

AI-DRIVEN TELEHEALTH IN PRENATAL CARE: A SIMPLIFIED REVIEW FOR CLINICAL USE

Mrs. Francita Ashrita Vaz

II Year M.Sc Nursing

Obstetrics and Gynecology Nursing

Shree Devi College Of Nursing Mangalore ,Karnataka , India

Abstract : Artificial Intelligence (AI) and telehealth are transforming prenatal care by improving early detection of complications, increasing access to services, and supporting continuous monitoring. This review explains these technologies and discusses their benefits, challenges, and future potential in maternal healthcare. The article aims to support nurses, students, and researchers in understanding how AI-driven telehealth can strengthen antenatal services, especially in low-resource settings.

KEYWORDS

Artificial intelligence, telehealth, prenatal care, remote monitoring, mHealth, maternal outcomes.

INTRODUCTION

Pregnancy is a critical period that requires regular monitoring and timely decision-making. In many places, pregnant women still face challenges such as long travel distance, cost, lack of specialists, and delays in identifying complications. With the growth of mobile phones, digital platforms, and artificial intelligence (AI), prenatal care is becoming more accessible. Telehealth allows mothers to receive care from home, and AI supports health workers by predicting complications and improving clinical decisions. This review explains these new technologies in simple terms and highlights how they can improve maternal and fetal outcomes.

OBJECTIVES OF THE REVIEW

1. To explain commonly used AI and telehealth technologies in prenatal care.
2. To review the benefits of AI-driven telehealth on maternal and fetal outcomes.
3. To identify challenges in implementing these technologies in clinical settings.
4. To provide recommendations for nursing practice and research.

METHODS

A narrative review approach was used. Literature published between 2015 and 2024 was searched using Google Scholar, PubMed, Scopus, and ScienceDirect. Keywords included AI in pregnancy, telehealth in antenatal care, remote maternal monitoring, mHealth, prenatal risk prediction, and digital health. A total of 120 articles were screened, and 40 relevant studies were reviewed.

TECHNOLOGY BACKGROUND

1. Artificial Intelligence (AI)

AI means computer systems that can think, learn, and make decisions like humans. In pregnancy, AI can predict risks such as preeclampsia, preterm birth, anemia, and GDM.

2. Machine Learning (ML)

A part of AI where the computer learns from data and improves its accuracy over time.

3. Deep Learning

Advanced ML where computers analyze images (e.g., ultrasound) or complex patterns.

4. Telehealth

Providing healthcare through video calls, mobile apps, and online platforms.

5. Remote Patient Monitoring (RPM)

Monitoring the mother at home using devices like BP monitors, glucometers, fetal Dopplers, and smart wearables.

6. mHealth Applications

Mobile phone apps used for pregnancy tracking, danger sign alerts, and appointment reminders.

7. Clinical Decision Support Systems (CDSS)

Computer programs that guide doctors and nurses are based on updated guidelines.

FINDINGS OF THE REVIEW

1. AI in Risk Prediction

AI tools can analyze BP, blood sugar, ultrasound, and blood test results to predict complications early. Examples:

- Predicting preeclampsia with 90% accuracy.
- Detecting early signs of fetal growth restriction.
- Predicting preterm labour from CTG data.

This allows nurses and doctors to take preventive actions at the right time.

2. AI in Remote Monitoring

Wearable hand sensors continuously monitor maternal health at home. These devices automatically send data to healthcare providers.

Benefits include:

- Early identification of hypertension.
- Tracking fetal heart rate remotely.
- Monitoring glucose for GDM mothers.
- Improved follow-up and compliance.

3. Telehealth for ANC Services

Telehealth reduces the need for frequent hospital visits.

It is useful for:

- High-risk pregnancy follow-up.
- Diet and lifestyle counselling.
- Mental health support.
- Postnatal check-ups.

Studies show that telehealth increases ANC attendance and maternal satisfaction.

4. Improved Decision-Making with AI

Clinical Decision Support Systems (CDSS) help nurses:

- Follow WHO antenatal care guidelines,
- Give timely referrals,
- Reduce delays in diagnosis.

AI-based ultrasound interpretation helps detect abnormalities even in low-resource areas.

5. Benefits for Low-Resource Settings

AI-driven telehealth is especially helpful where there are shortages of specialists.

It reduces:

- Travel time
- Out-of-pocket expenses
- Missed ANC visits

It improves:

- Early detection
- Emergency preparedness
- Community outreach

6. Maternal and Fetal Outcomes

Evidence shows improvement in:

- Reduced maternal mortality
- Lower rates of severe hypertension
- Better glycemic control in GDM
- Improved fetal monitoring
- Higher satisfaction with care

CHALLENGES IDENTIFIED

Even with many benefits, implementation faces problems:

- Poor network connectivity in rural areas
- Limited digital literacy
- Cost of devices
- Concerns about data privacy
- Need for training for nurses
- Lack of national-level standard guidelines

These must be addressed before full-scale adoption.

IMPLICATIONS FOR NURSING PRACTICE

- Nurses must be trained in using telehealth platforms.
- Digital documentation and data interpretation should be included in curriculum.
- Community health nurses can use mobile apps for follow-up and health education.
- Nurses can triage high-risk cases early with AI-based alerts.
- Tele-counselling can be used for diet, exercise, breastfeeding, and danger sign awareness.

FUTURE DIRECTIONS

- Integration of AI ultrasound tools in PHCs
- Use of chatbots for 24×7 maternal counselling
- National digital maternal health registry
- Affordable wearable fetal monitoring belts
- Virtual reality simulations for nursing education
- AI-supported labour room documentation

CONCLUSION

AI-driven telehealth is a powerful tool that can improve access, quality, and safety of prenatal care. It supports early detection, continuous monitoring, and timely decision-making. For nurses, it provides strong support in managing high-risk pregnancies and delivering patient-centred care. With proper training, policy support, and technological improvements, AI-driven telehealth can significantly contribute to better maternal and fetal outcomes worldwide.

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