Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

A Study on the Challenges and Resolution Strategies of Low Implementation in Two-Way Referrals within County Medical Communities: An Empirical Investigation in Lin'an District, Hangzhou

Songjie Zhu
General practice of the first people's Hospital of Linan District
Shujiao Song
General practice of the third people's Hospital of Linan District
Guanghui Zhang
General practice of Linan District Hospital of traditional Chinese medicine
Wei Qian
General practice of the first people's Hospital of Linan District
Bo Chen
General practice of Linan District Hospital of traditional Chinese medicine
Min Xu
General practice of Linan District Hospital of traditional Chinese medicine
Danqin Zheng
625001658@qq.com

General practice of the first people's Hospital of Linan District

Research Article

Keywords: two-way referral, county medical community, hierarchical diagnosis and treatment, implementation barriers, hospital administration

Posted Date: May 8th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9259342/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Additional Declarations: No competing interests reported.

Abstract

Objective

This study aims to examine the underlying factors contributing to the paradox of "high awareness but low implementation" of the two-way referral system within county medical communities, and to offer empirical evidence and managerial recommendations for enhancing the hierarchical diagnosis and treatment framework.

Methods

A cross-sectional survey was administered to 84 healthcare professionals and 640 patients within the medical community affiliated with a tertiary hospital in Lin'an District, Hangzhou, between January and June 2025. Data were analyzed using descriptive statistics, chi-square tests, and binary logistic regression models.

Results

The findings revealed significant inconsistencies in the execution of the two-way referral system. Among medical staff, although awareness was universal (100%), 61.90% reported inadequate training. Furthermore, 71.43% of institutions lacked explicit referral criteria, and 52.38% did not incorporate referral activities into performance evaluations. At the patient level, the willingness to seek initial care within the community was relatively high (72.50%), yet the actual referral rate remained low (15.00%). Trust in primary care technology was generally limited, with 80.00% of patients providing only moderate evaluations, and 87.81% demonstrated insufficient understanding of the referral system. Multivariate analysis identified that clear performance appraisal mechanisms (OR=5.00, 95% CI: 1.01–24.76) and streamlined referral pathways (OR=8.00, 95% CI: 1.25–51.29) significantly facilitated medical staff referrals ($p < 0.05$). Patient factors influencing referral experiences included age (OR=1.08), education level (OR=0.43), and perceptions of community hospitals (OR=0.42) ($p < 0.01$).

Conclusion

The two-way referral system within county medical communities is hindered by a multifaceted collaborative dilemma characterized by ambiguous policies, insufficient incentives, limited capabilities, and a deficit of trust. Addressing these challenges necessitates the systematic development of standardized referral protocols, the establishment of performance-based incentive structures focused on quality, substantial enhancement of primary care service capacity, and the implementation of targeted communication and trust-building initiatives.

Introduction

As a fundamental impetus for reforming the medical and health system and establishing a hierarchical diagnosis and treatment framework, the success of county-level medical communities hinges on the development of a scientifically grounded and seamless two-way referral system[1]. The primary policy objective is to ensure that patients receive their initial diagnosis at the grassroots level, with emergency and routine treatments managed distinctly. However, empirical evidence indicates that China’s two-way referral system is hindered by a persistent structural imbalance: while upward referrals are relatively straightforward, downward referrals remain challenging[2]. This asymmetry not only results in the overutilization of high-quality medical resources but also diminishes the overall efficiency of service delivery within the medical community[3].

Existing scholarly research predominantly emphasizes macro-level policy design or adopts the perspective of a single stakeholder group, such as patients or healthcare providers, often neglecting a nuanced examination of the micro-level mechanisms governing the system’s internal implementation within specific organizational contexts, such as county medical communities[4]. Moreover, these studies frequently overlook the dual perspectives of both medical practitioners

and patients. As one of China's earliest pilot initiatives in establishing county medical communities, the experiences and practices observed in Lin'an District, Hangzhou, provide valuable insights and serve as a reference model for analogous regions nationwide. Accordingly, this study, grounded in management practice and empirical investigation of the medical community in Lin'an District, aims to systematically identify practical obstacles to the implementation of the two-way referral system, conduct an in-depth analysis of the motivations influencing medical staff decisions and patient healthcare choices, and offer empirical evidence alongside strategic recommendations to address referral challenges and enhance the management framework of the medical community.

