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Research Advances and Innovative Optimization Routes of Midwifery Models for Advanced-Age Pregnant Women

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ABSTRACT

Advanced-age parturients (maternal age≥35years at delivery) have become a key population for maternal and infant safety protection due to age-related physiological decline and high incidence of pregnancy complications (e.g., pregnancy-induced hypertension, gestational diabetes mellitus). With the global trend of delayed childbearing and the implementation of China's three-child policy, the number of advanced-age parturients has continued to rise. The traditional physician-led single midwifery model can no longer meet their individualized care needs. This article systematically reviews the research status of midwifery models for advanced-age parturients at home and abroad from 2019 to 2025, analyzing the application scenarios, implementation effects, and existing limitations of various models from two dimensions: "typical international models" (obstetrician-led care, midwife-led continuous care, group prenatal care, etc.) and "domestic innovative practices" (group-based prenatal care, midwife clinics, integrated delivery rooms, MDT multidisciplinary collaboration, etc.). It focuses on comparing the differential advantages of different models in reducing the cesarean section rate, decreasing postpartum complications, and improving the psychological status of advanced-age parturients, and identifies core issues in domestic models, such as "uneven resource allocation, inconsistent evaluation standards, and shortage of midwives". Based on this, an optimization path of "midwife-centered multidisciplinary collaborative model" is proposed, including improving the primary-level service network, establishing a unified evaluation system, and strengthening midwife competency training. This study aims to provide references for enhancing maternal and infant outcomes of advanced-age parturients and promoting the high-quality development of obstetric care.

1. Background

The International Federation of Gynecology and Obstetrics (FIGO) defines advanced-age pregnancy as maternal age⩾35 years at delivery. Due to reduced ovarian function and decreased vascular elasticity, this population has a 2-3 times higher incidence of complications (e.g.,pregnancy-induced hypertension, gestational diabetes) than parturients of optimal childbearing age. Their cesarean section rate is more than twice that of optimal-age parturients, and they face significantly increased risks of postpartum pelvic floor dysfunction, anxiety, and depression [10-13]. In China, after the implementation of the two-child policy in 2015, the proportion of parturients aged ⩾ 35 years increased from 10.2% to 15.6%. With the launch of the three-child policy in 2021, this proportion has further risen, making the traditional physician-led single midwifery model inadequate to meet their individualized care needs [3-8].

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2. Materials and Methods

2.1. Identification of Research Questions

The specific research questions are as follows: ①What are the reproductive risks of advanced-age pregnant and parturient women? ② What are the midwifery models for advanced-age parturients? ③What are the potential application values and limitations of different midwifery models? ④What are the strategies and suggestions for the application of midwifery models in advanced-age pregnant and parturient women?

2.2. Inclusion and Exclusion Criteria for Literature

Inclusion Criteria: ①Literature content related to nursing models for advanced-age parturients; ②Full text of the literature available; ③Literature published in Chinese or English.Exclusion.

Criteria: ①Literature with duplicate publication, incomplete information or data; ②Literature with unavailable full text; ③Non-academic research articles such as editorials, commentaries, news briefs, and opinion pieces.

2.3. Search Databases

Computerized searches were conducted from the inception of each database to April 2024, and the search results were limited to Chinese and English publications, clinical trials, etc.

PubMed, Web of Science, OVID-Embase, The Cochrane Library, SinoMed, ScienceDirect, BMJ, UpToDate, and JAMA (Journal of the American Medical Association).CNKI, Wanfang Data, VIP Chinese Journal Service Platform, CBM , and the Chinese Medical Association Journal Database.

2.4. Literature Retrieval

The search terms included "advanced-age parturient", "elderly parturient", "midwifery model", "midwifery", "midwifery care", "nursing plan", "care plan", "pregnant and parturient women", "postpartum women", "puerpera", "individualized nursing plan", "perinatal women", "high-risk pregnant and parturient women", "antenatal care", "prenatal care", "nursing science", "nursing", and "nursing care".

In addition, to ensure comprehensiveness of the retrieval, supplementary manual searches were conducted for references included in relevant meta-analyses, references that might be contained in relevant reviews, and references included in the final studies.

The specific literature retrieval methods are as follows:

3. Reproductive Risk Characteristics of Advanced-Age Parturients

The reproductive risks of advanced-age parturients span the entire cycle of "pregnancy-delivery-postpartum", manifested in three key dimensions. These risk characteristics also determine their specific needs for midwifery models:

3.1. Pregnancy Stage: High Incidence of Complications

Affected by age-related physiological decline, advanced-age parturients have poor ovarian function, with an early miscarriage risk 1.8-2.5 times higher than that of optimal-age parturients. The incidence of pregnancy-induced hypertension and gestational diabetes is 2.3 times and 3.1 times that of optimal-age parturients, respectively. They are also prone to high-risk conditions such as placenta previa and premature rupture of membranes, requiring midwifery models to have the capabilities of "early risk screening and dynamic monitoring" [10-11].

