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A Qualitative Study on the Care Needs of Pregnant Women with HBV Infection Based on the Kano Model

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Abstract

Background

Hepatitis B virus (HBV) infection is a chronic infectious disease requiring supportive care during the perinatal period. The Kano model provides a theoretical framework for identifying patients' care needs. However, the core needs of pregnant women with HBV infection at different perinatal stages have not been fully explored.

Methods

A purposive sampling method was employed to recruit 18 pregnant women with HBV infection who attended the Department of Obstetrics at Nanjing Second Hospital from March to May 2025. Semi-structured interviews were conducted, and the interview data were collated and analyzed using Colaizzi's seven-step phenomenological analysis method.

Results

A total of 18 pregnant women with HBV infection were enrolled in this study. Three thematic categories were identified: (1) Must-be needs — including needs for knowledge of mother-to-child transmission (MTCT) prevention, breastfeeding knowledge, antiviral therapy knowledge, and privacy protection; (2) One-dimensional needs — including needs for psychological support and emotional counseling, as well as healthcare service accessibility and social security; and (3) Attractive needs — including needs for online medical services, personalized health management, and empowerment and value reconstruction.

Conclusion

The introduction of the Kano model may facilitate the development of individualized support strategies tailored to patients' needs, thereby potentially improving the perinatal care experience and maternal–infant health outcomes among pregnant women with HBV infection.

1. Introduction

Hepatitis B virus (HBV) infection remains one of the most significant global public health challenges, accounting for approximately one million deaths annually. Mother-to-child transmission (MTCT) constitutes the predominant route of HBV acquisition worldwide [1]. As the country bearing the heaviest burden of HBV-related disease globally, China has an estimated 70 million individuals living with chronic HBV infection, among whom the prevalence among women of childbearing age ranges from 7% to 8% [2,3]. Previous studies have indicated that approximately 40%–50% of newly infected cases acquire HBV through MTCT, which may subsequently progress to chronic hepatitis, cirrhosis, or hepatocellular

carcinoma, thereby imposing substantial morbidity and mortality burdens on both families and society at large [4]. In response to this pressing issue, the National Health Commission of China has promulgated the National Standards for the Prevention of Mother-to-Child Transmission of HIV, Syphilis, and Hepatitis B, which provides an institutional framework for the systematic prevention of MTCT [5].

Nevertheless, prior research has predominantly focused on quantifiable biomedical outcomes, such as antiviral efficacy and MTCT interruption rates, with comparatively insufficient attention paid to the psychological and social dimensions of care during the perinatal period. Such a narrow focus limits the ability to address the diverse and multifaceted care needs of this population [6]. Accumulating evidence suggests that pregnant women with HBV infection experience significantly greater physiological, psychological, and social stressors than their uninfected counterparts, and are consequently at higher risk for adverse pregnancy outcomes [7,8]. These compounded challenges give rise to a complex, heterogeneous, and high-level pattern of care demands that extends beyond conventional biomedical parameters.

A study conducted in Africa revealed that, at the time of initial diagnosis, healthcare counseling and guidance provided to women with chronic hepatitis B were predominantly oriented toward neonatal care, whereas systematic information regarding maternal viral load monitoring, liver function testing, and the optimal timing of antiviral therapy was frequently omitted [9]. Similarly, an Indonesian study identified structural barriers encountered by HBV-infected parturient women during healthcare-seeking processes, including prolonged hospital waiting times, insufficient continuity of care information, and limited health insurance coverage [10]. Furthermore, research from Melbourne demonstrated that nearly all HBV-infected women faced varying degrees of social isolation, with stigmatization and marginalization being particularly pronounced following the disclosure of their infectious status [11].