1. Data and Methods

1.1 Research Objective

A cross-sectional survey was carried out between January and June 2025, targeting medical personnel and patients within the medical community affiliated with a tertiary hospital located in Lin'an District, Hangzhou, Zhejiang Province. This medical community comprises one principal hospital alongside five community health service centers. Employing a stratified random sampling technique, a total of 84 healthcare professionals were selected, including 52 physicians, 20 nurses, and 12 public health or administrative staff members. The questionnaire administered to medical staff achieved a 100% valid response rate. Concurrently, 643 questionnaires were distributed to patients, yielding 640 valid responses and an effective response rate of 99.53%. The sample size was deemed sufficient to satisfy the essential criteria for conducting multivariate analyses.

1.2 Research Methods

The survey questionnaire used in this study was specifically developed for this research. The full English version of the questionnaire is available as a supplementary file (see Supplementary File 1 and 2). The questionnaire designed for medical staff consisted of 12 items addressing system awareness, implementation status, and individual attitudes. The patient questionnaire included 15 items encompassing healthcare-seeking behaviors, evaluations of community hospitals, system awareness and experiences, as well as attitudes and needs. Both instruments employed a five-point Likert scale. The overall internal consistency, as measured by Cronbach's alpha during a pilot study, was 0.82, indicating satisfactory reliability and content validity.

1.3 Statistical Analysis

Data entry and verification were performed using EpiData version 3.1, while statistical analyses were conducted with SPSS version 23.0. Categorical variables were summarized as frequencies and percentages. Group differences were assessed using the chi-square (χ^2) test. To identify significant factors influencing the implementation of two-way referral, binary logistic regression analyses were conducted with patients' referral experience and medical staff's referral implementation as dependent variables. Odds ratios (ORs) and corresponding 95% confidence intervals (CIs) were calculated. In instances of complete data separation, Firth logistic regression was applied to adjust estimates. Statistical significance was established at a p-value less than 0.05.

2. Results

2.1 Demographic Characteristics of Respondents

Among the surveyed medical personnel, 12 individuals (14.29%) were engaged in public health or administrative roles, 52 (61.9%) were physicians, and 20 (23.81%) were nurses. Concerning educational attainment, 44 respondents had completed junior college education. Specifically, 52.38% held undergraduate degrees, 42.86% were undergraduates (36 individuals), and 4.76% possessed master's degrees (4 individuals).

Regarding the patient cohort, 344 were male (53.75%) and 296 were female (46.25%). Educational background among patients included 256 illiterate individuals (40.00%), 232 with primary school education (36.25%), and 120 with middle school education (18.75%). Students accounted for 18.75%, while university students comprised 5% (32 individuals). The mean age of patients was 63.2 years (± 10.5), with an age range spanning from 30 to 92 years.

2.2 Perspectives of Medical Staff

The survey assessed medical staff's comprehension of the two-way referral system, the extent of its implementation within hospitals, and the staff's personal attitudes toward the system. Findings indicated that while the majority of medical personnel possessed a fundamental understanding of the two-way referral system, only 38.1% reported having received formal training related to it.

At the institutional level, although most respondents acknowledged that their hospitals had implemented two-way referral processes, only 28.57% indicated that clear referral criteria had been established, and merely 33.33% confirmed that two-way referrals were incorporated into performance evaluations. Nevertheless, infrastructural support appeared robust, with 80.90% of medical staff affirming the existence of a dedicated two-way referral channel within their hospitals.

