

# A Study on the Implementation Mechanism of Medical-Preventive Integration in the Context of Integrated Service System Construction: Post-print

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## Abstract

Background: Achieving primary-level integration of medical treatment and prevention and innovating mechanisms for medical-preventive coordination and integration constitute important tasks in China's healthcare sector during the 14th Five-Year Plan period. Objective: To analyze the implementation mechanism of medical-preventive integration within the context of integrated service system construction and to provide references for exploring pathways of medical-preventive integration that align with the Healthy China Strategy. Methods: Taking 2018 as the time node, literature was retrieved from CNKI and Wanfang Data Knowledge Service Platform using "medical-preventive integration," "medical-preventive coordination," and "integration of treatment and prevention" as keywords. Studies examining policy measures and implementation effects of cases in integrated service systems such as medical communities and medical alliances were selected, yielding 18 articles and 15 cases. Based on the Rainbow Model, system integration, organizational integration, professional integration, service integration, functional integration, and normative integration were identified as conditional variables from macro, meso, and micro levels as well as supporting elements, with effective medical-preventive integration as the outcome variable. Qualitative comparative analysis was employed to explore the implementation mechanism of medical-preventive integration within the context of integrated service system construction. Results: Four configurational paths can effectively enhance medical-preventive integration effects. The four paths correspond to multi-level integration and meso-micro integration types. The following findings were also obtained: (1) Implementing medical-preventive integration based on integrated service systems is more effective, and multiple pathways exist within integrated service systems to ef-

fectively enhance medical-preventive integration effects; (2) Service integration plays a fundamental ensuring role in improving medical-preventive integration effects; (3) Policy indicator settings for system integration, professional integration, and functional integration to improve medical-preventive integration are not yet well-established. Conclusion: (1) Enhance medical-preventive integration effects by relying on integrated service systems with Chinese characteristics such as medical alliances and medical communities; (2) Fully exert the fundamental ensuring role of service integration; (3) Draw on the successful experiences of multi-level integration cases, balance policy indicator settings across macro, meso, and micro levels, and simultaneously improve system integration, professional integration, and the integration of supporting elements.

## Full Text

### Research on Implementation Mechanism of Treatment-Prevention Integration Under the Background of Integrated Service System Construction

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## Abstract

**Background:** Realizing grassroots treatment-prevention integration and innovating the mechanism of treatment-prevention coordination and integration

constitute a critical task in China's medical and health field during the 14th Five-Year Plan period.

**Objective:** This study analyzes the implementation mechanism of treatment-prevention integration within the context of integrated service system construction, providing reference for exploring pathways of treatment-prevention integration that align with the Healthy China Strategy.

**Methods:** Using 2018 as the temporal cutoff point, we searched CNKI and Wanfang Data Knowledge Service Platform with keywords "treatment-prevention integration," "medical-preventive coordination," and "combination of prevention and treatment." We selected literature examining policy measures and implementation effects of integrated service systems such as medical communities and medical alliances, ultimately identifying 18 papers covering 15 cases. Based on the Rainbow Model, we identified system integration, organizational integration, professional integration, service integration, functional integration, and normative integration as condition variables from macro, meso, and micro levels plus supporting elements, with effective treatment-prevention integration as the outcome variable. Qualitative Comparative Analysis (QCA) was employed to explore the implementation mechanism.

**Results:** Four configuration pathways effectively enhanced treatment-prevention integration effects, categorized as multi-level integration pathways and meso-micro integration pathways. Key findings include: (1) Conducting treatment-prevention integration through integrated service systems is more effective, with multiple viable pathways for improvement; (2) Service integration plays a fundamental role in enhancing treatment-prevention integration effects; (3) Policy indicators for system integration, professional integration, and functional integration remain inadequately developed.

**Conclusion:** (1) Leverage China's distinctive integrated service systems (medical alliances and medical communities) to enhance treatment-prevention integration effects; (2) Fully exploit the foundational role of service integration; (3) Draw upon successful multi-level integration cases to balance policy indicators across macro, meso, and micro levels while improving system integration, professional integration, and supporting element integration.

**Keywords:** Health services administration; Treatment-prevention integration; Integrated service system; Qualitative comparative analysis; Rainbow model

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## Introduction

Promoting grassroots treatment-prevention integration represents a crucial measure for ensuring broad public access to equitable, systematic, and continuous health services encompassing prevention, treatment, rehabilitation, and health promotion. President Xi Jinping emphasized in the 20th Party Congress report

that we must adhere to prevention-first principles, strengthen health management of major chronic diseases, and enhance grassroots capabilities in disease prevention, treatment, and health management. On April 10, 2023, the Central Committee of the Communist Party of China and the State Council issued the “Opinions on Further Improving the Medical and Health Service System,” which stressed strengthening the combination of prevention and treatment while innovating mechanisms for medical-preventive coordination and integration. Consequently, realizing grassroots treatment-prevention integration and innovating relevant mechanisms has become a priority task for China’s medical and health sector during the 14th Five-Year Plan period.