Notably, existing studies have predominantly explored the care needs or psychological experiences of pregnant women with HBV infection through holistic descriptions [9,11], with limited systematic analysis of the hierarchical structure underlying different types of needs. The Kano model, a need-classification tool originally derived from the field of quality management, enables precise identification of key components in care delivery and facilitates the prioritization of resource allocation [12], thereby addressing the aforementioned research gap. This model has been successfully applied to the hierarchical identification and process optimization of care services among patients with chronic diseases, older adult populations, and nursing service delivery [13–15]. Against this backdrop, the present study employs a qualitative interview approach, incorporating the Kano model to systematically stratify and attribute the perinatal care needs of pregnant women with HBV infection. The aim is to comprehensively identify their core needs and priority intervention targets at various perinatal stages, thereby providing a reference for the development of patient-centered, tiered, and systematic perinatal intervention strategies that may enhance the care experience and improve pregnancy outcomes.

2 Methods

2.1 Study Design and Setting

This study employed a qualitative, descriptive design to investigate the hospital-based experiences of pregnant women with HBV infection seeking care at an infectious disease hospital. The current investigation focused on exploring the perinatal experiences of this population. Prior to the interviews, the purpose, methods, and significance of the study were explained to all participants. Confidentiality was assured, and participants were informed that the data would be used solely for scientific research purposes. Interview appointments were scheduled at the convenience of the participants, and all interviews were conducted in a quiet, private office, lasting between 30 and 60 minutes each. Each participant received a compensation of 50 RMB (approximately 7 USD) for their time and participation.

2.2 Participants

A total of 18 pregnant women with HBV infection were recruited from the Department of Obstetrics and Gynecology at Nanjing Second Hospital between March and May 2025. The inclusion criteria were as follows: (1) age ≥ 18 years; (2) ability to understand and communicate fluently in Chinese; (3) clinically confirmed diagnosis of chronic HBV carrier status with spontaneous conception; and (4) provision of informed consent and voluntary participation in the study. Initially, 20 potential participants were approached, of whom two were excluded for not meeting the eligibility criteria.

The baseline demographic and clinical characteristics of the enrolled participants are presented in Table 1.

No	Age	Gestational age (weeks)	Education level	Antiviral therapy	HBV infection status
P1	29	37	Junior college	Yes	Chronic hepatitis
P2	26	37	Junior college	Yes	Chronic hepatitis
P3	37	40	Bachelor's degree	Yes	Carrier
P4	27	38	Bachelor's degree	Yes	Carrier
P5	29	17	Bachelor's degree	Yes	Chronic hepatitis
P6	31	39	Junior college	Yes	Carrier
P7	34	38	Bachelor's degree	Yes	Carrier
P8	33	37	Junior college	Yes	Carrier
P9	33	37	Bachelor's degree	Yes	Chronic hepatitis
P10	31	37	Junior college	No	Carrier
P11	27	39	Bachelor's degree	Yes	Carrier
P12	37	38	Junior high school or below	Yes	Carrier
P13	35	40	Master's degree	Yes	Chronic hepatitis
P14	34	30	Junior college	Yes	Carrier
P15	30	39	Bachelor's degree	Yes	Carrier
P16	25	38	Bachelor's degree	Yes	Chronic hepatitis
P17	36	31	Bachelor's degree	Yes	Carrier
P18	37	28	Junior college	Yes	Carrier

2.3 Data Collection

Semi-structured interviews were conducted using an interview guide developed based on a review of the existing literature regarding healthcare experiences of pregnant women with HBV infection, as well as the research team's clinical expertise in perinatal care for infectious disease patients. The interview guide comprised the following open-ended questions:

(1) Could you please describe your experiences and feelings during pregnancy, including physical, psychological, and healthcare-seeking aspects?

(2) What has been your greatest concern or distress throughout this process, and what strategies have you employed to alleviate it?

(3) What is your level of knowledge regarding HBV carrier status and prevention of mother-to-child transmission (PMTCT)? Through what channels have you obtained relevant information and precautions?

(4) What impact has your condition had on you and your family?

(5) At the current stage of your illness and treatment, what kind of support or assistance do you most desire?

(6) Do you feel that the care you are currently receiving adequately meets your needs? If not, what additional support do you believe healthcare providers, family members, and friends could offer to better address your needs and facilitate your recovery?

