within the library sector, resilience is not merely the ability to survive technological disruptions, but rather the capacity to proactively adopt innovations to strengthen the health education ecosystem. Current research trends in Indonesia have begun to incorporate dimensions of adaptability and information system recovery as primary indicators of a health institution's resilience, where medical libraries transform into dynamic digital knowledge hubs. A resilient medical library evolves from a mere physical repository into a dynamic digital knowledge hub capable of rapidly adapting to the evolving needs of its users (Ramli, 2026).

2.2 Library Innovation and the Medical Learning Commons (MeLCom)

Current innovations in medical libraries are driven by the national digital transformation of health services, including the integration of the SATUSEHAT platform and the utilisation of advanced technologies such as AI and big data (Hanifa & Wicaksono, 2025). At the TU Medical Library, this innovation is manifested through the development of the Medical Learning Commons (MeLCom) (Pratiwi & Sabarina Saputri, 2024). MeLCom was established as a strategic response to post-pandemic challenges and the specific requirements of students enrolled in the Competency-Based Curriculum (KBK)[1], which emphasises discussion-based learning, case studies, and clinical

[1] In Indonesia, *KBK* stands for *Kurikulum Berbasis Kompetensi.*

practice. This initiative seamlessly integrates physical facilities, such as clinical practice tools, with advanced digital resources, including 3D anatomy applications and medical databases, thereby creating a "one-stop shopping" environment that significantly enhances academic productivity (Pratiwi & Sabarina Saputri, 2024).

2.3 The Role of Collaboration, Visionary Leadership, and Competency Development

The success of digital transformation within the medical information ecosystem relies heavily on visionary leadership capable of proactively steering institutions toward a digital future. Modern leadership is required not only to adopt technology but also to facilitate digital literacy programmes and equip staff with relevant competencies to navigate the challenges of disruption. In this context, competency-based career development for librarians through non-formal education, such as technical training, seminars, workshops, and professional certifications, serves as a crucial instrument in enhancing overall library service quality (Pratiwi, 2022).

In a resilient medical library ecosystem, staff development is not merely an internal process but must align with formally recognised national standards (Pratiwi & Sabarina Saputri, 2024). All librarians at TU have undergone a certification process through the Librarian Professional Certification Body (LSP)[2], a partner of the National Library of the Republic of Indonesia (PNRI)[3] licensed by the National Agency for Professional Certification (BNSP)[4]. These BNSP-issued competency certificates serve as evidence that TU librarians possess qualifications recognised nationally by the state (Pratiwi, 2022).

The implementation of competency standards aligned with the Indonesian National Work Competency Standards (SKKNI)[5] in the field of librarianship has proven to enhance the professionalism, motivation, and performance of medical librarians. This directly impacts the quality of service provided to the academic community as library users (Pratiwi, 2022). Professional resilience is further demonstrated through the librarians' perceptions of dynamic institutional regulations; librarians at the Faculty of Medicine of TU, view regulatory updates not as a burden, but as an adaptive challenge to continuously improve their skills and self-development amidst the rapid acceleration of science and technology (IPTEK)[6] (Pratiwi, 2022).

Beyond internal development, collaborative resource management is a primary key to overcoming infrastructure limitations and the challenges of shrinking budgets frequently faced by higher education libraries. Networking strategies through Health Literature, Library and Information Services Indonesia (HeLLIS Indonesia), particularly those under the auspices of the Ministry of Health (Kemenkes)[7], represent a strategic step to strengthen information resilience. Through consortium systems and resource sharing practices, medical libraries can expand access to expensive scientific databases and literature without bearing the financial burden independently (Autade, 2025). This cross-sectoral collaboration ensures inclusive information access and collectively strengthens the national health system.

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[2] In Indonesia, *LSP* stands for *Lembaga Sertifikasi Profesi Pustakawan.*
[3] In Indonesia, *PNRI* stands for *Perpustakaan Nasional Republik Indonesia.*
[4] In Indonesia, *BNSP* stands for *Badan Nasional Sertifikasi Profesi.*
[5] In Indonesia, *SKKNI* stands for *Standar Kompetensi Kerja Nasional Indonesia.*
[6] In Indonesia, *IPTEK* stands for *Ilmu Pengetahuan dan Teknologi.*
[7] In Indonesia, *Kemeskes* stands for *Kementerian Kesehatan*

2.4 Research Gap

Although library research in Indonesia has increased drastically over the past decade (2014-2024), bibliometric analysis reveals that most studies remain fragmented, primarily focusing on general service topics or partial evaluations of specific technology implementations (Khulzannah et al., 2025). A significant literature gap exists regarding the holistic integration of long-term professional practice, grounded in practitioner experience with visionary strategic innovation frameworks. Furthermore, most existing research tends to be theoretical and rarely addresses strategic collection management aspects, such as collaborative updating and weeding, or the tangible role of libraries in supporting SDG 3 indicators within the context of resilient medical libraries (Garnita et al., 2024).

This paper addresses this gap by offering a unique perspective based on over two decades of professional experience at the TU Medical Library. The research does not merely evaluate technological aspects but also aligns operational stability through traditional resource management, with the innovation paradigm of the AI era and collaborative networks such as HeLLIS Indonesia. This integration aims to create a medical library model that is not only adaptive but truly prepared for the challenges of tomorrow, a future-ready library (Ramli, 2026).

