

Building a Web-Based Library Research Support System in A County-Level Hospital: A Five-Year Service Evaluation from China

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ABSTRACT

Background: County-level hospitals in China are expected to strengthen clinical research capacity, yet many hospital libraries still function mainly as access points for journals, databases and document delivery. A web-based network library may provide a practical infrastructure for integrating information access with research training, project support, publication guidance and service evaluation. Objective: To describe the construction of a web-based library research support system in a county-level hospital and to evaluate its five-year operation using routine institutional data. Methods: A single-centre service evaluation was conducted at Xiangshui County People's Hospital, China. Aggregate data from 2021 to 2025 were obtained from the network library backend, research administration records, training attendance records, annual publication statistics and staff satisfaction surveys. Outcomes included annual visits, database downloads, download-to-visit ratio, training sessions and attendance, research projects, publications and satisfaction indicators. Descriptive statistics, Pearson correlation and least-squares linear trend analyses were used. Results: During 2021-2025, the network library recorded 11,409 visits and 7,889 downloads, with an overall download-to-visit ratio of 69.15%. Annual visits increased from 1,958 to 3,072 and annual downloads increased from 1,157 to 1,847. Visits and downloads showed a moderate positive correlation ($r = 0.699$, $P = 0.189$), although statistical significance was not reached because only five annual observations were available. Training expanded from 2 sessions and 58 person-times in 2021 to 10 sessions and 318 person-times in 2025. The hospital accumulated 34 approved or registered research projects, including 15 municipal health commission projects, 6 municipal science and technology bureau projects and 13 university-local cooperation projects. Publications increased from 6 to 28 per year, including 18 core/statistical-source papers and 4 SCI-indexed papers over five years. Satisfaction scores increased from 82.4 to 92.3 points, and satisfaction rates increased from 84.4% to 94.0%. Conclusions: A web-based network library can function as an organisational platform for research capacity building in county-level hospitals. Its value is not limited to literature provision but lies in linking information access, research training, project cultivation, publication support and feedback-based improvement. Because this was a single-centre, uncontrolled service evaluation, the findings should be interpreted as practice-based evidence rather than proof of causality.

ARTICLE DETAILS

Published On:
08 July 2026

KEYWORDS: network library; web-based library; hospital library; county hospital; research support service; service evaluation; research capacity building

Available on:
<https://ijmir.com>

1. INTRODUCTION

Clinical care, education and research are increasingly regarded as linked functions of modern hospitals. In large academic hospitals, research offices, methodological centres, statistical teams and specialised librarians may jointly support the research cycle. In many county-level hospitals, however, research support is thinner and more fragmented. Clinicians often work close to local disease burdens and service problems, but they may have limited time, training and institutional support for transforming clinical questions into researchable topics. In this context, the hospital library remains an underused infrastructure. Traditional hospital libraries have often been positioned mainly as document lending, database access or literature delivery units [1,2].

The demand placed on hospital libraries has changed. Clinicians no longer ask only whether a paper can be downloaded. More commonly, they need help with determining whether a topic is sufficiently novel, identifying current guidelines and consensus statements, retrieving evidence for project applications, organising references, understanding journal requirements and responding

to peer-review comments [3,4]. Earlier work has argued that hospital libraries should be counted as part of the research and clinical information infrastructure rather than treated as a peripheral administrative service [5]. Evidence from health library studies also suggests that professionally delivered library and information services can influence clinical decision-making, save clinicians' time and support organisational work [6,7]. Clinical librarian services have been associated with benefits for patients, clinicians and health-care organisations, although the strength and transferability of evidence differ across settings [8,9].

A network library, or web-based library platform, gives hospital libraries a more active route to these functions. It can serve as a practical front door to databases, e-journals, open-access resources, guidelines, research policies, training materials, publication tools and feedback channels. Professional standards and stakeholder reports show that hospital librarians are increasingly expected to respond to new information behaviours, digital access models and broader research support expectations [10,11]. Research lifecycle models further suggest that library services can be embedded at multiple points from question development to dissemination and evaluation [12,13]. Newer work has extended this logic to open science, research evaluation support and changing health information roles, in which librarians increasingly teach, partner and advise rather than only supply literature [14-17].

