NIGF E BULLETIN

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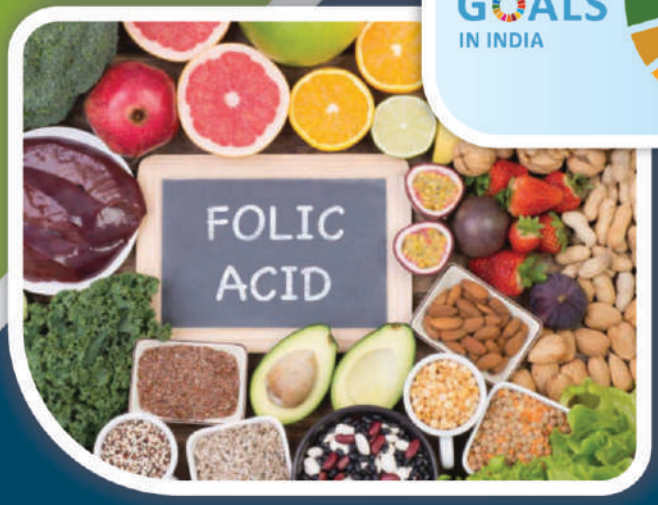
WORLD PRE-ECLAMPSIA DAY

SUSTAINABLE DEVELOPMENT GOALS IN INDIA



Theme :

Quality Antenatal Care in India

Path to Achieve SDG in India

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PATRON MESSAGE

Esteemed colleagues,

As we present the 6th bulletin of the North India Gynecologist Forum (NIGF), our focus is sharply drawn to a cornerstone of maternal well-being: Quality Antenatal Care in India. While we celebrate the significant strides in institutional deliveries, reaching an impressive 95%, the persistent maternal mortality rate of 93 per lakh live births compels us to critically examine the quality of care provided.

The crux of the matter, we believe, lies in the often-underemphasized aspect of antenatal visits and their comprehensive nature. Evidence unequivocally demonstrates that robust antenatal care is a pivotal determinant in improving maternal and neonatal outcomes. The recent World Health Organization (WHO) guidelines, advocating for a minimum of eight quality antenatal visits, underscore this very point. These visits are not merely about numbers; they represent opportunities for timely risk assessment, early detection of complications, provision of essential interventions, and empowering women with the knowledge for a healthy pregnancy and childbirth.

This bulletin delves into evidence-based strategies and best practices to enhance the quality of each antenatal encounter. Our aim is to motivate and equip you, the dedicated gynecologists of India, with actionable insights to transform antenatal care from a routine check-up to a powerful intervention that truly impacts maternal and fetal health. Let us collectively champion the cause of quality antenatal care and strive towards a future where every pregnancy is a safe and healthy journey.

Dr. Sharda Jain
Patron
North India Gynecologist Forum

PRESIDENTIAL MESSAGE

IT is great pleasure to release 6th Issue of NIGF bulletin on theme of QUALITY ANTENTAL CARE in India as NIGF Founder President & Chief editor of Bulletin on World Pre-Eclampsia Day 22nd May.

While India have implemented highly innovative programs to ensure comprehensive obstetric care for every class and section of women and family, quality in care esp antenatal care has not been optimized. Quality, coordinated antenatal care has great role in preventing obstetric complications as well promoting positive health of women and off springs. Quality Accessible affordable antenatal care is key to achieve SDG goal in our country.

We have framed the content of bulletin keeping in mind key issues and dilemma in clinical practice in antenatal care. We thank all the authors who have given updated and insightful articles which will be of great help for every clinician.

My special thanks to Guest editor Dr Minakshi Rohilla who have done hard work in editing every article. We are grateful to senior teachers Dr Jaya Chaturvedi, Dr Achla Batra & Dr Shikha Seth for their review article comprising past, present and future of antenatal care.

It is pleasure to compile all activities of NIGF – orations, virtual & physical academic programs, quiz and cultural activities. Our state chapter office bearers and quiz coordinator Dr Taru Chhaya are doing great job in organizing virtual and physical programs.

We are going to organize 3rd NIGF annual conference, on 19, 20 July at Hotel Nataraj Sarovar Portico Jhansi in association with Jhansi Ob Gyn society & MLB Medical College Jhansi. We invite all of you to this conference to make it great success. Please visit https://www.nigfconference2025.com/index.php For details of registration, abstract submission & other details.

You can access previous 5 Bulletins on https://shorturl.at/hqesT

Keep it in your E library, for ready reckoner.

Once again thank you for your belief in me, and walking with me on this journey of vision and mission of NIGF.

Happy Reading & Learning,

Yours sincerely

Dr Sadhana Gupta
President NIGF & Chief Editor

EDITOR'S NOTE

Quality Antenatal Care

Maternal health is a worldwide community health concern and antenatal care is its important component. Quality antenatal care (QANC) is of utmost significance for optimum perinatal outcome and lack of antenatal care throughout pregnancy is straight linked with maternal and neonatal morbidity and mortality. Quality antenatal care promptly enhances a "positive pregnancy experience" facilitating the complete welfare of the mother and child1.