3. Research Methodology

This research utilises a practice-based approach with a descriptive qualitative design. The qualitative approach was selected for its focus on assigning meaning to social or human phenomena through an in-depth exploration, where the researcher serves as the primary instrument for data collection through direct observation and reflection (Creswell & Creswell, 2023). This strategy allows for a holistic understanding of information resilience strategies and service innovations based on over two decades of active professional experience as a practitioner (2005-2026)

3.1 Research Setting

The research was conducted at the TU Medical Library in Jakarta, Indonesia. This location was chosen as it represents an institution undergoing transformation toward world-class university standards by integrating physical facilities and digital resources through the Medical Learning Commons (MeLCom) concept.

3.2 Source of Data and Data Collection

Data were collected within a natural setting, a fundamental characteristic of qualitative research (Creswell & Creswell, 2023). The researcher applied naturalistic observation, involving the systematic monitoring of medical students' behaviour while utilising MeLCom facilities without environmental manipulation or intervention (McLeod, 2026). This approach captures authentic user interactions with digital resources in a real-world context. Primary data sources include: (1) Professional practice reflections: narrative documentation derived from the researcher's experience as a medical librarian for over two decades (2005-2026); (2) Field observations: systematic observation of medical students utilising MeLCom for Basic Clinical Skills (KKD)[8] training and group discussions; (3) Institutional documentation: analysis of annual reports, collaborative collection development policies (including updating and weeding processes), and records of HeLLIS Indonesia networking activities.

[8] In Indonesia, *KKD* stands for *Keterampilan Klinis Dasar*.

3.3 Data Analysis

Data analysis was performed using thematic analysis to systematically identify, analyse, and report patterns or themes within the qualitative data (Ahmed et al., 2025). The process followed a disciplined sequence: (1) Data familiarisation: reviewing narrative notes from two decades of practice and field observations at MeLCom; (2) Coding: identifying relevant data segments and assigning labels based on concepts of information resilience, AI technology utilisation, and visionary leadership strategies; (3) Theme searching and review: categorising codes into strategic themes that describe the medical library transformation model at TU; (4) Interpretation: interpreting emerging themes to formulate a future-ready library model.

Data validation was conducted through source triangulation, comparing local findings at TU against digital resilience frameworks and international medical library standards, such as those established by the National Library of Medicine (NLM) and the National Health Service (NHS) (Khulzannah et al., 2025). This ensures that the developed innovations are not only locally relevant but also aligned with global research trends over the past decade (2014-2024).

4. Results and Discussion

This section provides a comprehensive analysis of the transformation and resilience of the TU Medical Library, integrating over two decades of professional practice (2005-2026) with systematic field observations. The discussion focuses on how service innovations and strategic resource management have established an information ecosystem that is highly adaptive to technological disruption. The findings are categorised into several key strategic themes, including spatial transformation through the Medical Learning Commons (MeLCom), the strengthening of human resource competencies based on national standards, and collaborative synergy through the HeLLIS Indonesia network to support the achievement of global health indicators

4.1 Transformasi MeLCom: Creating a "One-Stop Shopping" Within a Limited Space

Based on professional practice reflections spanning over two decades (2005-2026), it is evident that the TU Medical Library has successfully transformed from a traditional book-lending facility into a dynamic knowledge hub. The implementation of the Medical Learning Commons (MeLCom), although currently utilising a limited area of only 15 m^2 (Figure 1), has proven highly effective in facilitating students enrolled in the Competency-Based Curriculum (KBK) (Pratiwi & Sabarina Saputri, 2024).

Naturalistic observational findings highlighted a unique behavior among medical students: they independently brought clinical equipment, such as stethoscopes and tensimeters, into the library to practice basic clinical skills (KKD), as they perceived the library atmosphere to be more conducive than other campus spaces (Figure 2). This phenomenon reinforces the arguments of Pratiwi & Saputri (2024), which adapt the theory of Loyens & Gijbels (2008), stating that within a learning commons environment, users actively construct new knowledge by integrating information gathered on-site.



Figure 1: Reading area with a total space of 15 m²



Figure 2: Students using the library as a place for independent learning



Figure 3: Medical students performing basic clinical skills (KKD) practice using clinical tools, facilitated by faculty supervision within the library environment

This innovation strategically addresses post-pandemic challenges by re-engaging users through an integrated “one-stop shopping” medical information concept. In this model, the library serves as a dynamic knowledge hub, a multifunctional space for information sourcing, clinical creativity, and collaboration between students and faculty members (Figure 3). In response to these user needs, the faculty has facilitated basic KKD training equipment within the library, ensuring students no longer need to carry their own tools while providing a simplified yet effective resource environment (Figure 4).



Figure 4: The MeLCom corner setup at TU, equipped with touch-screen laptops, tensimeters, and specialised medical manikins for infusion practice

4.2 Certified Human Resource Competencies and Visual Technology Integration

The resilience of MeLCom is fundamentally supported by highly capable human resource capacity. All librarians at TU have successfully obtained professional certification through the Librarian Professional Certification Body (LSP), licensed by the National Agency for Professional Certification (BNSP), which validates their nationally recognised professional qualifications (Pratiwi, 2022). This professional standing is crucial as librarians now serve as scientific literacy facilitators, actively assisting users in ethically filtering information amidst pervasive technological disruption.

In its operational practice, MeLCom integrates advanced digital resources, including Visible Body for 3D anatomy visualisation by OVID, OSMOSIS for visual case-based learning, and the ClinicalKey Flex by Elsevier (Figure 5). Field findings indicate that these services often serve a remedial function, acting as an "information emergency unit" that helps students refine and correct their clinical understanding following formal classroom instruction. This need confirms the argument of Badke (2018) in Pratiwi & Saputri (2024), which posits that a learning commons functions as a vital support unit to bridge the gap in research instruction often overlooked in dense academic environments. Furthermore, the strategic utilisation of these technologies aligns with Indonesian library research trends over the past decade (2014-2024), which have demonstrated a

massive shift towards digital librarianship and AI adoption (Garnita et al., 2024; Khulzannah et al., 2025).