2.4 Data Analysis

Following each interview, the audio recordings were transcribed verbatim into written text by the research team within 24 hours. The transcripts were read repeatedly to achieve data immersion and facilitate subsequent integration of the interview content. Data analysis was conducted using Colaizzi's seven-step phenomenological analysis method, which involved the following procedures: (1) reading all transcripts to acquire a general sense of the content; (2) extracting significant statements pertaining to the phenomenon under investigation; (3) formulating meanings from these significant statements; (4) clustering the formulated meanings into themes; (5) integrating the resulting themes into an exhaustive description of the phenomenon; (6) condensing the exhaustive description into a fundamental structure; and (7) returning the findings to participants for validation (member checking). NVivo 12.0 software was employed for data management and to support the analytical process.

Two researchers independently and repeatedly compared, verified, analyzed, and categorized the data. In cases of disagreement, discussions were held with the broader research team until a consensus was reached on the final coding scheme and thematic structure.

2.5 Ethical Approval

This study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Nanjing Second Hospital (Approval No: 2025-LS-ky029). All participants provided written informed consent prior to enrollment and were assured of their right to withdraw from the study at any time without any consequence to their clinical care. Confidentiality of all personal information was strictly maintained throughout the research process.

3 Results

Three overarching thematic categories were identified through the analysis: (1) must-be needs — encompassing needs for knowledge regarding prevention of mother-to-child transmission (PMTCT), breastfeeding knowledge, antiviral therapy knowledge, and privacy protection; (2) one-dimensional needs — encompassing needs for psychological support and emotional counseling, as well as healthcare service accessibility and social security; and (3) attractive needs — encompassing needs for online medical services, personalized health management, and patient empowerment and value reconstruction.

3.1 Must-Be Needs of Pregnant Women with HBV Infection

3.1.1 Need for Knowledge and Guidance Regarding Prevention of Mother-to-Child Transmission

The majority of participants demonstrated limited understanding of the effectiveness of mother-to-child transmission (MTCT) prevention and expressed considerable apprehension regarding the potential adverse effects of antiviral prophylaxis on their neonates, underscoring an urgent need for targeted health education on PMTCT.

One participant (P1) described her anxiety surrounding routine prenatal monitoring: "Every prenatal check-up feels like a hurdle—I am constantly worried that my viral load might have increased. Although my doctor told me that the success rate of MTCT prevention is now very high, I still search online and come across negative stories, which keep me awake all night."

Another participant (P2) articulated her ambivalence regarding antiviral therapy adherence: "I was diagnosed with HBeAg-positive chronic hepatitis B during pregnancy, and the doctor prescribed antiviral medication for daily use to prevent transmission. However, I am concerned about the potential effects on my baby. I secretly stopped taking the medication for two days, but then I was afraid that all my efforts would be wasted, so I resumed taking it immediately. I feel deeply conflicted inside."

The same participant (P3) further expressed her need for timely feedback on treatment outcomes: "We have now completed the combined antiviral therapy and immunoprophylaxis regimen. I just want to know whether the MTCT prevention has been successful and when the final results will be available."

3.1.2 Need for Health Guidance on Breastfeeding Knowledge

Many participants held misconceptions regarding the safety of breastfeeding in the context of HBV infection and expressed a strong need for professional, evidence-based breastfeeding guidance. Despite being informed that breastfeeding was permissible under certain clinical conditions, participants remained apprehensive about the potential risk of viral transmission through breast milk.

Participant P4 described her lingering doubts despite receiving medical advice: "My doctor told me that breastfeeding is safe because my viral load is low, but no one could give me an absolute guarantee.

What if the virus is also present in my breast milk? Wouldn't all my previous efforts to protect my baby be undone if I breastfeed?"

Participant P3 vividly articulated the profound emotional torment associated with breastfeeding decisions: "The pain of cracked nipples is excruciating, but what hurts even more is the psychological anguish. Whenever I look at my baby, my mind races with the worst-case scenarios: What if this single feed transmits the virus to him? Am I showing him love, or am I harming him?"

3.1.3 Need for Knowledge Regarding Antiviral Therapy

Current evidence indicates that antiviral therapy administered to pregnant women with HBV DNA > 10^6 IU/mL or HBeAg-positive status can effectively interrupt mother-to-child transmission and maximally suppress viral replication, thereby improving clinical outcomes. However, participants in this study demonstrated substantial informational gaps and expressed urgent needs regarding multiple aspects of antiviral therapy, including its necessity, potential adverse effects, optimal timing of initiation, postpartum discontinuation schedules, and post-withdrawal viral load monitoring plans.