Objectives of QANC is to screen and to maintain the safety of the mother and fetus by early recognition of high-risk factors and antenatal problems. It is achieved through history based screening, health education, providing quality healthcare, vaccination, and management that endorse affirmative health results for both the expectant mother and her newborn. The WHO endorses a minimum of four adequately high quality antenatal visits to accomplish optimum health results. First visit is preferred before 12 weeks of gestation, second visit around 26-28 weeks of pregnancy and last 2 visits to be completed in third trimester before delivery. The crucial elements of an intensive manner to antenatal care involve registration of the pregnancy, identification and management of pregnancy-related complications like preeclampsia, underlying or concurrent illness, anemia, syphilis, HIV infection, mental health problems and domestic violence. Pre-emptive measures include Tdap (tetanus, diphtheria and acellular pertussis) immunization, supplementation of iron & folic acid and preparedness for the delivery1.

The insufficiency of antenatal care is linked to adverse maternal and neonatal health outcomes including an increased risk of miscarriage, premature delivery, small for gestational age new born and perinatal mortality. Socioeconomic inequalities often preclude deprived pregnant woman from receiving the necessary medical services. To bridge this gap, several maternal health programs have been introduced by the Ministry of Health & Family Welfare, Government of India to improve accessibility and support to pregnant women. Crucial initiatives for maternal and neonatal health are Janani Suraksha Yojana (JSY), Pradhan Mantri Matru Vandana Yojana (PMMVY), Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA), Janani Shishu Suraksha Karyakram (JSSK) and Surakshit Matritva Aashwasan (SUMAN). These initiative aim at providing free, dignified, all-inclusive and quality antenatal care to pregnant women, mothers, and newborns across India. The program's primary goal is to eliminate avoidable maternal and infant deaths by ensuring universal availability of necessary health services all through pregnancy, childbirth, and the postpartum phase. JSSK has contributed to a major development in maternal and child health in India. There is significant Increase in the rate of institutional deliveries from 47% (2011) to 79% (2021). Maternal mortality rate and neonatal mortality rate has also decreased by 28% and 27% respectively between 2011 and 20212.

However, in less developed countries the decline in maternal and neonatal mortality is not proportionate to

noteworthy surge in antenatal visits pointing towards deficiency in quality of antenatal care, driving insistently adverse maternal and newborn health outcomes. Quality antenatal care provides an opportunity for early identification of antenatal complications that increase the risk of adverse pregnancy outcomes. The exposure of antenatal care has improved meaningfully in the past ten years in India, but a sheer escalation in antenatal visit is not enough if the matter of quality is not concurrently tackled. Antenatal complications and inadequate handling of the same in terms of detection and management are known ground reasons of maternal and neonatal mortality in low-resource countries.

A rational balance of quality (services) and quantity (visits) in antenatal care is of great clinical importance. Data from the National Family Health Survey (NFHS-5- 2019-21) highlighted the significance of the quality of antenatal care services utilized irrespective of number of antenatal care visits. Even though approximately 3 in 5 pregnant women in India used a minimum instructed [3] 4 antenatal care visits all through their last pregnancy, only 1 in 5 of those received quality antenatal care services, demonstrating less than standard care. Moreover, 14.3% of the women received antenatal care services of insufficient quality despite attending [3] 4 antenatal care visits in their previous pregnancy3. Quality of antenatal service has also been assessed in a demographic health analysis from six South-Asian countries including a sample of 180,567 females aged 15–49 years who had delivered in previous three years before the survey. The quality of antenatal care was assessed by evaluating whether a woman had monitoring of blood pressure, urine and blood testing and supplements of iron and folic acid at any antenatal visits. Educational status, financial independence, willingness of pregnancy, number of pregnancies, distance of residence to health facility were related with quality antenatal care. Improving literacy and financial status, reducing the remoteness to healthcare services, and initiating rural area-friendly mediations are vital to enhance the quality antenatal care in South Asia4,5.

Certainly there is remarkably increase in the number of antenatal visits, its quality is questionable and demands a serious concern. India has reached way forward in achieving social media coverage and mass communication which should be used to increase the awareness and utilization of antenatal care services to target large population groups. This can help raise awareness, particularly among women which are often connected with social media applications despite belonging to poor socioeconomic strata. Information, education and counselling services with community participation should be integral part of quality antenatal care. Self-help group amongst pregnant women should be utilized to spread information about good reproductive outcome if quality antenatal care is judicious utilized by the participants. Primary health care workers in the field as first contact to the pregnant women should be sensitized not only to the antenatal care but to a quality antenatal care in particular.

QANC is an important maternal indicator of the effective utilization of policies and schemes by pregnant women in India. Understanding the factors influencing antenatal care in a better way will help us outline future policies that are structured specifically to improve the quality of antenatal care received by pregnant women. As has been correctly said, the health of women and children is a mirror image of overall health status of a country.