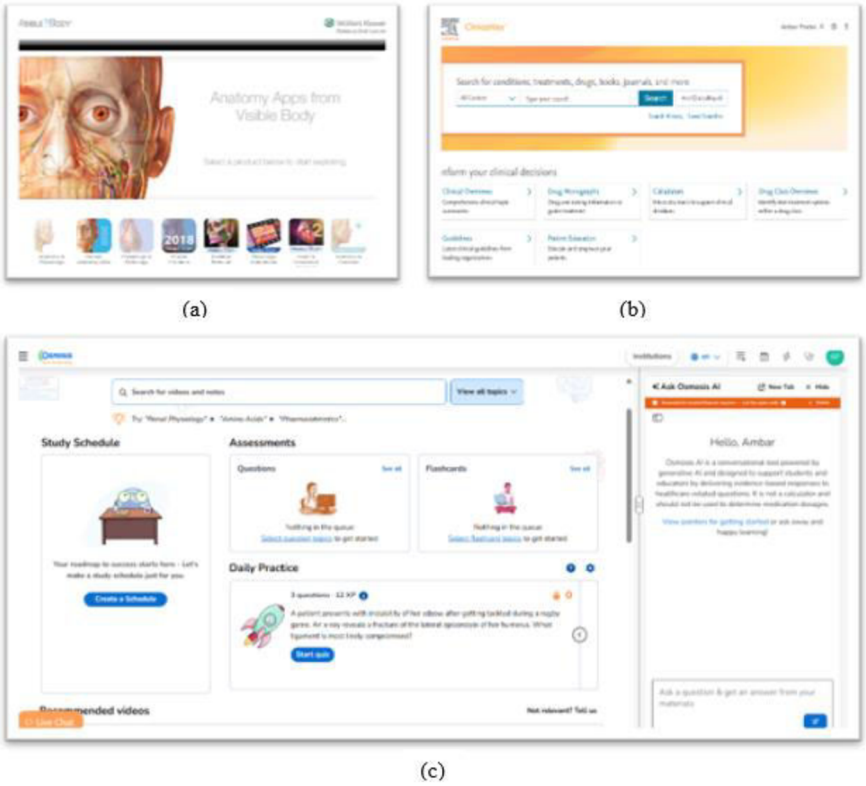


Figure 5: Integration of specialised medical digital resources in MeLCom: (a) Visible Body 3D anatomy by OVID, (b) ClinicalKey medical database access by Elsevier, and (c) OSMOSIS visual case studies by Elsevier

4.3 Strategic Collaboration through HeLLIS Indonesia in Addressing Constraints

The research findings emphasise that collaborative resource management is a cornerstone of library resilience in the face of shrinking budgets (Abernethy, 2025). Through the HeLLIS Indonesia network, the library participates in the collective resource sharing of premium international medical databases. This resilience is further fortified by the library's active membership in Forum of Indonesian Higher Education Libraries – Jakarta Chapter (FPPTI DKI Jakarta)[9], a forum that facilitates an e-resource consortium allowing institutions to secure subscriptions at a significantly reduced cost (Forum Perpustakaan Perguruan Tinggi Indonesia [FPPTI], 2020). Crucially, this participation is formally recognised in institutional and library accreditations, directly enhancing the university's academic reputation. Furthermore, this approach aligns with the National Research Master Plan (RIRN)[10] 2017-2045, ensuring that digital information access supports long-term national research goals (FPPTI, 2020).

This networking strategy demonstrates that national information resilience relies heavily on cross-institutional synergy (Wasir et al., 2025). Visionary leadership at TU facilitates this collaboration

[9] In Indonesia, *FPPTI* stands for *Forum Perpustakaan Perguruan Tinggi Indonesia.*
[10] In Indonesia, *RIRN* stands for *Rencana Induk Riset Nasional.*

to ensure inclusive information access for the entire academic community, while simultaneously supporting the achievement of SDG 3 (Good Health and Well-being) through the provision of accurate, evidence-based medical data (Garnita et al., 2024).

4.4 Challenges and Practical Implications of the Visionary Model

Despite the high demand for MeLCom, evidenced by student enthusiasm reaching 53 applicants in a single day for a session quota of only 15 slots, this research identifies significant challenges in scheduling coordination among students, faculty members, and librarians (Pratiwi & Sabarina Saputri, 2024). A practical implication of these findings is the necessity for more flexible institutional policies, such as the integration of library session schedules into the official institutional academic calendar to ensure more structured operations.

Overall, the resilient medical library model at TU demonstrates that spatial and financial constraints are not barriers to innovation, provided they are driven by visionary leadership and the strategic application of technology (Pratiwi & Sabarina Saputri, 2024). This practice establishes a benchmark for other medical libraries to evolve into active agents of change within the healthcare education ecosystem.

5. Conclusion and Recommendations

Drawing on the integration of over two decades of professional practice (2005-2026) and a detailed analysis of the MeLCom model, several fundamental conclusions regarding the research's contributions to medical librarianship are established. Furthermore, it outlines strategic implications for field practice, institutional policy, and the professional community. It also provides recommendations for future research and service development to proactively navigate digital technological disruptions.