3.2. Delivery Stage: High Risk of Adverse Outcomes

Advanced-age parturients experience weakened uterine contractility, which easily leads to prolonged labor and dystocia, resulting in a significantly increased cesarean section rate. For parturients over 40 years old, the cesarean section rate is more than twice that of optimal-age parturients, and the mortality rate related to cesarean section is as high as 15% [12]. Meanwhile, due to decreased vaginal elasticity, the incidence of complications such as perineal laceration and postpartum hemorrhage is 30%-40% higher than that of optimal-age parturients, requiring midwifery models to focus on "labor optimization and emergency management of complications" [11-12].

3.3. Postpartum Stage: Prominent Rehabilitation and Psychological Issues

Advanced-age parturients suffer from more severe postpartum pelvic floor dysfunction, with the incidence of pelvic floor muscle relaxation and postpartum urinary incontinence reaching 35%-50%, significantly higher than the 15%-20% of optimal-age parturients [12-13]. In addition, due to concerns about their own fertility and maternal-infant health, their incidence of antenatal anxiety and postpartum depression is 25%-30% and 15%-20%, respectively, requiring midwifery models to cover "postpartum rehabilitation guidance and psychological counseling" [13].

4. Midwifery Models for Parturients

4.1. Obstetrician-Led Care Model

4.1.1. Core Characteristics

Obstetricians play a central role in developing prenatal care and delivery plans, with nurses and midwives assisting in implementation. The model is divided into public obstetric care (provided by public hospitals without designated medical staff) and private obstetric care (provided by private physicians throughout the process). In countries such as Australia and Ireland, more than 30% of advanced-age parturients choose private obstetric care [17-19].

4.1.2. Adaptability Analysis for Advanced-Age Parturients

① Advantages:Private care offers strong continuity, allowing advanced-age parturients to participate in discussions on delivery plans. The rate of newborn admission to the Neonatal Intensive Care Unit (NICU) is 18%-22% lower than that of public care, and the satisfaction with prenatal examinations exceeds 85%. In public care, obstetrician-led intensive care units help reduce the mortality rate of high-risk advanced-age parturients, with a vaginal delivery rate 12%-15% higher than that of private care [17-18, 20].

② Limitations: Private care involves a high rate of obstetric interventions. The incidence of selective cesarean section and episiotomy in advanced-age parturients is 50%-60% higher than that in public care, and the postpartum hospital stay is prolonged. Public care does not allow parturients to choose medical staff; instead, prenatal examinations and delivery care are provided by different doctors and midwives, resulting in relatively low care experience satisfaction (only 65%-70%), which is lower than that of private care [18-19, 22].

4.2. Group Prenatal Care (GPC) Model

4.2.1. Core Value for Advanced-Age Parturients

① Improved Physiological Outcomes: Compared with traditional models, GPC reduces the cesarean section rate and episiotomy rate by 15%-20%, shortens the total labor duration by 1.5-2 hours, and decreases postpartum hemorrhage within 2 hours by 20%-25%. It also lowers the preterm birth rate by 10%-12% and the incidence of low birth weight infants by 8%-10% [32, 34, 39].

② Enhanced Psychological Status and Self-Management Ability: Peer support alleviates loneliness, reducing antenatal anxiety and depression scores by 20%-30%. Health education improves self-management ability, increasing the rate of adequate glycemic control in parturients with gestational diabetes by 20%-25% [33, 38-39].

③ Resource Adaptation Advantages: In low-income countries or resource-scarce regions, GPC reduces costs through "centralized services", increasing the coverage rate of prenatal examinations for advanced-age parturients from 45% to 78% [33].

4.3. Family Physician-Led and Multidisciplinary Collaborative Models

The family physician-led model is suitable for low-risk advanced-age parturients. Family physicians master the parturients' health history through long-term follow-up but need to refer parturients to hospital obstetricians for management of complications and delivery. The multidisciplinary collaborative model targets high-risk advanced-age parturients (e.g., pernicious placenta previa). A team consisting of obstetricians, midwives, and anesthesiologists jointly develops plans, with a 100% prenatal consultation rate, improving the efficiency of postpartum complication management by 30% [23, 71].