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Dr Minakshi Rohilla
Editor

SECRETARY GENERAL MESSAGE

It gives me a great pleasure and privilege that this bulletin is dedicated to quality antenatal care in India. The quality maternity case encompasses a range of elements aimed at ensuring the safety and well-being of pregnant women and their newborn. It includes aspects like skilled healthcare providers, access to necessary resources and interventions, respectful and compassionate care, and ongoing monitoring and support throughout pregnancy and postpartum period. WHO emphasizes that the quality care should be safe, effective, timely, efficient,equatable and people centred with the goal of achieving desired health outcomes for both mother and babies.

This bulletin caters to screening, prediction and prevention of pre-eclampsia. The nutrition, vaccinations maternal screening and genetics and aneuploidy screening are dealt with in details. The management of bleeding in antenatal period and acute pain in the antenatal period are also discussed .

I am sure this bulletin will add to the knowledge of our fellow members. It will help to improve the health of our mothers and babies.

Long live NIGF!!

Dr. Mala Srivastava
Secretary General, NIGF

PRESIDENT ELECT MESSAGE

Dear Colleagues,

I congratulate President Dr Sadhna Gupta for taking out a bulletin on a crucial topic - **Antenatal Care: Investing in the Future of Maternal and Child Health.**

As we stand at the forefront of advancing healthcare standards, few areas reflect our commitment to both present and future generations more profoundly than antenatal care. The journey of pregnancy is both transformative and vulnerable, making comprehensive antenatal care not just a medical necessity but a societal imperative.

Modern antenatal care extends far beyond routine check-ups. It is a holistic approach encompassing early risk identification, evidence-based interventions, patient education, mental health support, and nutritional counseling. Our role as healthcare providers is to ensure that every expectant mother receives respectful, individualized, and timely care—regardless of socioeconomic background or geography.

In recent years, we've seen significant strides in maternal mortality reduction, yet challenges remain. Disparities in access, quality of care, and continuity must be urgently addressed. As a society, we must continue to champion innovations in telemedicine, integration of community health workers, and patient empowerment tools that bridge these gaps.

Let us reaffirm our dedication to research, policy advocacy, and interdisciplinary collaboration to strengthen antenatal care frameworks. By doing so, we not only safeguard maternal and neonatal outcomes but also lay the groundwork for healthier communities.

I look forward to working with all of you to elevate the standards of maternal health and ensure that antenatal care receives the focus it rightfully deserves.

Warm regards,

Dr. Ragini Agrawal
President-Elect (NIGF)

CONTENTS

Advocating for Safer Motherhood and Highlighting the Importance of Maternal Healthcare

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Introduction

Maternal mortality remains a critical global health challenge, with significant disparities across regions. In 2023, the global maternal mortality ratio (MMR) was estimated at 197 deaths per 100,000 live births, a 40% decline from 328 in 2000, according to UN inter-agency estimates. However, achieving the Sustainable Development Goal (SDG) target of reducing MMR to below 70 by 2030 requires an annual reduction rate of nearly 15%, a pace rarely achieved nationally. Sub-Saharan Africa bears the heaviest burden, accounting for 70% of global maternal deaths (182,000) with an MMR of 454 per 100,000 live births, followed by Southern Asia at 17% (43,000) with an MMR of 117. In contrast, high-income regions like Australia and New Zealand report an MMR of just 3, highlighting stark inequities. Low-income countries face an MMR of 346, compared to 10 in high-income nations, with 92% of maternal deaths occurring in low- and lower-middle-income countries (LMICs). Within regions, disparities persist.[1]

Turning to India, we see remarkable progress in maternal health over the past decade. Between 2014 and 2016, the maternal mortality ratio declined to 130 per 100,000 live births.

By 2017 to 2019, it fell further to 103.Most recently, in the 2018 to 2020 period, it reached 97 per 100,000 live births. These figures are a testament to national efforts such as strengthening healthcare access, improving skilled birth attendance, and promoting maternal health awareness. However, there is still work to be done to achieve the Sustainable Development Goal of less than 70 maternal deaths per 100,000 live births by 2030.

In‘ India, northern states like Uttar Pradesh (current MMR 167/100,000 live births) contrast with southern states like Kerala (current MMR 32/100,000). These gaps reflect inequalities in healthcare access, skilled birth attendance (73% in low-income vs. 99% in high-income countries), and socioeconomic factors. Efforts must be directed toward addressing inequality, improving education, and ensuring access to quality healthcare for all mothers.[2]

Cultural and Social Factors Affecting Maternal Health

Cultural and social determinants profoundly influence maternal health outcomes, often exacerbating disparities. In many LMICs, cultural beliefs and gender norms limit women's autonomy in seeking healthcare. For instance, in rural Nigeria, cultural practices and delayed healthcare-seeking behaviours contribute to high maternal mortality, with only 12% of births in the poorest households assisted by skilled attendants compared to 87% in the wealthiest.[3] In Gambia, reliance on traditional birth attendants (TBAs) persists due to their perceived secrecy and friendliness, despite limited medical training. Socioeconomic factors, including poverty, low education, and unemployment, restrict access to quality care, particularly in rural areas. Interpersonal racism, residential

segregation, and domestic violence further heighten risks for underrepresented groups, such as U3 (understudied, underrepresented, underreported) populations in the United States, where Black women face maternal mortality rates three to four times higher than White women. Chronic stress from systemic inequities can lead to physiological complications like preterm birth and preeclampsia. In contrast, the "Hispanic paradox" in the U.S. shows lower maternal mortality among Hispanic women despite adverse social determinants, possibly due to strong social cohesion and healthier lifestyles. Addressing these factors requires culturally sensitive interventions and systemic changes to empower women and reduce barriers.