5.1 Summary of Contributions

This research contributes significantly by documenting the transformation of the TU Medical Library into a resilient institution through a practice-based approach spanning two decades. The primary contribution is the formulation of the Medical Learning Commons (MeLCom) model, which proves that spatial constraints (a limited area of only 15 m^2) do not hinder innovations that achieve widespread impact (Pratiwi & Sabarina Saputri, 2024). This research fills a significant literature gap by integrating the long-term field experience of senior practitioners with strategic innovation frameworks and visionary leadership aspects that are seldom addressed in depth within library studies in Indonesia.

5.2 Implications for Practice and Professional Community

The findings offer practical implications for medical library managers operating with limited budgets and space, encouraging the adoption of learning commons models that are both remedial and collaborative in nature (Pratiwi & Sabarina Saputri, 2024). For the professional community, this research reinforces the repositioning of librarians as agents of change and facilitators of information literacy, with competencies validated through national BNSP certification. It demonstrates that information resilience is achievable through a synergy of human expertise, strategic technology utilisation (including AI, 3D applications, and medical databases), and the strengthening of collaborative networks such as HeLLIS Indonesia (Garnita et al., 2024).

5.3 Policy Implications

From a policy perspective, the findings emphasise the necessity of institutional flexibility in integrating library session schedules into the official academic calendar. Strong university leadership support is crucial to ensure that facilities like MeLCom function optimally as vital support units, filling the research instruction gaps often neglected in dense academic environments (Pratiwi & Sabarina Saputri, 2024).

5.4 Recommendations and Future Work

Based on the research findings, it is recommended that medical libraries in Indonesia accelerate the adoption of cutting-edge technologies, such as AI and the Internet of Things (IoT), to further enrich user experiences and enhance information management efficiency (Khulzannah et al., 2025). Future studies should expand the scope of research through cross-country comparative analyses to provide a more comprehensive understanding of digital health transformation in a global context (Hanifa & Wicaksono, 2025). Additionally, a quantitative evaluation of MeLCom's long-term impact on student academic achievement is strongly suggested to further validate the effectiveness and scalability of this model.

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Building Future Readiness: A Collaborative Model at Monash Malaysia Library

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Abstract

Medical librarians often develop their expertise through working in medical libraries or institutions that support medical education and research. Their specialist knowledge is strengthened over time through continuous professional development, discipline-specific learning, and the resilience required to adapt to rapidly evolving trends in information services and healthcare education. At Monash Malaysia, liaison librarians actively pursued opportunities to build their capabilities by attending workshops, learning from subject experts, observing teaching sessions, participating in specialist programmes, seeking mentorship, and adopting a train-the-trainer approach. These ongoing efforts reflect a commitment to remaining agile and future-ready in an increasingly complex information landscape. Significant shifts in information access and retrieval, driven by digital transformation, artificial intelligence, and changing user expectations, present both challenges and opportunities for medical librarians. These developments require librarians to deepen their understanding of how information is discovered, evaluated, and applied in research, teaching, and clinical contexts. By continuously enhancing their expertise, embracing innovation, and responding proactively to emerging trends, future-focused medical librarians can continue to play a vital role in supporting education, research, and evidence-based healthcare in the digital age.

Keywords: Medical librarianship; Professional development; Future-ready librarians; Digital transformation

1. Introduction

Over the past two decades, the role of academic medical librarians has undergone many changes. Perceived over the years as custodians of physical resources and one point of need reference providers, medical librarians are increasingly integrated into academic institutions as active research collaborators, curriculum partners, and data stewards. This evolution is largely driven by the growth of evidence-based medicine (EBM), research data management (RDM) and developments in scholarly communication services in digital ecosystems. Central to this transformation is the concept of embedded librarianship, a model that shifts information specialists from passive service points directly into academic curricula, clinical workflows, and multi-disciplinary research teams. Medical librarians' domain expertise now spans the entire research lifecycle, from protocol development, complex database searching, and screening workflows to RDM, open science stewardship, and the ethical integration of generative artificial intelligence (GenAI).

The Monash University Malaysia (MUM) Library offers a case study on how the traditional liaison model evolved into deeply embedded academic partnerships. Operating across multiple campuses without a standalone physical medical library, the MUM Library took every opportunity to upskill to be future ready. Whilst the introduction to EBM while co-teaching with academics in the School of Pharmacy was the single most driving factor for rapid transformation, staff were quick to embrace the emerging competencies in open access, publishing strategies, copyright, data management and all that came together collectively as they became future ready.

This paper examines the literature that highlights the skills and competencies that are becoming important for medical librarians in academic settings, with the operational experiences of MUM, highlighting key drivers, implementation challenges, and strategic outcomes in EBM delivery, research support, and technological adaptation.

2. Literature Review

2.1. Embedded Librarian

As the roles of librarians changed over time, so did the roles of medical librarians in academic settings. Moving away from purely instructions and reference roles, one of the core shift in librarianship as well as medical librarianship is embedded librarianship. Medical librarians are transitioning from passive information providers to active collaborators, research experts and liaisons (Ma et al., 2018). While playing a critical role in teaching how to access and evaluate quality information and ensuring these skills are integrated into academic training, they are increasingly involved in evidence-based practice, scholarly research and data management.

Embedded librarianship has emerged as a prominent model for delivering specialised services. A review of the literature found a range of embedded librarianship being defined and used in common practice, ranging from embedding an online component into a single course to full physical and cultural integration into an academic unit or organisation. In institutions, embedded librarians co-teach core courses directly within the medical and health sciences curriculum (Franzen & Sharkey, 2021). With the proliferation of EBM, librarians help design and deliver modules focused on framing clinical questions, searching complex databases, and critically appraising literature (Barr, 2023). They are often embedded within specific student cohorts to improve information-seeking behaviour at critical points in their medical training (Barr, 2023; Franzen & Sharkey, 2021).