Participant P5 expressed confusion about the duration of antiviral treatment despite achieving satisfactory viral suppression: “At the 36-week check-up, my viral load had been suppressed to a very low level. I was quite puzzled at the time—do I need to keep taking the antiviral medication indefinitely?”

Participant P6 articulated her concerns about the potential systemic effects of antiviral agents: “I have been told that the side effects of antiviral drugs are minimal, but I still worry about potential damage to my liver and kidneys, as well as any adverse impact on my baby.”

3.1.4 Need for Privacy Protection

Several participants expressed concerns regarding the potential disclosure of their HBV status by healthcare providers during the care process, which they feared could precipitate family conflicts and social discrimination. Consequently, there exists a pressing need for the refinement of privacy protection protocols and the establishment of robust patient-trust mechanisms.

Participant P7 articulated her apprehension about inadvertent disclosure to extended family members: “My in-laws are unaware of my condition—only my husband knows. I am terrified that they might pick up on something from the doctors' or nurses' conversations, or that they might accidentally see my medical records or laboratory reports. They might not be able to accept it, and they would also worry about me transmitting the virus to the baby.”

Participant P8 described her concerns regarding workplace stigma: “To be honest, I have come to terms with my diagnosis, but I do not want my colleagues to find out. There is still so much misunderstanding about this disease in society. Once it gets out, even if people do not say anything to my face, I know there will be gossip and distancing behind my back. When we eat together or work side by side, they will secretly harbor doubts. Over time, I would also feel out of place.”

Participant P9 expressed her anxiety about future employment prospects: “I worry that when I look for a job in the future, employers will discriminate against me because I have hepatitis B.”

3.2 One-Dimensional Needs of Pregnant Women with HBV Infection

3.2.1 Need for Psychological Support and Emotional Counseling

3.2.1.1 Need for Family Support to Cope with Negative Emotions

The majority of participants experienced significant uncertainty regarding pregnancy outcomes and fetal health as a result of their HBV infection, with negative emotions considerably more pronounced than those typically observed in uninfected pregnant women. Throughout all stages of pregnancy and the puerperium, participants expressed a strong need for understanding, support, and companionship from family members.

Participant P10 articulated the emotional distress caused by subtle yet hurtful family behaviors: “The kinder my mother-in-law treats me, the more guilty I feel. I wish they would truly educate themselves about this disease and understand that daily activities like sharing meals do not transmit the virus—rather than pretending everything is fine to my face while secretly separating my tableware. That feeling of ‘being treated specially’hurts even more than being scolded outright.”

Participant P11 expressed persistent anxiety despite medical reassurance: “My doctor told me that the MTCT prevention rate is very high, but I still cannot stop worrying about my baby becoming infected.”

Participant P12 emphasized the indispensable role of family companionship: “I need my family by my side. I simply cannot get through this on my own.”

3.2.1.2 Need for Peer Support

Participants perceived that exchanging experiences with peers in similar situations could effectively alleviate the sense of isolation during the perinatal period. Consequently, there was a perceived need for the development of systematic and professional online management platforms for pregnant women with HBV infection, such as social media-based support groups.

Participant P13 described the reassurance gained from connecting with peers: “I joined a support group for pregnant women with HBV infection. Seeing other mothers share their successful experiences with MTCT prevention really put my mind at ease.”

Participant P14 expressed her sense of isolation due to the perceived scarcity of peers with similar conditions: “I feel that there are very few other pregnant women around me with HBV infection. It makes me feel quite alone.”

3.2.2 Need for Healthcare Service Accessibility and Social Security

3.2.2.1 Need for Financial Support

Although current health insurance policies in China provide free screening, free MTCT prevention services, and coverage under standard maternity insurance for pregnant women with HBV infection, the scope of these free services remains limited to the basic requirements for MTCT prevention. The existing reimbursement mechanisms—including fixed allowances for antenatal examinations, cost-containment measures for inpatient care, and cross-regional medical insurance policies—have not yet systematically accounted for the full spectrum of monitoring and treatment costs incurred by HBV-infected women throughout their pregnancy trajectory.