County-level hospitals are a particularly relevant setting for this transformation. They are close to community-level clinical practice and often have substantial patient volumes, but their research capacity may depend on a small number of motivated clinicians, external cooperation and intermittent training. A library-centred support system cannot replace formal research management, study design expertise or statistical collaboration, but it can reduce common early barriers: scattered access to evidence, unfamiliarity with search strategies, poor reference management, limited awareness of reporting norms and weak continuity between project application and manuscript preparation.

Against this background, this study reports the experience of Xiangshui County People's Hospital in constructing a web-based library research support system. Rather than describing the service as a simple list of activities, we organised the evaluation around a service chain: platform use, capacity building, project cultivation, publication output and user feedback. This structure was chosen because it better reflects how research support is experienced by clinicians in a county hospital. Many users enter through a resource need, but the practical value appears when that need is connected with training, project preparation, publication support and later service improvement.

2. METHODS

2.1 Study design and setting

This was a single-centre service evaluation and case study conducted at Xiangshui County People's Hospital, a county-level hospital in Jiangsu Province, China. The observation period covered five complete years, from 2021 to 2025. Data from 2026 were not included because a complete annual dataset had not yet been formed at the time of manuscript preparation.

The evaluated service was the hospital's web-based network library research support system. It was developed as part of routine institutional work to give clinicians and departments a more stable route to research-related information, consultation and training. The system included digital resource access, research policy dissemination, literature retrieval support, project application support, research training, publication consultation, discipline-specific information services and routine service evaluation.

2.2 Service model and implementation logic

The service model was organised around six linked components: resource integration, needs identification, project support, capacity training, outcome translation and feedback evaluation. The purpose was to move the library from a passive resource provider to a more visible research support platform. In daily work, a clinician preparing a project application could receive support for topic background scanning, guideline and consensus retrieval, reference formatting, database selection and information on potential publication outlets. A department planning research training could request a more structured session on evidence retrieval, reference management, manuscript preparation or journal selection.

Operationally, the library worked with the research administration department, clinical departments, the information technology department and external university-hospital cooperation platforms. The work was not limited to a single point in the research process. It covered topic selection and project application, research implementation and evidence management, and manuscript preparation and publication. The system therefore functioned as a connector between information resources and research management rather than as a separate website.

2.3 Service workflow

The workflow followed a practical sequence. First, the network library integrated subscribed databases, e-journals, guideline resources, institutional research policies, common reporting guidance and publication-related tools into one access route. Second, user needs were collected through training attendance, consultation records, departmental communication and satisfaction surveys. Third, repeated needs were converted into training topics or support templates. Fourth, project- and manuscript-related requests

Building a Web-Based Library Research Support System in A County-Level Hospital: A Five-Year Service Evaluation from China

were connected with research administration and, when necessary, external cooperation channels. Finally, annual service data were reviewed to adjust resource promotion, training frequency and consultation priorities.

This workflow reflected the reality of county-level hospitals. Clinicians may not clearly distinguish literature retrieval, topic selection, evidence synthesis, journal selection and manuscript revision as separate service categories. For this reason, the network library was designed as a flexible service chain rather than a fixed menu. The same platform could support a beginner who needed basic database instruction and a department that needed evidence mapping before preparing a project application.

2.4 Data sources and outcome measures

Data sources included five types of routine institutional records: annual backend data on network library visits and database downloads; research project records from the hospital research administration department; training attendance sheets and continuing education records; annual publication statistics; and staff satisfaction survey results. These records were aggregate and did not include patient-level clinical data or identifiable personal information.