Medical schools serve as heavy research hubs where embedded librarians frequently act as co-investigators or key collaborators on systematic reviews, meta-analyses, and scoping reviews. They design reproducible, highly complex search strategies that comply with rigorous methodological standards. They manage the data pipeline using screening and citation management tools, contributing directly to the study's design and final publication (Ma et al., 2018).

The integration of embedded librarians yields distinct advantages across the institution. It aligns library services with the specific information-seeking behaviours and workflows of health sciences faculty, staff, and students, leading to more efficient information retrieval (Kamada et al., 2021). The keys to success include personal expertise, collaboration skills, committee memberships, teaching experience, and strong personal relationships with faculty and school leadership (Linton, 2016).

2.2 Evidence-Based Medicine

The number of evidence synthesis publications which include systematic reviews, scoping reviews, rapid reviews, and other types of review has increased steadily over the past 25 years. Clinical trials reached its peak in 2013 before becoming stable with the annual number of systematic reviews indexed in PubMed exceeding the number of controlled clinical trials in 2019. By 2022, PubMed indexed 45,533 systematic reviews, averaging nearly 125 new reviews each day (Oregon Health & Science Library, 2026). This rapid growth in evidence synthesis has significantly expanded the role of medical librarians, requiring closer collaboration with researchers and the development of specialised expertise in systematic review methodologies, literature searching, research support, and evidence synthesis (Kuruppu, 2025).

While traditional literature searching has always been a core capability, demands have shifted medical librarians from search support roles to active research collaborators. In health sciences and medical research, the participation of a librarian is widely recognised as a key player. The *10 Ways Your Medical Librarian Can Help You Succeed with Scholarly Projects* clearly sums up how medical librarians can contribute and help researchers succeed in their scholarly projects. The first on the list is focused on EBM and the subsequent items contribute to the success of EBM projects (Gaspard et al., 2026).

Early literature framed librarians mainly as expert searchers, but newer work shows their role now extends across the full review lifecycle, including protocol development, question formulation, source selection, citation management, study selection, teaching, peer review, information management, and sometimes manuscript writing or project leadership (Asubiaro & Elueze, 2022; Mann, 2022; Spencer & Eldredge, 2018).

This expansion is visible in formal expectations. The Institute of Medicine requires librarians to perform or plan systematic review searches, and the Cochrane Collaboration recommends librarians' involvement in those searches (Spencer & Eldredge, 2018). Recent competency frameworks likewise define librarian skills in reference interviewing, preliminary searching, resource selection, building documented comprehensive strategies, peer review of searches, and reporting methods (Farris et al., 2024).

2.3 Data and Scholarly Communication

Academic libraries have aggressively expanded their services across the entire data lifecycle to meet strict institutional and federal mandates (Fuhr, 2022). They are engaged in applying core principles of data literacy, managing institutional data repositories, and consulting directly on comprehensive data management and sharing plans (Fuhr, 2022; Saunders, 2020).

Medical librarians are increasingly supporting RDM, curation, sharing, and data literacy rather than only literature retrieval. Multiple papers describe librarians as well-suited to manage data because their established skills in curation, preservation, access, and metadata translate directly to research data services (Federer et al., 2020; Francis, 2024; Reed & Butkovich, 2017).

The digitisation of research workflows has drastically expanded opportunities for librarians to collaborate with and add value for researchers. This includes scholarly publishing advice, guiding researchers on navigating open access and public access, identifying predatory publishers, and understanding traditional bibliometrics versus newer altmetrics. Librarians' expertise now

includes funding and grant management by assisting researchers with public access compliance. Medical librarians are moving from open access into open science, encompassing open data, open reproducible research, open evaluation metrics, and open source tools to ensure scientific outputs are freely available for reuse and collaboration (Shaffer, 2021).

Medical librarians expanded into scholarly communication through open access support, institutional repositories, publication guidance, and research visibility services. Librarians promote open access and help researchers comply with public-access and publisher requirements (Martin, 2013; Rahaman, 2023; Shaffer, 2021). Institutional repositories are a major service for disseminating outputs and sometimes research data (Cooper & Crum, 2013; Martin, 2013) Some librarians now support research information systems, metadata reuse, dashboards, bibliometrics, and profile data export (Reed et al., 2024)

2.4 AI and Advanced Technologies

GenAI is transforming higher education by reshaping approaches to teaching, learning, and research. With adoption growing among students and academics, it is becoming a norm to incorporate AI tools into their academic and research activities. Institutions are allowing AI technologies to enhance learning experiences, improve research productivity, and support more personalised educational environments. However, as Michalak et al. (2025) pointed out, AI's rapid uptake presents significant challenges related to responsible implementation, ethical use, academic integrity, and alignment with institutional priorities. Academic libraries have assumed an increasingly strategic role in supporting the effective adoption of GenAI.

The rise of GenAI is transforming the role of medical librarians from information specialists into AI-enabled knowledge professionals. Recent competency frameworks, including the *2025 AI Competencies for Academic Library Workers* from the Association of College and Research Libraries (ACRL), emphasise that AI competence extends beyond using AI tools, and requires ethical, analytical, and strategic capabilities. (American Library Association, 2025, October 6).

The intersection of AI and medical librarianship represents a fundamental shift in how health information is discovered, synthesised, and verified. Since medical librarians support clinical decision-making, systematic reviews, and biomedical research, building AI competencies is no longer a futuristic goal; it is an immediate professional requirement.

2.5 Digital Pedagogy and Virtual Learning Support

The massive push towards remote and hybrid environments in 2020 reshaped library instruction from standard physical reference desks into digital ecosystems. Librarians regularly build self-paced, online modules covering information ethics, search metrics, and digital literacy inside learning management systems (LMS).