Key Aspects of Safer Motherhood

The Safe Motherhood Initiative, launched in 1987, emphasizes reducing maternal mortality and morbidity through comprehensive strategies. Key aspects include access to Skilled Care: Ensuring births are attended by skilled health personnel (doctors, nurses, or midwives) is critical. Globally, skilled birth attendance increased from 58% in 1990 to 81% in 2019, but gaps remain in LMICs, where only 73% of births are assisted by trained professionals. Skilled care prevents deaths from causes like haemorrhage, infection, and obstructed labor.[4]

A recent Indian study[5] highlighted that despite national improvements in maternal healthcare, stark regional inequalities persist, especially in rural and socioeconomically disadvantaged areas. The study identifies clusters with significantly lower SBA coverage, which are often linked to limited healthcare infrastructure, lower female education levels, and poverty. These findings underscore the need for targeted, region-specific policy interventions to improve maternal health equity and ensure universal access to skilled delivery care, aligning with Sustainable Development Goals (SDG-3).

Regular antenatal care (ANC) visits and postpartum support reduce complications. Southern Africa reports near-universal ANC coverage, while West Africa lags, with one-third of women receiving no ANC. Postnatal care promotes breastfeeding and contraception, particularly for adolescents. Availability of emergency obstetric care, services, including caesarean sections and blood transfusions, is vital. Inadequate infrastructure in rural areas of sub-Saharan Africa and South Asia limits access, contributing to high MMRs.

Health Education and Empowerment is key to safe motherhood. Educating women about nutrition, warning signs, and the importance of timely care improves outcomes. Policy and Infrastructure Investment like strengthening healthcare systems through training, equipment, and accessible facilities is essential. Policies addressing gender inequities and social determinants enhance care equity.

To further strengthen maternal healthcare, India has launched several impactful health schemes over the years. The Pradhan Mantri Matru Vandana Yojana offers cash benefits of ₹5,000 to pregnant and lactating mothers, payable in installments. The Surakshit Matritva Aashwasan (SUMAN) scheme ensures quality antenatal care on the 9th day of each month and guarantees cashless delivery services, including cesarean sections, medicines, and diagnostics. Financial assistance is provided— ₹1,400 in low-performing states and ¹ 700 in high-performing states—to promote institutional deliveries in rural areas. Focus is placed on competency-based training of healthcare providers to deliver better intrapartum and postpartum care. Together, these schemes aim to uplift marginalized communities and bridge healthcare gaps.[6-7]

Advanced Technologies: Bridging the Gap in Access

Digital technologies, particularly mobile health (mHealth), are transforming maternal healthcare by bridging access gaps, especially in LMICs. In Nigeria, programs like Text4Life, implemented in rural Edo communities, address barriers such as transportation, cost, and provider availability. mHealth initiatives provide real-time health information, appointment reminders, and emergency coordination, improving care-seeking behaviors. However, gender disparities in mobile phone ownership—women are less likely to own phones than men—limit impact, necessitating gender-inclusive program design. In sub-Saharan Africa, where maternal mortality remains high, digital tools enhance safety by ensuring confidentiality and privacy, though cultural mismatches between traditional and skilled care persist. Telemedicine platforms connect rural women to specialists, reducing delays in emergency care. WHO's upcoming webinar on

digital personal health records (May 7, 2025) underscores the potential of technology to standardize maternal care data globally. Despite these advances, challenges like poor infrastructure, low digital literacy, and cultural resistance require tailored solutions to ensure equitable access. While high-tech solutions are transformative, low-tech innovations also play a critical role in underserved areas. Solar-powered birth kits provide clean lighting during deliveries in areas with limited electricity..

Non-pneumatic anti-shock garments (NASGs) help stabilize women experiencing postpartum hemorrhage, dramatically reducing maternal deaths. These affordable, practical innovations ensure that even the most marginalized women have access to life-saving interventions

The use of heli-ambulances for evacuating patients with obstetric emergencies, as implemented in the state of Uttarakhand, represents a transformative step in maternal healthcare, particularly in geographically challenging and remote regions. In critical situations where every minute counts—such as postpartum hemorrhage, eclampsia, or obstructed labor—rapid air evacuation can mean the difference between life and death. Uttarakhand's mountainous terrain often impedes timely ground transportation, making aerial evacuation a pragmatic solution. This initiative underscores the principle that *even a single life saved justifies the investment.*

Conclusion

Maternal health is a complex interplay of global disparities, cultural and social determinants, and systemic challenges. While progress has been made—global MMR dropped 40% from 2000 to 2023—regional inequities, particularly in sub-Saharan Africa and Southern Asia, demand urgent action. Safer motherhood hinges on skilled care, robust infrastructure, and empowered communities, supported by policies addressing structural inequities. Digital technologies offer innovative solutions to bridge access gaps, but their success depends on overcoming gender and infrastructural barriers. In India, Central and State Governments must expand subsidized maternity care and improve financial assistance programs like Janani Suraksha Yojana (JSY) and Janani Shishu Suraksha Karyakram (JSSK).There is a need to expand health insurance coverage for prenatal and maternity care, reducing the financial burden on families.Non-governmental organizations must continue supporting awareness campaigns, skill-building for healthcare providers, and direct aid to communities in need.