Platform use outcomes included annual visits, annual downloads and the download-to-visit ratio. Capacity-building outcomes included the number of training sessions and training person-times. Research output outcomes included annual new research projects, cumulative projects, project source categories, total publications, core/statistical-source publications and SCI-indexed publications. User feedback outcomes included the number of valid survey responses, satisfaction score and satisfaction rate. The satisfaction survey was an internally developed questionnaire covering convenience of resource access, usefulness of retrieval training, project application support, publication consultation and overall satisfaction. Scores were expressed on a 100-point scale. Satisfaction rate was calculated as the proportion of respondents who selected 'satisfied' or 'very satisfied'.

2.5 Statistical analysis and reporting considerations

Data were collated in Excel and analysed using Python. Count data were summarised as frequencies and percentages. Annual visits and downloads were analysed descriptively. Pearson correlation was used to explore the association between annual visits and annual downloads, and least-squares linear trend analysis was used to estimate annual changes. Because only five annual observations were available and no control hospital was included, the statistical analysis was treated as exploratory rather than confirmatory.

The evaluation focused on service implementation and institutional signals, not on estimating individual-level causal effects. We therefore interpreted platform use, training participation, project development, publication output and satisfaction as a linked set of practice-based indicators. The manuscript was prepared with reference to the SQUIRE 2.0 reporting principles, particularly in clarifying the local setting, the intervention, the measures and the limits of inference for this service evaluation [18].

2.6 Ethical considerations

This service evaluation was based solely on aggregate operational data and institutional research management records. It did not involve patients, human participants, patient-level clinical records, clinical interventions or identifiable personal information. Therefore, ethics approval and individual informed consent were not required.

3. RESULTS

3.1 Components of the web-based library research support system

The network library-based system integrated six service modules covering the main research support chain (Table 1). These modules were designed to lower information access barriers, identify repeated support needs, strengthen project application preparation, improve basic research capacity, facilitate publication and create a feedback loop for service improvement. The system was therefore not a single digital product but a service arrangement in which digital access, staff consultation, training and research management were connected.

Table 1. Components of the web-based library research support system

Service module	Main content	Function in the research process
Resource integration	Databases, e-journals, guidelines, consensus documents, open-access resources, research policies and publication tools	Reduces information access barriers and improves early-stage research preparation
Needs identification	Department needs collection, consultation logs, training feedback and frequently asked questions	Shifts the library from passive service to active and demand-sensitive support
Project support	Topic retrieval, background scanning, guideline interpretation, reference formatting and pre-search assistance	Supports project applications, feasibility judgement and preliminary study design
Research training	Layered training on searching,	Improves basic research capacity

Service module	Main content	Function in the research process
	reference management, basic statistics, writing and project applications	among clinicians and departments
Publication support	Target journal selection, format checking, revision comment interpretation and academic norm guidance	Promotes research output and publication translation while reducing avoidable submission errors
Feedback evaluation	Routine recording of visits, downloads, training, projects, publications, satisfaction and project conversion	Enables continuous service improvement and institutional monitoring

3.2 Platform use from 2021 to 2025

From 2021 to 2025, the network library recorded 11,409 visits and 7,889 downloads. The mean annual number of visits was 2,281.8, and the mean annual number of downloads was 1,577.8. The overall download-to-visit ratio was 69.15%. Annual visits increased from 1,958 in 2021 to 3,072 in 2025, representing a net increase of 56.90%. Annual downloads increased from 1,157 to 1,847, representing a net increase of 59.64% (Table 2; Figure 1). The pattern was not a simple year-by-year rise. Visits were relatively low in 2022, downloads reached their highest level in 2023, and both visits and downloads fell back in 2024 before increasing again in 2025. This fluctuation is plausible for a county hospital, where library use may concentrate around project application deadlines, manuscript preparation periods, database changes, professional title evaluation cycles and clinical workload peaks.