Regarding individual attitudes, medical staff exhibited a high degree of acceptance and enthusiasm toward the system. Specifically, 95.24% expressed willingness to carry out two-way referrals when clinically appropriate; 90.48% believed the system conferred benefits to patients; and 76.19% perceived that the system did not substantially increase their workload. Overall, satisfaction with the current system was high, with 76.19% of respondents reporting satisfaction—23.81% indicating they were "very satisfied" and 52.38% "relatively satisfied." Detailed data are presented in Table 1.

Table 1
Medical staff questionnaire n (%)

Problem	Option 1	Option 1	Option 3	Option 4	Option 5	x^2	*P*
1.Do you understand the two-way referral system?	fully aware of 4(4.76)	better understanding 68(80.95)	commonly 12(14.29)	not really 0(0)	not clear 0(0)	200.76	<0.01
2.Does your hospital carry out two-way referral?	yes 84(100)	no 0(0)				84	<0.01
3.Have you received training on two-way referral?	yes 32(38.10)	no 52(61.90)				4.76	<0.05
4.Does the hospital formulate or explain clear referral indications?	yes 24(28.57)	no 60(71.43)	unclear 0(0)			65.14	<0.01
5.Does the hospital include two-way referral in performance appraisal?	yes 28(33.33)	no 44(52.38)	unclear 12(14.29)			18.29	<0.01
6.Are you willing to conduct two-way referral for the patient if the patient's condition permits?	yes 80(95.24)	no 4(4.76)	uncertain 0(0)			145.14	<0.01
7. Do you understand the publicity of the two-way referral system?	yes 32(38.10)	no 52(61.90)	not carried out 0(0)			49.14	<0.01
8.If your hospital has tow-way referral,does the system significantly increase your workload?	yes 12(14.29)	no 64(76.19)	unclear 8(9.52)	not carried out 0(0)		120.95	<0.01
9. If your hospital has two-way referral, is there a special referral channel?	yes 68(80.90)	no 4(4.76)	unclear 12(14.29)	not carried out 0(0)		143.18	<0.01
10. Do you think the two-way referral system is beneficial to patients?	yes 76(90.48)	no 4(4.76)	unclear 4(4.76)			123.43	<0.01
***11. Does your hospital have applications**	internal procedures are set	using third-party programs	not set 0(0)	unclear 20(23.81)		130.10	<0.01

Note: * multiple choice questions, and the rest are single choice questions.

Problem	Option 1	Option 1	Option 3	Option 4	Option 5	x^2	*P*
related to two-way referral?	64(76.19)	0(0)					
12.Do you know which medical institutions in this region can conduct two-way referral?	fully aware of 28(33.30)	better understanding 44(52.38)	commonly 12(14.29)	not really 0(0)	unclear 0(0)	86.48	<0.01
13. If your hospital has carried out two-way referral, are you satisfied with the current system?	very satisfied 20(23.81)	quite satisfied 44(52.38)	commonly 20(23.81)	not very satisfied 0(0)	dissatisfied 0(0)	78.86	<0.01
Note: * multiple choice questions, and the rest are single choice questions.							

2.3 Patient perspective

A survey was conducted to examine patients' treatment behaviors within community hospitals, their evaluations of these institutions, their awareness and experiences concerning two-way referral systems, as well as their attitudes toward and needs for related healthcare frameworks. Findings revealed that 72.5% of patients expressed a willingness to seek treatment at community hospitals for non-critical conditions. Despite this, actual utilization rates were notably low: 35% of patients had not visited a community hospital in the preceding year, and 52.5% had done so only once during that timeframe. This discrepancy highlights a substantial gap between patients' stated preferences and their actual healthcare-seeking behaviors.

In terms of hospital evaluations, 80% of respondents rated the quality of medical care at community hospitals as average, indicating a relatively low level of trust among residents in these facilities. Assessments of medical equipment were similarly unfavorable, with 47.5% of patients describing the equipment as average and 43.75% perceiving it as relatively outdated. These findings suggest a pressing need for significant improvements in the infrastructure and resources of community hospitals.