The World Health Organization’s 2015 Global Strategy on Integrated People-Centered Health Services highlighted that health service delivery models should be primary care-oriented, shifting from treatment to prevention, with primary healthcare as the foundation of integrated service systems. The State Council’s 2018 “Notice on Key Tasks for Deepening Medical and Health System Reform in the Second Half of 2018” similarly emphasized using integrated service system frameworks to promote the integration of prevention, treatment, and rehabilitation services. Both international and domestic policies thus recognize the critical relationship between treatment-prevention integration and integrated service system construction.

Integrated service systems aim to address fragmentation in healthcare delivery by strengthening coordination among different services and enhancing continuity of care. The WHO defines integrated services as organizing and managing health system resources to deliver comprehensive, continuous services. Domestic scholars similarly view integrated services as coordinating medical institutions and personnel across different levels to promote collaborative development and improve population health. Despite varying conceptual expressions across countries, the core philosophy aligns with treatment-prevention integration goals—both emphasize integrating disease prevention and treatment to provide systematic, continuous healthcare services. Constructing and optimizing integrated healthcare delivery systems can strengthen collaboration between hospitals and public health institutions at all levels, improve linkages between preventive and curative services, shift the system toward health-centered rather than disease-centered care, and leverage the positive role of public health systems in integration, health promotion, and population health protection.

In recent years, China has developed representative regional models of integrated healthcare services, notably medical alliances and medical communities, which many regions have adopted as primary vehicles for promoting treatment-prevention integration. However, long-standing divisions between medical and public health systems, coupled with the persistent phenomenon of “emphasizing treatment over prevention,” have kept these two domains largely separate and parallel, hindering effective integration. Researching treatment-prevention integration within the context of integrated service system construction is therefore essential for developing robust integrated systems and exploring mechanisms

aligned with the Healthy China Strategy.

Scholars have extensively explored treatment-prevention integration theoretically and practically. Theoretically, researchers have studied concepts, theoretical mechanisms, and developed conceptual frameworks and indicator systems. Practically, changing demographics and disease burdens necessitate healthcare system adaptation emphasizing disease prevention. Studies reveal that primary care and medical services remain fragmented and should be combined for continuous health protection. Current challenges include systemic barriers between medical and public health systems, undervalued public health functions, and insufficient public health workforce capacity. Proposed solutions include institutional integration, payment reform, and improved compensation for public health work. Some scholars have drawn lessons from the US tiered diagnosis and treatment system and UK' s NHS and family doctor system to propose regionally appropriate models. While existing research is comprehensive, few studies have employed quantitative methods to examine common characteristics across multiple cases within integrated service system contexts.

Qualitative Comparative Analysis (QCA), founded by Mill in 1843, combines qualitative and quantitative approaches to explore causal pathways between policy element combinations and outcomes. QCA includes crisp-set QCA (csQCA), fuzzy-set QCA (fsQCA), multi-value QCA (mvQCA), and temporal QCA (t/tsQCA), with csQCA and fsQCA being most common. csQCA uses dichotomous coding (0 or 1), while fsQCA allows partial membership (0-1). This study employs csQCA for three reasons: First, the sample of 15 cases from medical alliances and communities fits QCA' s small-to-medium sample size requirement. Second, regional variations in integration policies provide the “substantial homogeneity across cases” and “maximum heterogeneity within cases” that QCA requires. Third, policy measures can be coded dichotomously based on implementation. The latest fsQCA3.0 software handles both crisp-set and fuzzy-set data, so we used it for analysis without additional calibration since variables were already coded as 0 or 1.

While QCA is widely applied in economics and management, its use in healthcare research remains nascent. Few scholars have applied QCA to treatment-prevention integration. This study innovatively introduces QCA to analyze policy combinations affecting integration outcomes across diverse cases, broadening research perspectives and providing references for exploring integration mechanisms during the 14th Five-Year Plan period.