Table 2. Annual visits and downloads of the network library, 2021-2025

Year	Visits (n)	Downloads (n)	Download-to-visit ratio (%)
2021	1,958	1,157	59.09
2022	1,642	1,403	85.44
2023	2,661	2,381	89.48
2024	2,076	1,101	53.03
2025	3,072	1,847	60.12

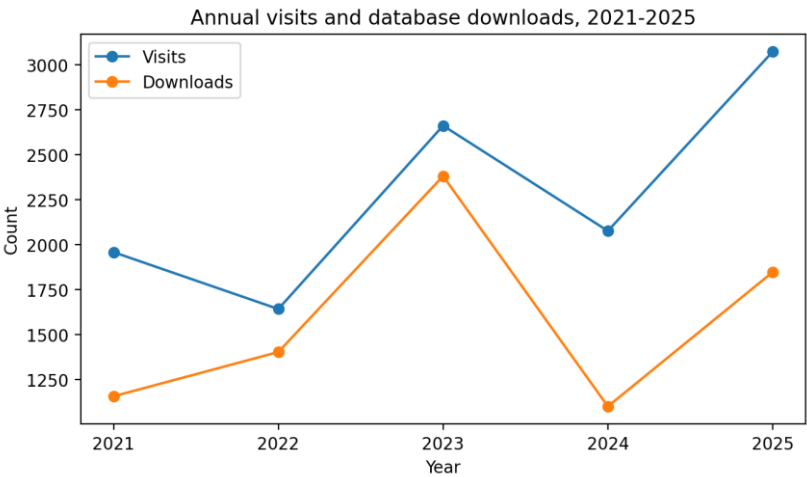


Figure 1. Annual visits and database downloads of the network library, 2021-2025.

3.3 Exploratory analysis of platform use intensity

Exploratory correlation analysis showed a moderate positive association between annual visits and annual downloads (Pearson $r = 0.699$, $P = 0.189$). The association did not reach statistical significance, which is unsurprising because the analysis included only five annual observations. Linear trend analysis estimated an annual increase of 266.2 visits per year ($P = 0.160$) and 107.8 downloads per year ($P = 0.603$); neither trend was statistically significant. The coefficient of variation was 25.22% for visits and 34.02% for downloads, indicating greater variability in download behaviour than in visit behaviour (Table 3).

Building a Web-Based Library Research Support System in A County-Level Hospital: A Five-Year Service Evaluation from China

Taken together, the platform data are best described as overall expansion with marked annual fluctuation. For this reason, service value should not be judged by visits alone. A more balanced reading requires platform use data to be interpreted together with training, projects, publications and user feedback.

Table 3. Annual change and use intensity of the network library

Year	Visit change (%)	Download change (%)	Download/visit (%)	Use characteristics
2021	-	-	59.09	Initial use base established
2022	-16.14	+21.26	85.44	Relatively active download use despite fewer visits
2023	+62.06	+69.71	89.48	Peak download intensity
2024	-21.98	-53.76	53.03	Annual decline and fluctuation
2025	+47.98	+67.76	60.12	Visits and downloads rebounded

3.4 Training, publications and satisfaction

During the operation of the network library, the hospital incorporated literature retrieval, reference management, project application, manuscript writing and journal selection into routine research training. The number of training sessions increased from 2 in 2021 to 10 in 2025, and training attendance increased from 58 to 318 person-times. Over the five-year period, 933 training person-times were recorded. The increase in training attendance was larger than the increase in platform visits, suggesting that the library was increasingly used as a capacity-building service rather than only as a database entrance.

Research publications increased during the same period. Annual publications rose from 6 in 2021 to 28 in 2025, with 78 publications over five years. Among them, 18 were core/statistical-source publications and 4 were SCI-indexed publications. Satisfaction indicators improved in parallel: the mean satisfaction score increased from 82.4 to 92.3 points, and the satisfaction rate increased from 84.4% to 94.0% (Table 4). These changes should be read as signals of service improvement rather than as proof that the library alone caused the increase in publications.