Regarding patients' knowledge and experience with two-way referral systems, considerable informational deficits were observed: 48.12% of patients demonstrated limited understanding, while 39.69% were entirely unaware of the system. Medical staff introductions served as the primary source of information for 90% of patients, indicating that dissemination channels remain limited. Only 15% of patients had undergone a referral, reflecting low system utilization. Although 90% expressed willingness to accept referrals when medically indicated, distrust of the referred hospital was the predominant reason for reluctance, cited by 62.5% of those unwilling to participate.

Concerning the hierarchical diagnosis and treatment system, 72.5% of patients supported the practice of initially visiting community hospitals and endorsed this model of care. Nevertheless, 71.25% rated the system as average and reported low satisfaction levels. Furthermore, 82.5% of patients believed that community hospitals should expand their services to include inpatient wards. Detailed data are presented in Table 2.

Table 2
patient questionnaire n (%)

Problem	Option 1	Option 2	Option 3	Option 4	Option 5	x^2	P
1. Are you willing to go to the community hospital first when you suffer fro, non critical diseases?	yse 464(72.50)	no 176(27.50)				129.6	<0.01
2.How many times have you visited a community hospital in the past 1 year?	no visit 224(35.00)	1 time 336(52.50)	2–5 times 72(11.25)	5–10 times 0(0.00)	more than 10 times 8(1.25)	675	<0.01
***3. If you choose to go to a community hospital instead of a larger hospital, what are the possible reasons?**	close distance 280(42.68)	convenient transportation 184(28.05)	large proportion of reimbursement 144(21.95)	good medical treatment 0(0.00)	good services attitude 48(7.32)	375.2	<0.01
4.What do you think of the medical level of community medical institutions?	very high 0(0.00)	high 16(2.50)	commonly 512(80.00)	poor 80(12.50)	difference 32(5.00)	1468	<0.01
5. What do you think of the level of medical equipment in community hospitals?	more advanced 0(0.00)	advanced 16(2.50)	commonly 304(47.50)	relatively backward 280(43.75)	relatively backward 40(6.25)	709	<0.01
***6.If you are ill, why did you not choose a tertiary hospital?**	the disease itself is mild 288(40.45)	waiting time is too long 176(24.72)	difficulty in registration 24(3.37)	cumbersome procedures 184(25.84)	inconvenient transportation 40(5.62)	340.98	<0.01
7. Do you understand the two-way referral system?	well understood 0(0.00)	understand 8(1.25)	commonly 70(10.94)	not really 308(48.12)	i don't know 254(39.69)	643.94	<0.01

Note: * multiple choice questions, and the rest are single choice questions.

Problem	Option 1	Option 2	Option 3	Option 4	Option 5	x^2	*P*
***8From which channels did you learn about the two-way referral system?**	television 0(0.00)	newspaper 0(0.00)	network platform 32(5.00)	introduction to medical staff 576(90.00)	other 32(5.00)	1968	<0.01
9Have you ever turned up or down?	yes 94(14.68)	no 512(80.00)	unclear 34(5.32)			640.81	<0.01
10.If your condition permits, are you willing to conduct two-way referral?	yes 576(90.00)	no 40(6.25)	unclear 24(3.75)			925.62	<0.01
***11. What are the most important conditions for the hospital you want to transfer to?**	medical level 624(90.00)	advanced equipment 24(6.25)	complete medicines 16(2.35)	good service attitude 0(0.00)	high reimbursement ratio 16(0.25)	2191.06	<0.01
***12. If you are not willing to conduct two- way referral, what are the reasons?**	distrust the transferred hospital 440(62.50)	backward equipment 144(20.45)	poor service attitude 56(7.96)	incomplete medicines 24(3.41)	the cost is high or the difference is not big 40(5.68)	855.89	<0.01
13. Do you agree that the first consultation should be conducted in the community hospital?	consent 464(72.50)	disagree 152(23.75)	it doesn't matter 24(3.75)			480.20	<0.01
14. Are you satisfied with the current two-way referral system?	satisfaction 16(2.50)	fairly satisfied 24(3.75)	commonly 456(71.25)	not very satisfied 112(17.50)	dissatisfied 32(5.00)	1097.0	<0.01
15.Do you think community hospitals need to set	yes 528(82.50)	no 8(1.25)	it doesn't matter 104(16.25)			717.80	<0.01

Note: * multiple choice questions, and the rest are single choice questions.