Martzoukou (2021) highlights that before the COVID-19 pandemic, universities had already widely adopted digital technologies to support teaching, learning, research, and collaboration through a variety of online tools and resources. As a result, the rapid transition to online education during the pandemic was built upon existing expertise rather than introducing entirely new practices. Academic librarians in their supporting role followed the same pattern.

Librarians' digital competency is essential for managing digital libraries, delivering innovative services, and effectively adopting emerging technologies. Continuous training strengthens these skills, enabling librarians to enhance resource management, user support, collaboration, and content creation while remaining responsive and relevant in an evolving digital landscape (Bolasco, 2023).

In summary, the transformation of the medical librarians into a deeply embedded collaborator marks a definitive evolution in medical education and research. By going beyond traditional reference roles, embedded librarians have proven to be indispensable anchors across the entire academic lifecycle, whether they are contributing diligently towards evidence synthesis, navigating complex data management and scholarly communication mandates, or embracing rapid emergence of GenAI and digital pedagogy. As academic environments continue to digitise and rely more heavily on evidence-based frameworks, the value of the medical librarian lies not in physical book curation, but in their dynamic ability to cultivate critical partnerships, champion research integrity, and deliver high-level technical expertise directly to the point of need.

3. Case Study

At MUM, the liaison librarian model has long been an integral part of library services. Under this model, librarians are assigned to specific Schools (equivalent to Faculties) and serve as dedicated library partners. Over time, these librarians develop strong collaborative relationships with academic staff, enabling a deep understanding of the Schools' teaching, learning, and research needs while simultaneously promoting and delivering relevant library services. This partnership model benefits both parties. Through close engagement with academics, liaison librarians are able to identify areas where students and staff require support and tailor library services accordingly. On the other hand, academics frequently invite liaison librarians to deliver sessions on information literacy, evidence-based searching, referencing tools, academic integrity, citation management, and advanced literature searching skills relevant to specific assignments and coursework.

3.1 From Collaboration to Embedded Practice

One of the strongest examples of this partnership can be seen in the relationship between the MUM Library and the School of Pharmacy. Through years of close collaboration, liaison librarians developed expertise in EBM, became involved in curriculum delivery, and eventually established themselves as key contributors to systematic review support across the university. It started with a significant turning point that came in 2017 when the Faculty of Pharmacy and Pharmaceutical Sciences at Monash University Australia introduced a new Vertical Integrated Master (VIM) degree. As part of a broader curriculum review, the structure of several units changed substantially, creating both challenges and opportunities for library involvement. One of the core units, Professional Practice (PHR2012), focused heavily on EBM and required substantial library participation. Under the new structure, approximately one-third of the unit's content was delivered by library staff. The teaching approach adopted a flipped classroom model consisting of an independent discovery phase, a one-hour interactive lecture, a two-hour workshop, and a one-hour closing lecture. Library-led sessions followed a similar pattern. Given the significant teaching responsibility assumed by librarians, they were also involved in developing assessment questions and marking examinations.

The Library's role extended beyond classroom delivery. Colleagues from Monash University Australia worked closely with academic staff to develop Moodle-based learning content, ensuring that MUM remained actively involved throughout the process. This level of participation represented a compelling example of embedded librarianship, where librarians contributed not only as support staff but also as educators and curriculum partners. The outcome was significant staff upskilling and an even stronger partnership with the Faculty.

3.2 Collaboration as a Pathway to Expertise

The active collaboration among academic staff, library colleagues in Australia, and external experts provided librarians with valuable opportunities to develop subject expertise. The Professional Practice unit introduced students to the principles of evidence-based practice, including locating, evaluating, synthesising, and applying research evidence for clinical decision-making. While the Library was well positioned to teach literature searching and information retrieval, there were concerns about whether the librarians possessed sufficient expertise in EBM to deliver such comprehensive content. Rather than becoming a barrier, this challenge became a pathway for professional growth. As curriculum materials were developed in Australia, MUM librarians remained closely involved and proactively immersed themselves in the methodologies underpinning EBM. To further strengthen their knowledge, it was decided that a face-to-face engagement with Australian colleagues would provide a more effective learning experience.

In 2018, the Pharmacy liaison librarians from MUM visited the Pharmacy Library in Australia, where they observed teaching practices, discussed curriculum design, clarified content-related questions, and strengthened professional relationships with their counterparts. The visit proved invaluable in deepening the librarians' understanding of EBM and preparing them for workshop delivery that aligned with faculty expectations. During the first four weeks of the unit, the librarians co-taught alongside academics on topics such as retrieving evidence and understanding study designs, critical appraisal of research literature, and evidence synthesis. In Australia, the library staff were often supported by PhD candidates or teaching associates who could assist with specialised clinical questions. However, due to the Ministry of Higher Education (MoHE) regulations in Malaysia, postgraduate students are not permitted to participate in teaching activities. This limitation prompted further collaboration with academics within the School of Pharmacy.

Recognising the importance of building librarian capability, the Head of School worked with the library staff to develop alternative support mechanisms. Through the Head's professional networks, Professor Zoriah binti Aziz, then Head of the School of Pharmacy at Universiti Malaya and a recognised expert in EBM and meta-analysis, was invited to assist. She not only contributed to lecture delivery but also provided extensive training to the librarians, significantly strengthening their EBM knowledge and confidence. The academic staff also encouraged the librarians to observe classes delivered throughout the semester. This opportunity allowed the librarians to gain a holistic understanding of the EBM process, from research question formulation to evidence synthesis, while also exposing them to the principles underpinning systematic reviews.