Table 4. Research training, publications and satisfaction indicators, 2021-2025

Year	Training sessions	Training person-times	Publications	Core/stat. papers	SCI papers	Survey n	Score	Satisfied (%)
2021	2	58	6	1	0	45	82.4	84.4
2022	4	126	9	2	0	76	85.1	86.8
2023	6	185	14	3	1	105	88.2	90.5
2024	8	246	21	5	1	136	90.6	92.6
2025	10	318	28	7	2	168	92.3	94.0

Note. Core/statistical-source and SCI-indexed papers are subcategories of the total number of publications.

3.5 Research project development

The organisation of research support improved after the network library system was implemented. From 2021 to 2025, the hospital accumulated 34 approved or registered research projects. Annual new projects increased from 2 in 2021 to 12 in 2025. Cumulative projects increased from 2 in 2021 to 34 in 2025 (Table 5; Figure 2).

Project sources also became more diverse. Across the five years, 15 projects were supported by the municipal health commission, accounting for 44.12%; 6 were supported by the municipal science and technology bureau, accounting for 17.65%; and 13 were developed through university-local cooperation, accounting for 38.24%. The increase in projects cannot be attributed to the library alone, but the service chain provided visible support for topic scanning, literature evidence, application preparation and later manuscript development.

Table 5. Annual research projects and source categories, 2021-2025

Year	Municipal health commission	Municipal science and technology bureau	University-local cooperation	Annual new projects	Cumulative projects
2021	1	0	1	2	2
2022	2	1	1	4	6
2023	3	1	3	7	13
2024	4	2	3	9	22
2025	5	2	5	12	34
Total	15	6	13	34	-

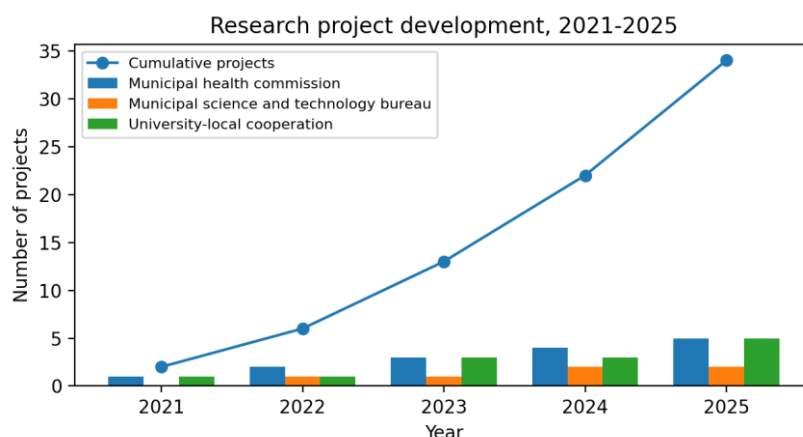


Figure 2. Annual new and cumulative research projects, 2021-2025.

3.6 Integrated interpretation of the service indicators

The five-year data suggest that the system developed along more than one pathway. Platform visits and downloads reflected access to information resources; training reflected capacity building; projects reflected early-stage research conversion; publications reflected later-stage output; and satisfaction reflected user acceptability. These indicators did not move identically from year to year, but they formed a coherent institutional picture. The library became more visible in the research process, and the hospital gradually accumulated a more structured support chain for clinicians and departments.

4. DISCUSSION

4.1 Principal findings

This five-year service evaluation suggests that a web-based network library can be used as a practical platform for organising research support in a county-level hospital. The system connected digital resource access, training, project support, publication guidance and feedback evaluation into a continuous service chain. Over the observation period, platform use increased overall, training participation expanded, research projects accumulated, publications increased and satisfaction indicators improved. Because the design was uncontrolled, the findings should be understood as practice-based evidence of feasibility and service value, not as causal proof.