Every mother deserves the right to survive childbirth. Every baby deserves a healthy start to life. It is up to us—as healthcare providers, policymakers, advocates, and individuals—to make safer motherhood a reality. Achieving SDG targets by 2030 requires intensified, coordinated efforts to ensure every woman, regardless of region or circumstance, experiences safe and equitable maternal care.

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Major Government Schemes of India for Pregnant Ladies

Prenatal care plays a vital role in improving pregnancy outcomes by ensuring regular medical supervision, early detection of complications, and essential nutritional guidance. In our country where maternal mortality remains a major public health concern, access to quality prenatal care is critical. However, socioeconomic disparities often prevent underprivileged expectant mothers from receiving the necessary medical services.

To bridge these gaps, several maternal health programs have been launched by the Indian government to improve accessibility and support for pregnant women. Key initiatives include

1. Janani Suraksha Yojana (JSY)
2. Pradhan Mantri Matru Vandana Yojana (PMMVY)
3. Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA
4. Janani Shishu Suraksha Karyakram (JSSK)
5. Surakshit Matritva Aashwasan (SUMAN)
6. Ayushman Bharat

1. **Janani Suraksha Yojana (JSY),** Janani Suraksha Yojana (JSY) is a safe motherhood intervention .It was launched under the National Rural Health Mission (NHM)in 2005. The objective of this program is to reduce maternal and neonatal mortality by promoting institutional delivery among poor pregnant women. The scheme is being implementation in all states and Union Territories (UTs), with a special focus on Low Performing States (LPS)

   Under JSY, financial support is extended to eligible pregnant women to encourage institutional deliveries. Payments to pregnant women are made in one installment The scheme provides cash assistance for up to two live births, with eligibility of amount determined by factors such as state category, residency, and economic background.

   Rural mothers delivering in urban government or accredited private facilities are eligible for ₹1400 cash assistance. Mothers must present their MCH and JSY cards, issued by ANMs, to receive benefits. Referral slips from ASHA, ANM, or MO I/C are required for deliveries in specified hospitals and accredited institutions. Only genuine BPL cards and SC/ST certificates are accepted for deliveries in accredited private and PSU institutions.

   In urban areas where ANM are not available, proof in support of receiving 3 ANC Check Ups, Immunization of TT-2 Booster from any registered medical practitioner (Government / private) are accepted for cash assistance under JSY.Mothers residing in urban areas and accessing urban government facilities are entitled for a cash benefit of Rs. 1000/- only which are to be paid by MO I/C / SDMO / CDMO/ College Superintendent or their authorized representatives at the time of delivery.

   ASHA workers and other link workers play a pivotal role in ensuring the success of JSY by assisting pregnant women throughout their

healthcare journey. Their efforts have significantly contributed to the program's impact.

Their role includes

- Identification of pregnant women as beneficiaries and facilitating ANC registration.
- Assisting with obtaining necessary certifications.
- Ensuring at least three ANC checkups, including TT injection and IFA tablets.
- Referral to a government or accredited private health facility for delivery.
- Counseling for institutional delivery.
- Escorting the woman to the health center and stay until discharge.
- Arranging newborn immunization up to 14 weeks.
- Reporting birth or death to ANM/MO.
- Conducting postnatal visits within 7 days to monitor maternal health.
- Promoting breastfeeding initiation within an hour and continuation for 3–6 months.
- Encouraging family planning.

ASHA, AWW, and Link workers are paid Rs 600 in rural areas and Rs 200 in urban areas Payments under JSY are disbursed only by ANM.JSY does not provide for ASHA package for pregnant women choosing to deliver in an accredited private institution or at home

JSY has made notable improvements in maternal health indicators

- Increased the rate of institutional deliveries from 38% in 2005 to 79% in 2021.
- Reduced maternal mortality rate by 37% between 2004-05 and 2015-16.
- Contributed to a decline in neonatal mortality rate by 28% between 2004-05 and 2015-16.

2. Janani Shishu Suraksha Karyakram (JSSK) - JSSK was launched in 2011 as a centrally sponsored scheme that provides free and comprehensive healthcare services to pregnant women and newborns. These services include:

- Free skilled delivery services, including caesarean section if needed
- Free newborn care services
- Free essential drugs and diagnostics
- Free transportation to and from the health facility

To ensure comprehensive maternal care, JSSK extends its benefits to all pregnant women delivering in government health facilities. Women can access these services by registering at their nearest Anganwadi or health center with their identity and residence proof.