3.3 Expanding Support Beyond Pharmacy

This sustained collaboration enabled the liaison librarians to develop substantial expertise in EBM and systematic reviews. Their involvement extended beyond Professional Practice, leading to continued co-teaching, student consultations, and research support activities. The successful delivery of PHR2012 demonstrated the value of strong librarian-academic partnerships. The close

working relationship between the Library and the School of Pharmacy was instrumental in the successful delivery of the unit and paved the way for expanded involvement in other pharmacy units in subsequent years.

Equipped with new knowledge and practical teaching experience, the liaison librarians were soon supporting the School of Medicine. As the Library began offering structured workshops on systematic reviews, demand from medical students and researchers grew rapidly. Tailored classes and consultation services became the routine, and systematic review support emerged as one of the Library's most sought-after services. The impact has been remarkable. From virtually no systematic review consultations in 2018, the Library now provides approximately 50 to 60 consultations annually. Students, researchers, and academic staff regularly seek assistance with literature searching, protocol development, database selection, search strategies, and evidence synthesis.

3.4 Supporting Medical Education Across Multiple Campuses

The MUM's medical programmes operate across three locations, namely Sunway, Johor Bahru, and Segamat. There is no dedicated standalone medical library. Instead, the Library operates through a highly integrated and collaborative model, embedding its services directly within the Schools and academic environment. This partnership enables specialised support across the full academic spectrum, including the Young Scholars Programme (YSP) participants, undergraduate and postgraduate students, academic staff and researchers, professional staff working with the Research Office, and alumni, where appropriate.

The Library has embraced digital transformation to support users regardless of location. Learning resources are developed using platforms such as Adobe Captivate, Articulate Rise, Google Sites, and Vyond. Services are delivered through LibGuides, face-to-face and online consultations, workshops, and research support programmes, including collaborations during institutional research events. The effectiveness of this support is further enhanced by access to premium healthcare information resources provided through Monash University Australia like AccessMedicine, UpToDate, BMJ Best Practice, Ovid MEDLINE, Embase, CINAHL, Trip Database and other specialised medical resources. To add to this, having access to Covidence is a great support for those developing systemic reviews. These resources enable the liaison librarians to provide high-quality, evidence-based support to students and researchers across the medical and health sciences disciplines.

3.5 Professional Development and Continuous Learning

Maintaining expertise requires ongoing professional development. Library staff actively pursue training opportunities and continuously update their knowledge to remain relevant in an evolving information environment. Librarians have participated in internationally recognised programmes such as the Australasian Evidence-Based Practice Librarians' Institute (AEBPLI), which provides intensive training in supporting clinical information needs, evidence-based practice, and systematic reviews. Additional professional development has included participation in Cochrane Malaysia workshops, EBM training at Universiti Malaya, webinars, and knowledge-sharing sessions with colleagues in Australia.

Knowledge gained through these initiatives is systematically shared within the Library through structured peer-learning and mentoring, ensuring continuity and consistent service quality. The Library has also shared its expertise with peer institutions, including Sunway University and the International Medical University (IMU), contributing to broader capacity building within the higher education sector.

3.6 Expanding Research Support Services

Beyond medical librarianship, the MUM librarians have significantly expanded their research support capabilities over the past decade. The liaison librarians now provide extensive guidance on scholarly communication, research impact metrics and altmetrics, publishing strategies, open access publishing, copyright issues, predatory publishing both via consultations sessions as well as dedicated workshops. Similarly, support for RDM has grown substantially, with librarians offering workshops and consultations on data cleaning, basic data analysis, and secure data storage within Monash repositories.

3.7 Preparing for the Age of Artificial Intelligence

As artificial intelligence (AI) increasingly transforms higher education and research, liaison librarians continue to adapt their services. Staff actively explore emerging AI tools, assess their capabilities and limitations, and promote responsible and ethical use. To better understand how AI can support research workflows, the Library has evaluated and subscribed to tools such as Elicit, Undermind, and Consensus for their own use and demonstration purposes. Among these, Elicit has generated particularly strong interest within the School of Medicine, resulting in growing demand for workshops and consultation sessions focused on AI-assisted literature discovery and research support.

In all, MUM's experiences demonstrate how the liaison librarian model can evolve from traditional library support into a deeply embedded academic partnership. By working closely with Schools, participating directly in teaching, embracing continuous professional development, and responding proactively to emerging research needs, the liaison librarians have successfully expanded their expertise and impact.

What began as a collaboration with the School of Pharmacy to support EBM teaching ultimately led to advanced support for systematic reviews, research impact, data management, and AI-assisted research. The key lesson is clear: strong partnerships with academic schools, combined with continuous learning and adaptability enabled the liaison librarians to remain relevant, responsive, and valuable contributors to the university's teaching and research mission.

4. Discussion

As demonstrated by the broader literature and reinforced by MUM's experiences, the value of medical librarianship is shaped by strategic partnership. MUM's experiences demonstrate that embedded librarianship is a collaborative partnership with effective integration that requires direct participation in core health sciences curricula, as illustrated by MUM Library's involvement with the School of Pharmacy's PHR2012 unit under the VIM degree. Delivering part of the unit content via a flipped classroom model, co-designing assessments, and grading examinations reflects deep pedagogical integration. Bridging the initial domain-knowledge gap in clinical concepts like EBM requires conscious institutional investment. MUM achieved this through cross-border study visits to Monash University Australia, classroom immersion, and external expert mentorship from figures like Professor Zoriah binti Aziz to navigate local regulatory limits on teaching assistants.