Participant P15 acknowledged the existing support but highlighted the financial gaps: “Free screening and MTCT prevention services have indeed eased the financial burden. However, the costs of repeated viral load testing and antiviral medications during pregnancy are still quite substantial, and these are not currently covered by our health insurance.”

Participant P16 described the limitations of fixed antenatal reimbursement quotas: “The antenatal examination allowance is set based on routine pregnancy care. For those of us who require more frequent monitoring, once the quota is exhausted, we have no choice but to pay out-of-pocket or use the general outpatient scheme.”

Participant P17 articulated the financial challenges associated with cross-regional care: “I chose to deliver in a different city to access better medical facilities. However, the deductible and reimbursement rates for cross-regional health insurance are quite different from those in my home city, which adds to the financial strain.”

3.2.2.2 Need for Health Education and Knowledge Dissemination on HBV

Participants reported significant knowledge deficits regarding HBV transmission and prevention, not only among themselves but also within their families and communities. These misconceptions were identified as a major source of social stigma and intrafamilial tension, highlighting an urgent need for targeted public health education initiatives that convey accurate scientific information, dispel persistent myths, and promote equitable attitudes toward those affected by HBV.

P18 articulated a broad societal need for improved health literacy: “I wish there were more awareness campaigns about hepatitis B—so people could realize that it is not as frightening as they imagine, and that it is both preventable and treatable. For my mother-in-law's generation, many old misconceptions persist; they are alarmed at the mere mention of hepatitis.”

She elaborated on her family's uncertainty regarding basic prevention: “My family is unclear about how HBV spreads. They wonder whether routine interactions—sharing meals, shaking hands, working in the same office, or using communal bathrooms—could transmit the virus. They desperately need clear, evidence-based answers.”

She further described the challenge of navigating contradictory sources of information: “My relatives try to educate themselves through friends or online searches, but the information they come across is inconsistent and sometimes contradictory. They are left confused about whom to trust.”

3.2.2.3 Need for a Professional Medical Team

Multiple participants expressed concern and disappointment regarding the competence of healthcare providers at community or primary-level facilities. They reported that vague or noncommittal responses from these providers sometimes exacerbated their anxiety, underscoring an urgent need for access to specialized, knowledgeable, and confident medical teams.

Participant P19 recounted her experience at a community health center: “The doctors at the community clinic were friendly enough, but I really did not feel they understood hepatitis B. When I asked whether I could receive the immunoprophylaxis injection at their facility, they hesitated and said, ‘We are not sure whether you need it or not in your case.’”

She further described the psychological toll of an evasive response regarding pregnancy continuation: “I asked the community doctor whether I should continue with the pregnancy. She paused for a long time and then said, ‘We cannot guarantee anything—you will have to make the decision yourself.’ That response haunted me for an entire week, and I barely slept.”

3.2.2.4 Need for Continuity of Care

Participants expressed a strong need for ongoing guidance and support from healthcare professionals throughout all stages of pregnancy and the puerperium. This need became particularly salient upon discharge, when participants encountered numerous uncertainties regarding neonatal care practices, evaluation of infant MTCT prevention outcomes, and the optimal timing and location for postpartum follow-up assessments. These concerns underscore the necessity of structured continuity-of-care services for this population.

Participant P19 articulated her need for practical neonatal care guidance: “I feel quite uncertain about how to care for my baby—for instance, how to handle issues like milk regurgitation, heat rash, and diaper rash. It would be much more helpful if healthcare providers could come and teach me about these things and give me hands-on guidance.”

P19 further expressed confusion regarding post-discharge follow-up: “The nurse told me to ‘remember to come back for follow-up’ when I was discharged, but they did not specify when exactly I should go, which hospital I should visit, or what tests I needed to have done.”