JSSK has contributed to a significant improvement in maternal and child health in India

- Increase in the rate of institutional deliveries from 47% in 2011 to 79% in 2021.
- Reduction in maternal mortality rate by 28% between 2011 and 2021.
- Reduction in neonatal mortality rate by 27% between 2011 and 2021.

3. Pradhan Mantri Matru Vandana Yojana (PMMVY) - PMMVY was launched by the Government of India in 2017, PMMVY aims to empower mothers-to-be by providing financial support. It is a centrally sponsored scheme offering assistance to pregnant women and lactating mothers for their first live birth in a healthcare facility.

This financial incentive promotes maternal health and well-being by encouraging:

- **Early registration of pregnancy,** ensuring access to essential prenatal care and reducing the risk of complications.
- **Regular antenatal check-ups,** which help monitor the health of both mother and baby, enabling early detection and management of potential issues.
- **Institutional deliveries,** ensuring women give birth in healthcare facilities under the supervision of skilled professionals, increasing the likelihood of safe childbirth.

PMMVY provides financial assistance in three installments:

- Rs. 1,000 upon early pregnancy registration (before 12 weeks).
- Rs. 2,000 after six months of pregnancy, following at least one antenatal check-up.
- Rs. 2,000 after childbirth, upon registration and vaccination of the child.

This financial aid helps families cover various pregnancy-related expenses, such as:

- Prenatal vitamins and supplements
- Transport to healthcare facilities

- Delivery costs
- Newborn care essentials

PMMVY has positively impacted millions of mothers across India by:

- Increasing early pregnancy registration rates
- Improving utilization of antenatal care services
- Encouraging institutional deliveries, thereby reducing maternal and neonatal mortality
- Empowering women with financial autonomy and decision-making power

4. **Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) -** The Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) is a government initiative aimed at providing comprehensive and quality antenatal care to pregnant women across India. Launched by the Ministry of Health & Family Welfare, the program ensures free, fixed-day antenatal check-ups for women in their second and third trimesters at designated government health facilities on the 9th of every month.

Key Features of PMSMA

- **Universal access** to antenatal care for all pregnant women, particularly those in their second and third trimesters.
- **Fixed-day service-**check-ups are conducted on the 9th of every month at government health facilities.
- **Specialist consultations -** OBGY specialists, radiologists, and physicians provide expert care.
- **Risk identification -** high-risk pregnancies are flagged with red stickers on Mother and Child Protection cards for close monitoring.
- **Public-private collaboration -** private doctors are encouraged to volunteer for the campaign.
- **Digital accessibility -** pregnant women can locate the nearest PMSMA facility via a mobile/web-based application.

Services Provided Under PMSMA

- Comprehensive antenatal check-ups, including diagnostics and counseling.
- Essential medications, such as iron and folic acid (IFA) supplements and calcium tablets.
- Screening for complications to ensure early intervention.
- Tetanus toxoid vaccination
- Guidance on nutrition, hygiene, and safe pregnancy practices.

To avail these services, pregnant women need to visit their nearest government health facility on the 9th of any month. They are issued a PMSMA card, which must be presented at each visit.

Since its launch, PMSMA has contributed to:

- Higher rates of early pregnancy registration
- Improved utilization of antenatal care services
- A decline in maternal and neonatal mortality rates

Extended Pradhan Mantri Surakshit Matritva Abhiyan (E-PMSMA),-PMSMA has now been extended to give special emphasis to high risk pregnancies as E-PMSMA to ensure quality antenatal care and individual tracking of high-risk pregnancies.

Key Enhancements in E-PMSMA

- **Expanded high-risk pregnancy categories -** List of high pregnancies have been expanded to 25
- **Additional PMSMA sessions -** beyond the 9th of every month, allowing more frequent check-ups.
- **Institutional delivery assurance -** high-risk pregnancies are tagged with the nearest First Referral Unit (FRU) for specialized care.
- **Digital tracking -** improved monitoring of maternal health outcomes through individual tracking systems.

5. **Surakshit Matritva Aashwasan (SUMAN) Scheme -** The Surakshit Matritva Aashwasan (SUMAN) initiative, launched on October 10, 2019, during the 13th Conference of the Central Council of Health and Family Welfare in New Delhi, aims to provide free, dignified, and high-quality healthcare to pregnant women, mothers, and newborns. The program's primary goal is to eliminate preventable maternal and infant deaths by ensuring universal access to essential health services throughout pregnancy, childbirth, and the postpartum period.

Key Features of SUMAN

- **Free healthcare** services for pregnant women, postpartum mothers, and newborns at all public health facilities.

- **Zero tolerance** for maternal and newborn deaths due to preventable causes.
- **Guaranteed** access to antenatal care (ANC), institutional deliveries, and postnatal care—without out-of-pocket expenses.
- **Respectful maternity care,** ensuring dignity, privacy, and compassionate support for mothers.
- **Early identification of high-risk pregnancies** and structured referral mechanisms for specialized care.
- **Free emergency transportation** services for pregnant women requiring urgent medical attention.