A strength of this evaluation is the use of a multi-indicator data chain. Service papers on hospital libraries can easily become activity reports if they only list databases, training sessions or document delivery. By presenting platform use, training, projects, publications and satisfaction together, this study shifts the question from 'what did the library do?' to 'how was the service used and what institutional changes were observed?'. This distinction is important because a research support platform may generate value through indirect and delayed pathways that are not visible in backend visit statistics alone.

4.2 Implications for county-level hospitals

For county-level hospitals, research capacity building cannot rely on one-time training or database subscription alone. Clinicians often need repeated support in transforming clinical questions into researchable topics, identifying current evidence, understanding project requirements and preparing manuscripts. Specialist involvement in evidence searching and review preparation has been shown to broaden librarian roles beyond searching alone, including planning, question formulation and peer

review of search strategies [19,20]. Reporting guidance for systematic review searches also reinforces the need for transparent, reproducible search work, which is an area where library staff can provide practical support [21].

The experience of Xiangshui County People's Hospital indicates that such a platform may reduce some of the time and trial-and-error costs of research for clinicians. It can also help transform scattered individual efforts into more standardised departmental and institutional research activities. This interpretation is consistent with studies showing that librarian or information specialist involvement can improve the reported quality of search strategies and that embedded research informationists can contribute to research teams more directly [22,23].

4.3 Interpreting fluctuations in platform use

The platform data did not show a strict year-by-year increase. Instead, visits and downloads fluctuated, with downloads peaking in 2023 and falling back in 2024. This pattern is plausible in a hospital setting. Clinicians may use the network library intensively during project application periods, literature review preparation, manuscript writing or professional title evaluation, but their use may decrease when clinical workload rises or when database and training cycles change.

Therefore, the value of a network library should not be judged by visit counts alone. Some high-value services, such as interpreting project guidelines, advising on topic novelty, helping refine a manuscript structure or matching a paper to a target journal, may not be fully captured by backend visit statistics. Service language and interface design also matter, because library jargon may create barriers for potential users [24]. Future evaluations should combine backend use data with service logs, department-level data, user interviews and longer follow-up of project and publication outcomes. Replicable service models for reproducible research may offer useful ideas for making these evaluations more standardised [25].

4.4 The network library as a research capacity-building mechanism

The findings can also be interpreted through the wider evolution of hospital library roles. Hospital librarians have been described as occupying vital present and future pathways in clinical, educational and organisational work, and commentators have emphasised the changing value of libraries and librarians in health care [26,27]. For a county-level hospital, this role is less about creating a large academic library and more about building a small but reliable mechanism that links information, people and research procedures.

Research capacity building is usually not achieved through a single intervention. It requires skills, confidence, organisational support, partnerships and visible opportunities for using research in practice. Cooke's framework for evaluating research capacity building stresses both individual and organisational development, while later realist work has highlighted the mechanisms through which research capacity development may operate in health and social care settings [28,29]. The present service model fits this logic. Resource integration addressed access; training addressed skills; project consultation addressed confidence and feasibility; publication support addressed output translation; and feedback evaluation addressed adaptation.

Implementation science provides another useful lens. The Consolidated Framework for Implementation Research emphasises the interaction between intervention characteristics, inner setting, outer setting, individuals and implementation process [30]. Proctor and colleagues distinguished implementation outcomes such as acceptability, adoption, feasibility, penetration and sustainability from final service or clinical outcomes [31]. From this perspective, the satisfaction rate, increasing training attendance and broader project participation in our study are best understood as implementation signals. They indicate that the service was becoming more acceptable and more embedded, but they do not by themselves prove downstream academic or clinical effectiveness.

The operational elements of the service also resemble several recognised implementation strategies, such as developing educational materials, conducting ongoing training, identifying and preparing local champions, building partnerships and using audit-and-feedback cycles [32]. The RE-AIM framework further reminds evaluators to consider reach, effectiveness, adoption, implementation and maintenance rather than only short-term output [33]. For the next stage, the network library should therefore collect department-level reach, repeat-user patterns, consultation types, project conversion time and manuscript outcomes. These indicators would make it possible to evaluate not only whether the platform is used, but also whether it becomes a sustained part of hospital research management.