Problem	Option 1	Option 2	Option 3	Option 4	Option 5	x^2	*P*
up inpatient wards?							
Note: * multiple choice questions, and the rest are single choice questions.							

2.4 Multi factor analysis of factors affecting the implementation of two-way referral

The Firth logistic regression analysis, using the dependent variable of whether medical staff actively engage in referral implementation, revealed that the presence of clear performance appraisals (yes versus no: OR = 5.00, 95% CI: 1.01–24.76, p = 0.048) and the availability of smooth referral channels (yes versus no/unclear: OR = 8.00, 95% CI: 1.25–51.29, p = 0.028) were significant positive predictors of their willingness to carry out referrals. Detailed results are presented in Table 3.

Table 3
results of Firth logistic regression analysis of influencing factors of medical staff's referral execution intention (n = 84)

influence factor	regression coefficient	Standard error	Wald χ^2	*P*	Odds ratio (OR)	95% confidence interval
(Reference: Doctor)						
Public health personnel	-1.203	0.892	1.82	0.177	0.30	(0.05–1.76)
Nurse	-0.512	0.734	0.49	0.485	0.60	(0.14–2.54)
Administrative staff	-1.609	1.095	2.16	0.142	0.20	(0.02–1.76)
Training (yes vs no)	1.386	0.816	2.89	0.089	4.00	(0.81–19.81)
Assessment status (yes vs no)	1.609	0.816	3.89	0.048	5.00	(1.01–24.76)
Clear indication (yes vs no)	1.386	0.816	2.89	0.089	4.00	(0.81–19.81)
Referral channel (yes vs no/unclear)	2.079	0.949	4.80	0.028	8.00	(1.25–51.29)
Note: model likelihood ratio test: c2 = 15.32, P = 0.009, pseudo R ²=0.286, *P < 0.05* is statistically significant						

A binary logistic regression analysis using the patient's "referral experience" as the outcome variable revealed that age (OR = 1.08, 95% CI: 1.05–1.11, p < 0.001) acted as a positive predictor. In contrast, having a higher education level (OR = 0.43, 95% CI: 0.29–0.64, p < 0.001), giving a better rating to community hospitals (OR = 0.42, 95% CI: 0.25–0.71, p = 0.001), and making more annual visits (OR = 0.56, 95% CI: 0.38–0.82, p = 0.003) were associated with a decreased likelihood. Detailed results are presented in Table 4.

Table 4
binary logistic regression analysis results of influencing factors of patients' referral experience (n = 640)

variable	coefficient	Standard erro	z	*P*	Odds ratio(OR)	95% confidence interval
Constant term	-2.625	1.312	-2.000	0.045	0.072	[0.006, 0.949]
Age	0.074	0.014	5.206	< 0.001	1.077	[1.047, 1.108]
Educational level	-0.834	0.200	-4.172	< 0.001	0.434	[0.294, 0.643]
Community hospital evaluation	-0.873	0.270	-3.230	0.001	0.418	[0.246, 0.709]
Referral understanding	0.308	0.177	1.738	0.082	1.361	[0.961, 1.926]
Annual number of visits	-0.587	0.199	-2.950	0.003	0.556	[0.376, 0.821]
: Accuracy:0.6568, Precision:0.2857, Recall:0.8085, F1 score: 0.4222, AUC: 0.7560						

3. Discussion

This study empirically reveals the root cause of the dilemma characterized by "high awareness but low implementation," which arises from a lack of synergy across four key areas: system, incentives, ability, and trust[5].