Services Covered Under SUMAN

Under this scheme, beneficiaries receive free access to:

- A **minimum of four antenatal check-ups,** including essential diagnostics and treatments.
- **Institutional deliveries** at government health facilities, assisted by skilled birth attendants.
- **Essential obstetric care,** including cesarean sections if required.
- **Free transportation services** for emergency maternal care
- **Comprehensive postnatal care** for mothers and newborns, ensuring early detection of complications.
- **Vaccination programs** and **newborn screenings** for optimal early childhood health.

To avail SUMAN Services women has to register at nearest government hospital or primary health center and undergo antenatal checkup. The documents required are Identity and address proof

- Visit the nearest government hospital or primary health center.
- Register for the scheme and undergo antenatal check-ups.
- Access institutional delivery, postnatal care, and newborn screenings.
- Utilize free transportation services for emergency maternal care.

By eliminating financial barriers and reinforcing quality care, the SUMAN scheme plays a critical role in safeguarding maternal and newborn health, promoting safe pregnancies, and reducing mortality rates across India.

6. **Ayushman Bharat -** Ayushman Bharat, a flagship healthcare program of the Government of India, plays a crucial role in promoting antenatal care by offering health insurance coverage.

Key aspects of Ayushman Bharat:

1. **Coverage for antenatal services:** The scheme covers antenatal check-ups, investigations, and hospitalizations, reducing financial barriers to care.
2. **Support for high-risk pregnancies:** Complications arising during pregnancy are covered, ensuring access to quality care.
3. **Empanelled hospitals:** The scheme includes accredited hospitals that provide antenatal care services, improving healthcare access.
4. **Cashless services**: Beneficiaries receive antenatal care without out-of-pocket expenses, alleviating financial burden.

Required Documents:

- Ayushman Bharat card
- Identification proof
- Pregnancy-related documents (e.g., ANC card)

Eligibility Criteria:

Families identified as vulnerable based on deprivation criteria in the Socio-Economic Caste Census (SECC) 2011.

- **Rural families** qualify under six deprivation criteria:
  - No adult member between 16-59 years
  - Female-headed households with no adult male members
  - Households with kucha walls and roof
  - Scheduled Castes (SC) and Scheduled Tribes (ST) categories
  - Households with disabled members and no able-bodied support
  - Landless households relying on manual casual labor
- **Urban families** qualify under specific occupational categories, such as:
  - Street vendors and hawkers
  - Domestic workers
  - Rag pickers and beggars
  - Construction workers

- Sanitation workers and gardeners
- Transport workers

Currently, Ayushman Bharat is implemented across all states and UTs except West Bengal, Odisha, and the National Capital Territory (NCT) of Delhi.

Challenges and Limitations in Access and Implementation

While government schemes like **PMMVY, PMSMA, JSY, JSSK** and **SUMAN** have significantly improved maternal and child health in India, challenges remain.

1. **Awareness and Information Gaps -** Many pregnant women lack knowledge of available government schemes and their eligibility. Barriers such as illiteracy, language barriers, and limited internet access hinder awareness. Additionally, healthcare workers and local authorities may not communicate scheme details effectively.
2. **Procedural Hurdles -** Complex registration processes with extensive documentation requirements create difficulties for beneficiaries. Bureaucratic delays in financial disbursement and lack of transparency further obstruct access.
3. **Infrastructure & Resource Constraints -** Healthcare facilities, especially in rural areas, face shortages of:
   - Trained professionals
   - Essential medications
   - Diagnostic services

   Additionally, transportation barriers prevent women from accessing prenatal care.
4. **Social and Cultural Barriers**
   - Gender bias, societal stigma, and financial dependency often restrict women's ability to seek healthcare.
   - Traditional practices conflicting with modern medical recommendations may discourage institutional care.

The Way Forward

To enhance maternal health initiatives:

- Improve awareness through community outreach and digital literacy programs.
- Simplify registration processes and increase transparency in financial disbursement.
- Strengthen healthcare infrastructure by ensuring the availability of trained professionals, medications, and diagnostic facilities.
- Address socio-cultural barriers through education and advocacy.

By focusing on interdisciplinary collaboration and digital solutions, these programs can be made more inclusive, efficient, and impactful, ensuring every pregnant woman receives safe and quality prenatal care.

Resource material

1. htpp://nhm.gov.in jsy
2. htpp://nhm.gov.in jssk
3. htpp:// pmmvy.wcd .gov.in
4. htpp://pmsma.mohfw.gov.in
5. htpp://suman.mohfw.gov.in
6. htpp//pmjay.gov.in