3.3 Attractive Needs of Pregnant Women with HBV Infection

3.3.1 Need for Online Medical Services (Telemedicine)

Participants residing in remote areas or outside the city where the study hospital was located expressed a strong preference for telemedicine services. Given the perceived lack of HBV-specific expertise at local primary-care facilities and the substantial time and physical burden associated with traveling to tertiary hospitals, these women voiced a need for authoritative, remote guidance on a range of issues—including interpretation of antenatal test results, viral load monitoring, timing of medication initiation and discontinuation, and evaluation of infant MTCT prevention outcomes.

Participant P19 expressed enthusiasm for the convenience of telemedicine: “It would be wonderful to have access to online consultations. Whenever I have questions after a check-up, I could just ask my doctor online and get a quick response.”

She further elaborated on the practical challenges of in-person visits: “I come from another city. Every time I visit the hospital, it takes me several hours of travel. Being heavily pregnant, commuting back and forth is really exhausting. If online consultations were available, I would definitely choose that option without hesitation.”

3.3.2 Need for Personalized Health Management

Participants in this study exhibited considerable individual variability in viral load, liver function parameters, and medication responses, highlighting the need for tailored health management plans that are developed following comprehensive assessment of each patient's unique clinical profile.

Participant P20 articulated her desire for individualized follow-up schedules: “Each person's laboratory indicators are different, so the frequency of follow-up visits may also vary from person to person. I would like the doctor to give me a follow-up plan that is specifically tailored to my own condition.”

P20 further expressed her need for personalized treatment decision-making: “My liver function showed some fluctuations at the postpartum follow-up. I would like to know—based on my current viral load and liver function status—whether I should continue with watchful waiting or initiate pharmacological intervention.”

3.3.3 Need for Empowerment and Value Reconstruction

For pregnant women with HBV infection, the appeal of optimal care extends beyond the successful achievement of MTCT prevention to encompass psychological fulfillment through empowerment and value reconstruction—specifically, the need to be seen, heard, and respected as a whole person rather than merely as a clinical case.

Participant P20 expressed profound appreciation for the holistic care she received: “I never expected that the doctors and nurses would ask me, ‘How are you feeling emotionally?’ or ‘Does your family understand your situation?’ or even say, ‘You are doing such a great job managing your condition.’ In that moment, I felt that they were not just treating my disease—they were caring for me as a person.”

She further articulated her transformative journey from fear and uncertainty to resilience and self-affirmation: “In the past, I never dared to imagine that I could have a healthy baby. Now that my baby is perfectly healthy and I am doing well myself, I feel that I have overcome the most difficult hurdle in my life. After this, there is nothing that can intimidate me anymore.”

4. Discussion

The findings of this study reveal a clear three-tiered hierarchical structure of care needs among pregnant women with HBV infection, comprising must-be needs, one-dimensional needs, and attractive needs—a configuration that closely aligns with the Kano model originally proposed by Kano et al. [16]. The significance of this finding lies in its departure from previous approaches that treated maternal needs as a flat, enumerated list; instead, it elucidates the differentiated mechanisms through which distinct need types contribute to the formation of patient experiences. This stratified perspective enhances our understanding of the complexity and multidimensionality of care needs in this population, enables clear identification of the differentiated roles that each need type plays in shaping patient experiences, and establishes a clear priority hierarchy for care delivery.

4.1 Consolidating Core Knowledge of MTCT Prevention and Privacy Protection to Fortify the Defense Line Against Infectious Diseases

This study identified that the must-be needs of pregnant women with HBV infection are highly concentrated across four dimensions: knowledge of mother-to-child transmission (MTCT) prevention, breastfeeding guidance, antiviral therapy, and privacy protection. This finding indicates an urgent demand among this population for core knowledge regarding MTCT prevention, and aligns closely with the priority intervention strategies emphasized in both domestic and international authoritative guidelines. The Chinese Guideline for the Prevention of Mother-to-Child Transmission of Hepatitis B Virus (2024 Edition) [17] explicitly recommends that pregnant women with an HBV DNA level ≥ 2×10^5 IU/mL initiate antiviral therapy between 24 and 28 weeks of gestation, with tenofovir disoproxil fumarate (TDF) or tenofovir alafenamide fumarate (TAF) as the preferred agents for MTCT prophylaxis. Furthermore, for neonates born to hepatitis B surface antigen (HBsAg)-positive mothers, hepatitis B vaccine and 200 IU of hepatitis B immunoglobulin should be administered as early as possible within 12 hours of birth. This combined immunoprophylaxis strategy can reduce the risk of MTCT to below 1%. The dual-intervention model—comprising antenatal antiviral therapy and postnatal combined immunoprophylaxis—constitutes the biomedical defense line against HBV MTCT and represents the core knowledge domain of greatest concern to HBV-infected pregnant women. The treatment recommendations outlined in the guideline provide a clear evidence base for the present study. In future practice, nursing staff can translate these guideline standards into operationalizable health education content to deliver precision-guided guidance to infected pregnant women.