4.5 Practical refinements for future operation

Several practical refinements follow from this evaluation. First, the library should classify consultations by research stage, such as topic selection, literature retrieval, project application, data analysis preparation, manuscript writing and journal selection. This would make the service workload more visible and help management understand which stage needs additional support. Second, department-level training should be differentiated. Beginners may need database retrieval and reference management, while experienced clinicians may need help with study registration, reporting checklists, evidence synthesis, target journal selection and response to reviewers.

Third, the platform should strengthen the quality of literature retrieval. Searching multiple databases is often necessary for comprehensive evidence work, and systematic search support requires attention to database selection, search syntax, reference

management and deduplication [34]. In addition, studies of systematic review authors have suggested that librarian involvement is associated with greater use of recommended search methods, although such involvement may be underreported [35]. These findings support the development of more explicit search consultation records and reusable search templates within the network library.

Fourth, publication support should be framed as academic norm guidance rather than as simple journal recommendation. County-level clinicians may benefit from early advice on research question clarity, article type, reporting guideline selection, reference accuracy, figure and table presentation, and ethical declaration requirements. Fifth, satisfaction surveys should be supplemented with short qualitative feedback. A numerical score can show general acceptability, but open comments can reveal why clinicians do or do not use the service.

4.6 Limitations

This study has several limitations. First, it was a single-centre service evaluation, and the findings may not be directly generalisable to hospitals with different sizes, resources, staffing models or research management structures. Second, the platform use data were annual aggregates; monthly data, department-level data and user-level repeat-use patterns were not available, which limited analysis of how specific service activities influenced use. Third, growth in research projects and publications cannot be attributed solely to the network library because hospital management, talent development, discipline construction, external cooperation and policy support were also important factors.

Fourth, the satisfaction survey was developed for internal service evaluation and had not undergone formal reliability and validity testing. Fifth, publication counts did not capture article quality, citation impact, study design quality or whether the publications directly benefited from library support. Finally, the short time series limited statistical power and precluded strong causal inference. Future multi-centre studies should include comparison hospitals, longer observation periods and more granular process measures.

5. CONCLUSIONS

The construction of a web-based network library research support system is a feasible pathway for transforming a county-level hospital library from a traditional literature service unit into a research support platform. In this five-year practice at Xiangshui County People's Hospital, the network library integrated resource access, needs identification, project support, research training, publication consultation and feedback evaluation. From 2021 to 2025, the hospital recorded 11,409 visits and 7,889 downloads, while training participation, publications, satisfaction scores and research projects all increased. These findings suggest that network libraries may contribute to research capacity building in county-level hospitals when they are embedded into hospital research management and discipline development. Further multi-centre and comparative studies are needed to evaluate effectiveness more rigorously.

DECLARATIONS

Ethics approval and consent to participate

This service evaluation was based solely on aggregate operational and institutional management data. It did not involve patients, human participants, patient-level clinical records, clinical interventions or identifiable personal information. Therefore, ethics approval and individual informed consent were not required.

Consent for publication

Not applicable.

Availability of data and materials

The aggregated datasets used in this study are available from the corresponding author upon reasonable request and subject to institutional permission.

Competing interests

The authors declare that they have no competing interests.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Authors' contributions

Y.C. drafted the manuscript. P.J. and H.L. collated network library operation data and research training data. Z.J. and Z.Z. participated in the satisfaction survey and verification of research project data. Y.J. and G.Y. collated research administration data and publication statistics. Z.K. contributed to study conception, manuscript structure and critical revision. All authors read and approved the final manuscript.

ACKNOWLEDGEMENT

The authors thank the staff of Xiangshui County People's Hospital who contributed to the operation of the network library and research support services.

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