3.1 System Implementation: From Concept to Practice

Globally, many countries have adopted two-way referral systems. In countries such as India, Iran, and Mozambique, the referral model has led to low referral rates at primary healthcare institutions due to the absence of effective system safeguards, standardized referral procedures, and other contributing factors. Although China has made more progress in establishing a two-way referral system compared to these nations, similar issues remain. When compared to the UK's NHS referral system, there is still a notable disparity in the rate of first visits at county-level medical communities in China; the NHS achieves a first-visit rate at the grassroots level exceeding 90% .

This study found that despite the two-way referral system achieving full administrative coverage within the medical community (Table 1), challenges in implementation arose due to insufficient training in the referral process (61.90% of staff untrained) and unclear standards (71.43% lacking clear guidelines). This finding aligns with international research indicating that "the absence of a clear pathway leads to inefficient referrals"[6]. This problem is especially evident in downward referrals. For instance, some doctors treat referrals merely as an "administrative task," neglecting the individual needs of patients. This may be attributed to the county health department's failure to establish unified referral standards and centralized management. The two-way referral system involves not only referrals within the same medical community but also referrals between all higher- and lower-level hospitals within the county, as well as referrals involving provincial and municipal hospitals. Due to inadequate communication and the lack of unified management among different medical communities within the same county, when the system remains at a procedural level without detailed, actionable clinical pathways (such as specific referral thresholds for various diseases), medical staff face uncertainty and inconsistency in implementation. It is recommended that the health department take the lead, collaborating with clinical experts to develop a quantitative Referral Standard Guide based on common diseases and to create an intelligent prompt and decision-support module integrated into the information system[7,8]. This would help shift referral decisions from being based on "experience" to becoming more standardized and evidence-based.

3.2 Incentive Mechanism: Addressing the Challenges of Multiple Referrals and Associated Risks

The survey revealed that 52.38% of medical personnel reported that referrals were not incorporated into performance evaluations. Furthermore, some existing assessment frameworks relied solely on the number of referrals as a metric and were linked to punitive measures, thereby generating a negative incentive characterized by the phenomenon of "multiple referrals and multiple risks"[9].These outcomes suggest that the current incentive structure is skewed and inadequately accounts for the "quality" and "prognosis" of referrals.

Consequently, it is imperative to develop a dual-dimensional evaluation framework that emphasizes both referral quality and patient prognosis, thereby enhancing patient care quality and outcomes. Additionally, performance incentives should be allocated to high-quality referrals that meet appropriate clinical indications[10]. Concurrently, integrating the "referral point system" with criteria for professional title advancement may prevent indiscriminate performance penalties[11]. Establishing a shared medical responsibility mechanism within healthcare communities will further motivate medical staff to actively engage in the two-way referral system.

3.3 Capacity Limitations: Software and Hardware Constraints Impacting Service Continuity in Primary Medical Institutions

Patients' low satisfaction with primary care technology and equipment directly reflects a deficit in "technological trust." Issues such as incomplete essential drug lists at the grassroots level and shortages of commonly used medications further undermine institutional capacity, perpetuating a detrimental cycle of "insufficient capability – patient attrition – impeded capacity enhancement." Addressing this challenge requires the establishment of a sustainable "sink upgrade" mechanism targeting talent development, technological advancement, and equipment modernization within medical communities[12]. This can be facilitated through policies such as "district review and street use" and the dynamic adjustment of drug formularies to ensure alignment between drug supply and grassroots demand, thereby significantly strengthening the service capabilities of primary healthcare institutions[13,14].

3.4 Patient Decision-Making: Reconstructing Trust and Cognitive Intervention

The observed paradox of "high willingness but low compliance" among patients underscores a significant disparity between "institutional trust" and "technical trust." Current information dissemination heavily depends on informal communication through medical personnel (accounting for 90%), indicating a deficiency in official outreach and ineffective communication strategies. Transparency and the deployment of multi-channel information dissemination are essential components for fostering trust[15]. It is therefore recommended that healthcare administrators implement a closed-loop feedback system to monitor referral outcomes, regularly report diagnostic concordance rates and treatment efficacy for patients referred to primary care physicians, and selectively publicize this data to patient populations to restore trust through empirical evidence[16]. Concurrently, the strategic utilization of new media platforms should be maximized to establish a tri-level interconnected publicity network spearheaded by hospitals and encompassing the medical community, community centers, and families, thereby facilitating accurate information access and mitigating informational barriers[17,18].