This study also found that participants commonly harbored concerns regarding the safety of breastfeeding and urgently needed scientific guidance to clarify the feasibility, indications, and

precautions associated with breastfeeding. A study by Yue Caihong et al. [18] investigated the current status of breastfeeding among HBV-infected parturients and identified that antiviral medication use, fear of MTCT, and family opposition were the primary contributors to low breastfeeding rates. The guideline indicates that breastfeeding can be performed in chronic HBV-infected pregnant women who continue TDF or TAF therapy postpartum, or after the neonate has received standard combined immunoprophylaxis [17]. However, most participants in this study were unaware of this evidence-based conclusion, and some erroneously believed that HBV infection constituted an absolute contraindication to breastfeeding. In light of these cognitive misconceptions, breastfeeding guidance is of paramount importance. Relevant scientific evidence and eligibility criteria should be positioned as core components of health education to assist HBV-infected pregnant women in making informed infant-feeding decisions.

Furthermore, this study revealed that participants had an urgent need for privacy protection, which may be attributable to the risk of family conflict and social discrimination following disclosure of their infectious status. This finding is consistent with previous research [19], which has demonstrated that HBV-infected pregnant women frequently encounter negative attitudes or discriminatory behaviors from friends, relatives, and even strangers after disclosing their diagnosis, thereby exacerbating social stigmatization and discouraging disclosure to family members. This suggests that the privacy protection needs of HBV-infected pregnant women extend beyond the narrow scope of medical information confidentiality to encompass multiple dimensions, including family relationship maintenance, social identity preservation, and career development security. Accordingly, nursing staff should strengthen their awareness of privacy protection, optimize patient flow processes and medical record management systems, and establish a safe healthcare environment for HBV-infected pregnant women.

4.2 Establishing a Multidimensional Emotional Support Network and Optimizing the Healthcare Service Guarantee System to Facilitate Care Pathways

This study revealed that the one-dimensional needs of pregnant women with HBV infection exhibit a structural pattern that progressively extends from psychological support to healthcare service guarantees, encompassing six dimensions: family support, peer support, financial security, health education, professional medical teams, and continuity of care. Further analysis of the interrelationships among these dimensions reveals that financial relief constitutes the foundational guarantee for psychological security; systematic health education creates the cognitive prerequisites for family support; and collaborative professional teamwork and continuity of care respectively reduce decisional conflict and prevent service fragmentation. These dimensions do not exist in isolation but are intricately intertwined, collectively forming a complex network of needs. This finding is consistent with the results of Deng et al. [20], who demonstrated that HBV-infected pregnant women in the third trimester experience multiple concurrent stressors—including physical burden and negative emotions (stigma, anxiety, and depression)—alongside the financial strain of long-term treatment and postpartum medical expenses, resulting in significantly higher levels of anxiety and depression compared to uninfected pregnant women. In contrast to previous studies [21] that have primarily focused on the emotional

support function of families, the present study further reveals that the effectiveness of family support depends not only on emotional investment but also on family members' scientific understanding of the disease. When family members harbor misconceptions about transmission routes, behaviors such as excessive precautionary measures or deliberate distancing may paradoxically exacerbate patients' stigma. Moreover, limitations in disease-related knowledge are not confined to HBV-infected individuals but are pervasive across the broader society, suggesting that health education needs extend from the individual to the societal level. Only through comprehensive societal cognitive renewal can the prejudice and exclusion born of ignorance be fundamentally dismantled. Taken together, the one-dimensional needs of HBV-infected pregnant women constitute an organic whole in which all internal elements are closely interconnected. Intervention strategies targeting any single dimension in isolation are unlikely to adequately address patients' real-life circumstances. Rather, only by constructing an integrated support system that features multidimensional synergy and both internal and external linkages can care pathways be effectively facilitated, thereby enhancing care experiences and improving quality of life for this population.