Such involvement significantly improves the quality of EBM support compared to one-off workshop on search strategies. Operating across a multi-campus environment, MUM successfully embedded services with additional support tools like Covidence. Furthermore, MUM librarians ventured deeper into the research lifecycle with support expanded into RDM, bibliometrics, open access and others. In order to stay relevant and future ready, the Library was quick to learn and adopt AI tools to take them to the researchers by subscribing to academic AI tools like Elicit, Undermind and Consensus. By leading workshops on AI-assisted literature discovery, the librarians ensure that emerging technologies enhance rather than compromise evidence synthesis, cementing their position as important partners in medical education and research.

5. Conclusion and Recommendations

In order to succeed as embedded medical librarians, libraries must adopt a deeply integrated collaborative model structured around key priorities. First, libraries can actively secure embedded roles by co-designing modules and co-teaching with faculty. Second, they can formalise advanced evidence synthesis services by offering structured systematic review consultations, providing specialised screening software, and advocating for librarian co-authorship to enhance search quality and reproducibility. Third, support must span the entire research lifecycle to address funder mandates through guidance on RDM, open science, and bibliometrics. Finally, libraries must lead in digital technologies and AI tools, but at the same time build awareness about responsible use and critical appraisal of the outputs. For MUM, the main ingredients were establishing librarians as collaborators in medical education and research, and continuous professional development. The Library has not stopped. It continues to drive towards future readiness, actively exploring emerging technologies and services that will shape the future of librarianship and serve the medical School along the way.

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MEDIA HIGHLIGHTS

Utusan Borneo Online | 8 SEPTEMBER 2026

Sarawak giat bangun ekosistem kesihatan moden, manfaatkan AI atasi kekurangan doktor

Sarawak sedang membangunkan ekosistem kesihatan secara menyeluruh dengan menggabungkan teknologi kecerdasan buatan (AI), penyelidikan, penemuan ubat-ubatan dan pelancongan perubatan bagi meningkatkan keupayaan sektor kesihatan negeri.





tvs | 8 SEPTEMBER 2026

Medical libraries vital to evidence-based medicine, says Dr Sim

Medical libraries play an important role in supporting modern healthcare, evidence-based medicine, research and access to health information.

SARAWAK TRIBUNE | 8 SEPTEMBER 2026

Take medical libraries into clinical practice: Sim

Medical librarians must step beyond their traditional role as custodians of information and become active partners in clinical practice, research and healthcare policymaking.



MEDIA HIGHLIGHTS

Utusan Borneo Online | 8 SEPTEMBER 2026

AI bisi potensyel mantu napi penanggul untuk lutur, ngubah chara servis pengerai

Premier Sarawak berkata teknologi kecerdasan buatan (AI) berpotensi membantu penjawat kesihatan untuk memberi perkhidmatan yang lebih baik dan mengubah cara penyampaian perkhidmatan kesihatan.





dayak daily | 8 SEPTEMBER 2026

'You are competing with ChatGPT': Dr Sim urges medical librarians to stay relevant, strengthen role in healthcare

Datuk Amar Dr Sim Kui Hian urged medical librarians to embrace new technologies, including artifical intelligence, and strengthen their role in supporting healthcare professionals, researchers and educators.

BORNEO POST online | 8 SEPTEMBER 2026

Medical libraries vital to evidence-based medicine, says Dr Sim

Medical libraries are playing an increasingly important role in evidence-based medicine, health policymaking and research as healthcare becomes more data-driven and digitalised, said Deputy Premier Datuk Amar Dr Sim Kui Hian.



MEDIA HIGHLIGHTS

UKAS
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8 SEPTEMBER 2026

Medical Libraries Drive Sarawak's Digital Health Transformation

Medical libraries are evolving into a strategic component of the healthcare ecosystem by supporting evidence-based medicine, big data analytics and health policy formulation, says Sarawak Deputy Premier Datuk Amar Dr Sim Kui Hian.





詩華日報 ONLINE

8 SEPTEMBER 2026

150专家齐聚古晋 亚洲医学图书馆 研讨会聚焦4大议题

2026年亚洲医学图书馆研讨会（AMLIS 2026）今日在古晋举行，吸引约150名来自马来西亚及亚洲各地的医学图书馆员、医疗专业人员、学者、学生及研究人员齐聚一堂，探讨数码化及人工智能（AI）在医学图书馆领域的创新应用与发展。

GLIMPSES OF AMLiS 2026



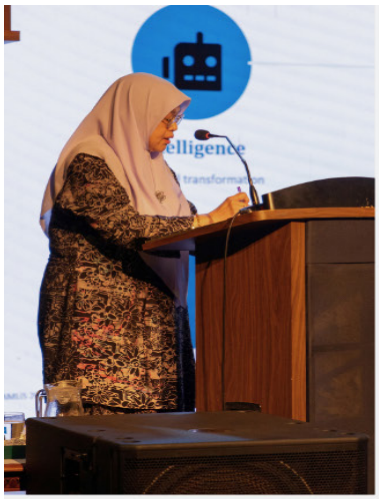














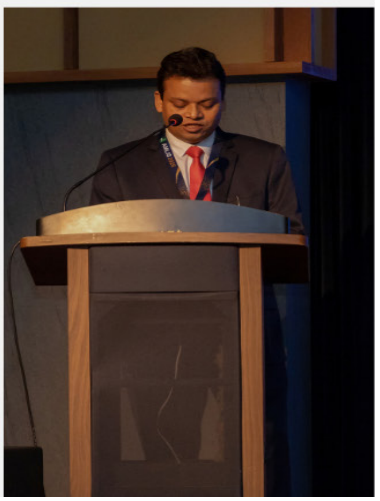






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