5. Innovative Practices of Midwifery Models for Advanced-Age Parturients in China

Drawing on international experience and combining the care needs of advanced-age parturients and domestic medical resource characteristics, five localized models have been innovatively developed, focusing on addressing issues such as "insufficient continuity, excessive intervention, and limited primary-level coverage":

5.1. Midwife Clinic Model

5.1.1. Core Characteristics

Midwives with more than 5 years of experience and professional qualifications provide one-on-one services for advanced-age parturients at 20-40 weeks of gestation, including delivery mode assessment, prenatal nutrition guidance, and postpartum rehabilitation planning. Some hospitals have established "midwife-physician joint clinics" to manage complications [40-45]. Currently, this model has been promoted in tertiary hospitals in 15 provinces and cities (e.g., Hubei, Shanghai), with coverage in primary-level institutions of less than 10% [43-44].

5.1.2. Implementation Effects and Limitations

① Effects: The vaginal delivery rate of advanced-age parturients increases by 18%-22%, the incidence of postpartum hemorrhage and neonatal asphyxia decreases by 25% and 15%, respectively, and care satisfaction exceeds 88% [46-48].

② Limitations: There is no unified service standard (e.g., consultation starts at 28 weeks of gestation in some hospitals and in the first trimester in others), and no clear standards for staffing and evaluation indicators. Primary-level institutions struggle to implement the model due to insufficient human resources [48-50].

5.2. Primary Midwifery and Continuous Care Models

5.2.1. Primary Midwifery Model

Optimized from doula-supported delivery, an experienced midwife provides full-course one-on-one accompaniment for advanced-age parturients during delivery, including psychological counseling, free position guidance, and post-delivery observation for 2 hours.

Combined with painless delivery technology, it reduces pain scores [51-56]. After implementation, the total labor duration is shortened by 2-3 hours, the postpartum hospital stay is reduced by 1 day, and the incidence of maternal and infant complications decreases by 20%-25% [52-53].

5.2.2. Continuous Care Model

① Extending from "delivery"to"pregnancy-postpartum": During pregnancy, follow-up visits are conducted every 2 weeks to guide weight management and complication prevention; 7 days after delivery, home visits are conducted to assess pelvic floor function and breastfeeding status. When applied to prenatal weight management, this model reduces the incidence of gestational diabetes in advanced-age parturients by 18% and the incidence of macrosomia by 12% [59-60].

② Limitation: The ratio of midwives to women of childbearing age in China is approximately 1:4000, far lower than the international standard of 1:1000. The shortage of human resources means the model can only cover high-risk advanced-age parturients, and primary-level midwives lack the ability to identify complications [57-58].

5.3. Integrated Delivery Room (LDR) Model

5.3.1. Core Characteristics

Integrating "Labor-Delivery-Recovery" in a single family-style room, the model is led by midwives with physician intervention as needed, suitable for low-risk advanced-age parturients [61-64].

5.3.2. Implementation Effects and Limitations

① Effects: The satisfaction of advanced-age parturients with the delivery environment exceeds 92%, and anxiety scores decrease by 30%-35%. Combined with unprotected perineal midwifery technology, the incidence of perineal trauma decreases by 25%, and the cesarean section rate drops to 28%-32% [62-64].

② Limitations: High equipment costs mean the model is only implemented in tertiary hospitals, with coverage in primary-level institutions of less than 5%. Service fees are 50%-100% higher than those of ordinary delivery rooms, and appointment difficulty is high [61, 65].

5.4. MDT Multidisciplinary Collaborative Model

5.4.1. Core Characteristics

Targeting high-risk advanced-age parturients (e.g., gestational diabetes, pernicious placenta previa), a team consisting of obstetricians, midwives, anesthesiologists, dietitians, and psychologists develops delivery plans during pregnancy, provides collaborative management during delivery, and conducts joint rehabilitation after delivery [68-72].

5.4.2. Implementation Effects

For parturients with pernicious placenta previa, the postpartum hemorrhage rate decreases from 35%-40% to 15%-20%. For parturients with gestational diabetes, the rate of adequate glycemic control increases by 30%. The response time of the multidisciplinary team is shortened to 5-10 minutes, an improvement of more than 60% compared with the traditional model [70-72].

6. Optimization Path of Midwifery Models for Advanced-Age Parturients

Based on the reproductive risk characteristics of advanced-age parturients and existing problems, and combining domestic and international practical experience, an optimization framework of "midwife-centered multidisciplinary collaborative model" is proposed, including four key directions:

6.1. Building a "Full-Cycle Multidisciplinary Collaborative" Service System

Integrating the "peer support" of GPC, "high-risk management" of MDT, and "full-cycle coverage" of continuous care to form a closed-loop service of "prenatal care-intrapartum assistance-postpartum rehabilitation":

① Pregnancy Stage: Midwives lead basic care (weight and blood glucose monitoring), and MDT consultations are initiated when complications are identified (physicians develop treatment plans, dietitians adjust diets);

② Intrapartum Stage: Midwives lead the delivery process, with physicians intervening as needed (e.g., emergency cesarean section) and anesthesiologists providing pain relief support.