4. Conclusions and Recommendations

This study concludes that the challenges surrounding two-way referrals within county medical communities stem from a complex interplay of factors rather than a single cause. Specifically, the issue arises from a lack of coordination across

four key areas: system design, incentive structures, service capabilities, and doctor-patient trust. To address these challenges, the following comprehensive governance strategies are recommended:

First, standardize referral pathways. Under the leadership of health authorities, develop quantitative clinical pathways and standard operating procedures for common diseases, integrating them into information systems to facilitate intelligent management.

Second, implement precise incentive mechanisms by reforming performance evaluation systems. Prioritize referral quality as a central metric, linking it effectively to both team and individual performance assessments as well as career advancement opportunities to encourage positive behaviors.

Third, enhance service capabilities. Create a sustainable "sink upgrade" system focused on talent cultivation, technological improvements, and management of drug formularies. Emphasize ensuring adequate drug and equipment supplies at the grassroots level to strengthen initial diagnosis and treatment capacities.

Fourth, foster transparent communication. Employ diverse and targeted communication approaches, leverage information platforms to openly share referral processes and outcomes with patients, and provide personalized explanations through family doctors to rebuild and strengthen trust between doctors and patients.

Future studies could investigate variations in referral efficiency across different medical communities and assess how reforms in medical insurance payment systems influence two-way referral practices.

Declarations

Data Availability Statement

Data Sharing: The datasets analyzed in this study are available from the corresponding author upon reasonable request.

Author contributions

The individual contributions of the authors are as follows: Conceptualization: Z.S., S.S., G.Z., W.Q.; Data curation: S.S., G.Z., B.C., M.X.; Formal analysis: S.J., S.S., G.Z., D.Z.; Funding acquisition: D.Z.; Investigation: S.J., S.S., G.Z., B.C., M.X.; Methodology: S.J., S.S., G.Z., W.Q.; Project administration: D.Z.; Resources: D.Z.; Supervision: D.Z.; Validation: B.C., M.X.; Writing – original draft: S.S., G.Z.; Writing – review & editing: W.Q., D.Z. All authors have reviewed and approved the final manuscript.

Funding

This work was supported by the Hangzhou Medical and Health Science and Technology Project (Grant No. B20254685).

Ethical Declarations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. The study protocol, including all data collection procedures involving human participants, was reviewed and approved by the Ethics Committee of the First People's Hospital of Lin'an District, Hangzhou City (Approval No. Lin'an First Hospital Ethics Review 2025 No.1). The Committee’s review ensured compliance with China's “Ethical Review Measures for Biomedical Research Involving Humans” and relevant data protection guidelines.

Prior to participation, written informed consent was obtained from all surveyed healthcare workers and patients (or their legal guardians). The consent process clearly explained the study's purpose, data usage, and the participants' right to withdraw at any time.

All data collected were anonymized at the point of analysis. Personal identifiers were removed to ensure confidentiality. The research utilized anonymized survey data for statistical analysis, with no subsequent identification possible. In accordance with China's "Personal Information Protection Law" and relevant regulations governing the use of de-identified data for scientific research, additional institutional review board (IRB) approval beyond the aforementioned Ethics Committee approval was not required for the analysis of this fully anonymized dataset.

Competing interests

The authors declare no competing interests.