## Methods

**1.2 Data Collection and Sample Selection** The National Health Commission' s 2018 “Notice on Doing a Good Job in Family Doctor Contracted Services in 2018” first introduced the term “treatment-prevention integration” in policy documents, making 2018 an appropriate temporal cutoff. We searched CNKI and Wanfang Data using keywords “treatment-prevention integration,” “medical-

preventive coordination,” and “combination of prevention and treatment,” initially retrieving 340 papers after removing duplicates. We then selected literature based on integrated service system construction context.

The selection process involved three steps: First, we carefully read all papers, identifying 38 case studies based on medical communities or medical alliances. Second, we excluded studies before 2018 and those lacking detailed policy measures or outcome indicators. This yielded 18 valid papers covering 15 major cases (two papers each covered Fujian Sanming, Chongqing, and Henan Jiaxian, so we removed three duplicate cases). presents case information.

**1.3 Variable Setting** Existing treatment-prevention integration practices in China primarily focus on single pathways like system or service integration, leaving other dimensions unaddressed. Valentijn et al.’s Rainbow Model serves as the recognized framework for integrated service systems, reflecting healthcare integration across macro, meso, and micro levels plus supporting elements. Its people-centered, population-based principles align with treatment-prevention integration’s goal of providing comprehensive, continuous services. We therefore adopted the Rainbow Model as our theoretical framework, setting condition variables across four levels to explore implementation mechanisms from six dimensions: system, organization, profession, service, function, and norm.

Drawing on integrated service system conceptual frameworks, existing treatment-prevention integration indicator systems, and our selected cases’ policy measures, we defined six condition variables and one outcome variable:

1. **System Integration (Macro-level):** Policy and institutional arrangements promoting integration between public health and medical service systems to ensure balanced resource allocation and continuous services. Coded as 1 if guidance documents or implementation plans were issued to build integrated health systems, otherwise 0.
2. **Organizational Integration (Meso-level):** Horizontal and vertical integration of treatment-prevention institutions, promoting unified public health management centers to coordinate medical and public health work. Coded as 1 if both horizontal collaboration (between medical insurance and primary care departments) and vertical resource 下沉 (sinking) were achieved, otherwise 0.
3. **Professional Integration (Meso-level):** Collaboration among healthcare professionals with different expertise to deliver continuous, comprehensive services. In treatment-prevention integration, this manifests as personnel integration—opening channels between medical and public health systems and cultivating general practitioners with integrated competencies. Coded as 1 if both training programs and vertical personnel mobility between upper- and lower-level institutions were implemented, otherwise 0.

4. **Service Integration (Micro-level):** Integration of service delivery content, shifting from disease treatment to prevention-treatment continuity. Coded as 1 if both full-cycle services (prevention-diagnosis-treatment-rehabilitation) and comprehensive health services (chronic/infectious disease control, maternal-child health, elderly care, traditional Chinese medicine, health education) were provided, otherwise 0.
5. **Functional Integration (Supporting element):** Integration of health information and performance assessment, including unified information platforms for shared data and supervision mechanisms incorporating multiple indicators with financial incentives. Coded as 1 if both information sharing and performance-based incentives were established, otherwise 0.
6. **Normative Integration (Supporting element):** Standardized use of treatment-prevention funds, coordinating medical insurance funds, public health funds, and government subsidies through payment reform. Coded as 1 if measures were taken to integrate multiple funding channels, otherwise 0.

The **outcome variable** was effective treatment-prevention integration. Based on Healthy China goals of improving population health, shifting from treatment-centered to health-centered approaches, and enhancing service continuity and system governance, we assessed outcomes from both supply and demand perspectives. Supply-side effectiveness manifests as enhanced grassroots medical and health management capabilities; demand-side effectiveness appears as improved population health outcomes. Coded as 1 when both supply and demand criteria were met, otherwise 0.

These six condition variables and one outcome variable represent classic pathways derived from integrated service system implementation. We coded all 15 cases accordingly, with results shown in .

## Results

**2.1 Necessary Condition Test** We first coded variables and constructed a truth table, then calculated consistency and coverage using fsQCA software. A consistency threshold of 0.9 indicates a necessary condition. Results in show that micro-level service integration achieved perfect consistency (1.0), exceeding the threshold and qualifying as a necessary condition.

**2.2 Configuration Analysis** Using a 0.9 consistency threshold, we performed standard analysis, yielding three solution types: simple, intermediate, and complex. The intermediate solution, which incorporates theoretically and empirically justified logical remainders, is typically preferred in QCA research for its balance of parsimony and complexity. We therefore selected the intermediate solution for interpretation.

The analysis produced four optimal configurations for effective treatment-

prevention integration, with combined coverage of 1.0 ( $>0.5$ ) and combined consistency of 1.0 ( $>0.8$ ), indicating ideal fit. Results are presented in and summarized in .