4.3 Exploring Smart Healthcare and Personalized Health Management Models to Achieve Empowerment and Value Reconstruction

From the perspective of attractive needs, this study revealed that HBV-infected pregnant women expressed higher-level aspirations encompassing online medical services, personalized health management, and empowerment and value reconstruction. At present, most healthcare institutions employ uniform follow-up protocols and standardized health education content, which fail to adequately account for the individual variability among HBV-infected pregnant women. Unlike their uninfected counterparts, this population requires distinct antenatal care protocols and monitoring frequencies—including dynamic adjustment of antiviral regimens based on viral load levels during pregnancy, close postpartum monitoring of hepatic biochemistry and HBV-DNA quantification, and evaluation of infant immunological responses [22,23]. Tertiary hospitals designated for infectious disease care should establish multidisciplinary collaborative systems centered on case managers [24], and develop targeted, personalized health management plans tailored to each patient's gestational age, viral load, liver function, and psychological status, thereby enhancing self-efficacy and empowering patients to actively participate in disease management.

Furthermore, this study identified a widespread demand for telemedicine services among HBV-infected pregnant women, which may be attributable to the limited professional capacity of primary healthcare facilities, the time-consuming and physically burdensome nature of long-distance travel to tertiary hospitals, and the associated psychological and physical strain. Online platforms hold promise for addressing patient needs regarding interpretation of antenatal test results, dynamic monitoring of viral load trajectories, and decision-making at critical junctures of MTCT prevention. This finding is consistent with previous research demonstrating high demand for telemedicine services among chronically ill patients in remote areas [25]. Nursing professionals, adopting a patient-centered approach and leveraging internet-based technologies, can develop scientifically rigorous educational content grounded

in guidelines and evidence-based medicine, while simultaneously establishing smart management platforms that integrate online consultation, follow-up reminders, and precision information delivery. Through sustained, accurate, and dynamic care, patients can gradually transition from passive recipients to active managers of their own health, ultimately achieving the reconstruction of self-worth and life meaning in the context of disease coping.

5. Conclusion

Through semi-structured interviews and grounded in the theoretical framework of the Kano model, this study conducted an in-depth exploration of the perinatal care needs of 18 pregnant women with HBV infection, and distilled three hierarchical need levels—must-be needs, one-dimensional needs, and attractive needs. The findings elucidate that the care needs of HBV-infected pregnant women exhibit a progressive hierarchical structure, extending from core knowledge requirements for MTCT prevention, through emotional support and coordination with external resources, and ultimately culminating in self-worth realization and identity reconstruction. These findings suggest that clinical nursing staff should adopt a needs-hierarchy-oriented approach, integrate hospital-community-family resources, and develop multidimensional, individualized intervention strategies encompassing health education, psychosocial support, and smart healthcare, thereby delivering comprehensive, full-cycle continuity of care to this population.

Several limitations of this study should be acknowledged. The investigation was conducted at a single tertiary hospital, and the findings were not validated using quantitative methods. Future research could employ multicenter mixed-methods designs to further explore the supportive care needs of HBV-infected pregnant women during the perinatal period, and to contribute to the advancement of maternal and infant health in the context of infectious diseases.

Declarations

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COMPETING INTERESTS

The authors declare no competing interests.

Author Contribution

X Q□L W and Y X□Conceptualization, methodology , investigation, formal analysis and writing original draft.Q Q , M L □Methodology, investigation.L C and N Z□Investigation , data curation.J C and D W□Ethics approval, data curation .H H□Conceptualization, supervision , formal analysis , and writing-review & editing.All authors reviewed the manuscript.

Data Availability

The original contributions presented in the study are included in the article; further inquiries can

be directed to the corresponding authors.

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