References

1. Yip W, Fu H, Chen AT, Zhai T, Jian W, Xu R, et al. 10 years of health-care reform in China: progress and gaps in Universal Health Coverage. Lancet. 2019;394(10204):1192-204. doi:10.1016/S0140-6736(19)32136-1.
2. Li X, Krumholz HM, Yip W, Cheng KK, De Maeseneer J, Meng Q, et al. Quality of primary health care in China: challenges and recommendations. Lancet. 2020;395(10239):1802-12. doi:10.1016/S0140-6736(20)30122-7.
3. Liu Y, Kong Q, Yuan S, van de Klundert J. Factors influencing implementation of bidirectional referral between primary and secondary care: a systematic review. BMJ Open. 2023;13(1):e067291. doi:10.1136/bmjopen-2022-067291.
4. Chen M, Chen W, Zhao Y. Does the medical alliance policy improve the efficiency of the two-way referral system in rural China? Evidence from a quasi-natural experiment. Int J Equity Health. 2024;23(1):12. doi:10.1186/s12939-024-02128-0.
5. Zhou S, Huang T, Li A, Wang Z. Does the integration of health services improve the efficiency of the referral system? Evidence from the urban medical consortium in China. Front Public Health. 2020;8:613. doi:10.3389/fpubh.2020.00613.
6. Yang L, Liu C. Developing clinical pathways for common chronic conditions in primary care: a Delphi study in China. BMC Prim Care. 2023;24(1):1-10. doi:10.1186/s12875-023-02048-y.
7. Gong S, Wang Y, Cai Z, Yan X. Unpacking the black box of two-way referral in China: a configurational approach of health information technology affordances. Inf Technol People. 2024;37(2):789-809. doi:10.1108/ITP-05-2022-0357.
8. Huang F, Gan Y, Lu Z. The impact of digital health interventions on the coordination of care in integrated health systems: a scoping review. J Med Internet Res. 2024;26:e52987. doi:10.2196/52987.
9. Wang H, Wang L, Liu C, Chen L. The impact of diagnosis-related group (DRG) payment on the physician's behavior of referral in China: A difference-in-differences analysis. Soc Sci Med. 2022;315:115513. doi:10.1016/j.socscimed.2022.115513.
10. Li T, Lei Z, Chen J. Does performance-based financing improve the quality of primary health care? A systematic review and meta-analysis. BMJ Glob Health. 2023;8(5):e011821. doi:10.1136/bmjgh-2023-011821.
11. Wang Z, Chen Y, Pan J, Liu GG. The comparison of healthcare utilization and costs between referral and non-referral patients in China. Int J Health Plann Manage. 2019;34(4):1387-99. doi:10.1002/hpm.2888.
12. Zhang Y, Zhou Z, Zhao Y. The effect of gatekeeping on the quality of primary care in China: A cross-sectional study. Lancet Reg Health West Pac. 2021;15:100252. doi:10.1016/j.lanwpc.2021.100252.
13. Sun J, Luo H, Wang Y. A comparison of the factors associated with the utilization of primary health care between public and private sectors in China. Health Policy Plan. 2021;36(6):880-9. doi:10.1093/heapol/czab028.
14. Zhang P, Zhao L, Liang J, Qiu H. The effect of primary care quality on the willingness of hypertensive patients to use primary care as first contact in China. BMC Fam Pract. 2020;21(1):1-9. doi:10.1186/s12875-020-01101-4.
15. Wu D, Lam TP, Sun KS. Factors associated with the intention of downward referral among patients with chronic diseases in tertiary hospitals: A cross-sectional study in China. BMC Health Serv Res. 2022;22(1):114.

doi:10.1186/s12913-022-07522-4.

16. Xu J, Yan Y, Chen Y, Liu D. Patient satisfaction and its determinants in the tiered healthcare system in China: The role of referral systems and gatekeeping. Health Policy Plan. 2023;38(5):576-86. doi:10.1093/heapol/czad015.
17. Yu B, Meng Q, Mills A. The impact of the health provider's recommendation on patient choice of healthcare facility in rural China: evidence from a cross-sectional study. Health Policy Plan. 2022;37(4):522-31. doi:10.1093/heapol/czab151.
18. Chen S, Guo L, Liu J. The role of social capital in physician-patient trust and patient adherence in the context of China's referral system: A cross-sectional study. PLoS One. 2022;17(4):e0267048. doi:10.1371/journal.pone.0267048.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryFile1Medicalstaffquestionnaire.docx
- SupplementaryFile2Patientquestionnaire.docx