Across all four configurations, micro-level service integration appears as a core condition, confirming its foundational role. The configurations reveal two distinct pathways:

1. **Meso-Micro Integration Path (Configurations S1 and S4):** These configurations lack macro-level system integration but include meso-level organizational integration and micro-level service integration as core conditions, with at least one supporting element (normative integration) as a peripheral condition. Despite missing macro-level elements, these pathways achieve effective integration through meso- and micro-level arrangements. Cases following this path include Tongling (Anhui), Sanming (Fujian), Jieshou (Anhui), and Jiaxian (Henan).
2. **Multi-Level Integration Path (Configurations S2 and S3):** These configurations include core conditions across macro, meso, and micro levels, with at least functional integration in supporting elements. Effective integration requires coordinated efforts at all three levels. Cases following this path include Zhongxian (Chongqing), Yunxian (Yunnan), Chongqing municipality, Wudi (Shandong), and Shenzhen Bao' an District (Guangdong).

The highest coverage configurations were S2 (multi-level) and S1 (meso-micro). Notably, S2 lacked professional integration, while S1 lacked system and functional integration, suggesting that policy indicators for these dimensions remain underdeveloped in China' s integrated service systems.

**2.3 Robustness Check** We increased the consistency threshold from 0.9 to 0.95, which yielded identical pathway configurations, confirming result robustness.

## Discussion

This study identified four configurations that enhance treatment-prevention integration effects within integrated service system contexts, categorized as multi-level and meso-micro integration pathways. Key findings include:

First, multi-level integration represents the optimal pathway, with two of four configurations following this pattern and the highest-coverage path being multi-level. This suggests that multi-level integration, which relies on integrated service systems providing comprehensive, lifelong services coordinated across institutions, is more effective than single-pathway approaches like family doctor services or chronic disease management alone.

Second, service integration serves as a foundational condition across all pathways. As a micro-level variable, it represents the basic mechanism for achiev-

ing treatment-prevention integration by providing continuous, comprehensive services from prevention to rehabilitation, including chronic disease control, maternal-child health, elderly care, traditional Chinese medicine, and health education.

Third, the highest-coverage configurations lacked professional, system, or functional integration, indicating underdeveloped policy indicators in these areas. Possible reasons include insufficient integration efforts at macro and meso levels and inadequate attention to supporting elements. Some regions have yet to develop locally appropriate funding integration mechanisms or sufficiently emphasize performance assessment and staff incentives.

### Policy Recommendations

Based on these findings, we propose the following recommendations to enhance treatment-prevention integration:

1. **Leverage China's distinctive integrated service systems.** Multiple effective pathways exist within medical alliances and medical communities. Prioritize multi-level integration configurations that achieve balanced development across macro, meso, and micro levels. Promote coordinated development of medical, public health, and medical insurance systems; facilitate horizontal and vertical institutional integration between public health and medical institutions; cultivate integrated general practitioners; and provide continuous, people-centered services from prevention to rehabilitation.
2. **Fully exploit service integration's foundational role.** Place service integration as the top priority, delivering full-cycle, comprehensive services through medical alliances and communities, incorporating chronic disease control, maternal-child health, elderly care, traditional Chinese medicine, and health education.
3. **Draw on multi-level integration successes to balance policy indicators and improve integration dimensions.** For system integration, use medical alliances to promote balanced resource allocation. For professional integration, strengthen training, develop integrated general practitioners, and open personnel exchange channels. For functional integration, link performance directly to integration efforts; explore locally appropriate funding integration through payment reform; and implement financial incentives to motivate grassroots public health workers.

### Conclusion

This study innovatively applied QCA to analyze 15 typical treatment-prevention integration cases within integrated service system contexts. Based on the Rainbow Model, we examined differentiated policy combinations across macro, meso, micro levels and supporting elements, revealing core conditions affecting inte-

gration outcomes. Our findings broaden research perspectives and provide references for exploring integration mechanisms and pathways during the 14th Five-Year Plan period, offering valuable lessons for other regions developing Healthy China-aligned treatment-prevention integration mechanisms.

**Author Contributions:** HU Meili conceptualized the study, designed the research protocol, and drafted the manuscript; SHEN Dou implemented the research process and conducted data analysis; ZHANG Qian collected literature and performed investigations; LI Hongli, YANG Wen, YANG Jinlan, and GU Fang cleaned data and collected materials; LIU Yuehua revised the final version and assumed overall responsibility for the paper.

**Conflict of Interest:** The authors declare no conflicts of interest.

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