③ Postpartum Stage: Midwives conduct rehabilitation assessments, and psychologists provide intervention for depressive symptoms, achieving "early risk identification, precise intervention, and personalized rehabilitation" [70-72].

6.2. Improving the Primary-Level Service Network

① Resource Downward Allocation: Promote "simplified GPC" (once every 2 weeks, 60 minutes per session) and "telemedicine MDT consultations" (connecting with tertiary hospital teams) in county-level hospitals and community health service centers to make up for the lack of capacity in primary-level institutions [33, 44].

② Cost Control: Launch a "basic version" of integrated delivery rooms (reducing high-end facilities while retaining core functions) to lower service prices and improve accessibility for advanced-age parturients in primary-level areas [65].

6.3. Establishing a Unified Standard System

Led by the National Health Commission, joint efforts with universities and hospital experts to develop the Standards for Midwifery Models for Advanced-Age Parturients:

①. Service Processes: Clarify core links such as midwife clinics starting consultations at 20 weeks of gestation and primary midwives providing full-course accompaniment;

②. Staff Qualifications: Require primary midwives to have more than 5 years of obstetric experience and pass training on complication identification for advanced-age parturients;

③. Evaluation Indicators: Establish a three-dimensional evaluation system centered on "maternal and infant outcomes (cesarean section rate, complication rate) + psychological status (anxiety/depression scores) + satisfaction" [48-50].

6.4. Strengthening the Construction of Midwife Teams

Expanding Training Scale: Universities add courses on "advanced-age parturient care" to train primary-level midwives in a targeted manner; Specialized Competency Training: Conduct training on "complication identification for advanced-age parturients, psychological counseling, and multidisciplinary collaboration" to improve professional capabilities; Optimizing Human Resource Allocation: Attract midwives to work in primary-level areas through policy incentives (e.g., subsidies, priority promotion) to alleviate the shortage of human resources [57-58].

7. Conclusion

The innovation and optimization of midwifery models for advanced-age parturients must focus on "adapting to risk characteristics and addressing clinical pain points". Domestic and international practices show that models characterized by "midwife-centered care, multidisciplinary collaboration, and full-cycle coverage" can effectively reduce the incidence of adverse maternal and infant outcomes and improve care satisfaction. Although problems such as uneven resource allocation and lack of standards exist, the goals of "localizing international experience, standardizing domestic practices, and popularizing standardized services" can be gradually achieved by building a multidisciplinary collaborative system, improving the primary-level network, unifying standards, and strengthening midwife teams. The innovation and optimization of midwifery models for advanced-age parturients is a systematic project that requires integrating medical resource endowments, demographic characteristics, and parturients' actual needs. Through continuous improvement of service quality and coverage, the overall capacity for maternal and infant safety protection of advanced-age parturients will be enhanced, providing strong support for the high-quality development of obstetric care. In the future, further multi-center randomized controlled trials are needed to verify the long-term effects of the optimized models.

Author Contribution

Feifei Chen is the sole author of this manuscript and was responsible for the conceptualization, literature review, analysis, drafting, and final approval of the article.

Compliance with Ethical Standards

This review article is based entirely on previously published studies and does not involve any original research with human participants or animals. Therefore, ethical approval and informed consent were not applicable.

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Competing Interest declaration

The author declares no conflicts of interest.

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Appendices

Table 1

Chinese Databases	English Databases
China National Knowledge Infrastructure（CNKI）	PubMed、Web of science、OVID-Embase
VIP Chinese Journal Service Platform	The Cochrane library、Sinomed、ScienceDirect
Wanfang Data Knowledge Service Platform	IEEE、ProQuest、Spring link、EBSCO、JSTOR、
China Biology Medicine Disc）（CBM）	BMJ、Taylor、UP to date、Jama、
Chinese Medical Association Journals	NEJM、Scopus、Willy、SAGED

Table 2

Database	Search Formula
Taking "PubMed" as an example	#1 advanced-age parturient [MeSH Terms]
	#2 midwifery model/midwifery / midwifery care/nursing plan / care plan/pregnant and parturient women [Title/Abstract]
	#3 #1 OR #2
	#4puerpera/individualized nursing plan/perinatal women/high-risk pregnant and parturient women/ perinatal women/antenatal care / prenatal care/nursing science / nursing/ nursing care [Title/Abstract]
	#5#1 OR #4