Screening, Prediction and Prevention of PE - Solution to Challenges

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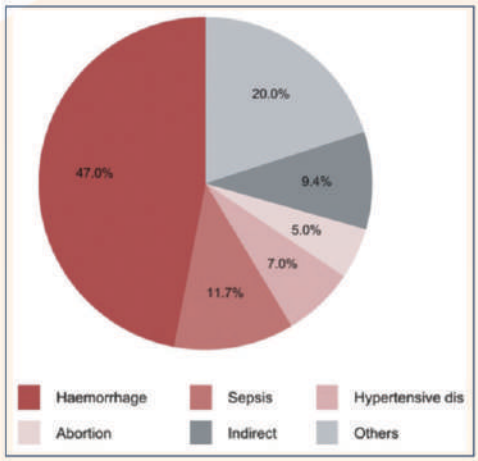
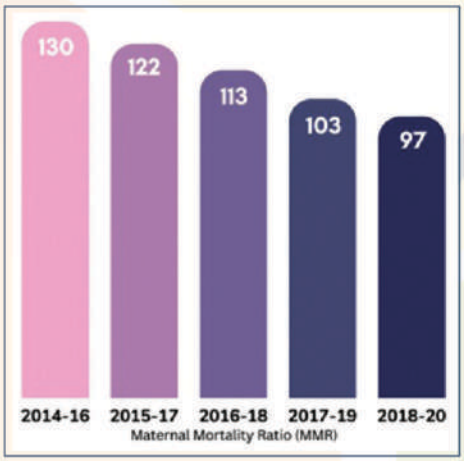
Introduction

Despite advancements in maternal health services and marked reduction in maternal morbidity over the last few decades, hypertensive disorders of pregnancy continues to be one of the major reasons of maternal and fetal complications in Indian obstetric practice, affecting approximately 5–10% of pregnancies, more in rural underserved regions upto 10-11%. (figure -1)





Hypertensive disorders in pregnancy classification:

1. Gestational Hypertension
2. Pre-eclampsia
3. Eclampsia
4. Chronic H.T. &
5. Superimposed pre-eclampsia.

Evidence suggests that pre-eclampsia is a placental-origin syndrome with systemic endothelial dysfunction leading to multi-organ involvement affecting both mother and fetus in utero. With this understanding logic of first-trimester screening, preventive strategies, and meticulous antenatal surveillance from 12 weeks has been evolved with identifying high-risk women early and instituting timely interventions to mitigate complications.

Diagnosis:

Gestational H.T. is diagnosed based on the onset of hypertension (blood pressure ee140/90 mm Hg) on two occasions 6 hours apart after 20 weeks of gestation, while associated proteinuria (ee0.3 g/24 hours) or any sign of organ dysfunction defines Preeclampsia. Blood pressure touching 160/110mmHg or more defines Severe pre-eclampsia. Addition of neurological component in form of seizures converts it into Eclampsia. Eminent signs of eclampsia are severe headaches, visual disturbances vomiting and upper abdominal pain.

Proteinuria (of ee2+ by dipstick, ee300 mg/d by 24 hour collection, or ee30 g/mol by urinary protein:creatinine ratio) or hyperuricaemia (greater than 7); (ii) haemolysis, elevated liver enzymes, and low platelets (HELLP) syndrome even in the absence of hypertension or

proteinuria.

Pre-eclampsia is defined as Early-onset when develops before 34 weeks and is often more severe and associated with fetal growth restriction (FGR), while that developing after 34 weeks is called late-onset PE which is more common and vulnerable as fetal point of view as it does not give time to fetus to adapt to hypoxia, anoxia and acidemia.

Most PE-related complications are preventable if be start screening from 1st trimester (11-13 weeks) and manage based on it.

Brief Pathophysiology: Preeclampsia results from

Abnormal trophoblastic invasion of uterine spiral arterioles

↓

villous arteries remain sensitive to vasoconstrictors

↓

poor placental perfusion, -- placental ischemia,

↓

release of antiangiogenic factors like sFlt-1, and other chemokines

↓

chemokines cause systemic endothelial injury – edema

Clinically, it starts manifesting after 20 weeks as hypertension with or without proteinuria, and may involve hepatic, renal, hematologic, or neurologic & coagulation pathways.

Screening:

The First Step in Screening is Risk assessment by history which should be done at the first ANC visit itself by the doctor or the paramedic and identifies 30-40% cases

1. History of PE in prior pregnancy
2. Chronic hypertension, renal disease, or autoimmune disorders (e.g., SLE, APS)
3. Diabetes mellitus
4. Nulliparity or advanced maternal age (>35 years)
5. Multiple pregnancy
6. High BMI (>30 kg/m²)
7. Family history of PE

GESTOSIS scoring (Indian score) has been defined for assessing the risk of PE. A total score of 3 or more indicates a high risk for preeclampsia. [1][1]

Tools for Risk Prediction:

1. Mean Arterial Pressure (MAP) at every visit starting from 1st trimester. Elevated MAP >90 mmHg is predictive of PE
2. Uterine Artery Doppler: performed between 11–13+6 weeks using transabdominal or transvaginal approach. Increased Pulsatility Index (PI) 1.7-1.8 or persistence of early diastolic notching after 20-22 weeks suggests impaired placentation I.e, risk of PE and Fetal growth restriction (FGR). [2][2]
3. Low levels of Placental Growth Factor (PlGF) and PAPP-A correlate with placental dysfunction
4. sFlt-1/PlGF ratio has been suggested to have highly predictive of imminent PE although bit costly and not available at all places at present.

The Fetal Medicine Foundation (FMF) has given a combined prediction algorithm that integrates all screening tools from history, examination, investigation (uSG, doppler and biochemical) that can detect up to 90% of early onset PE with 10% false positivity rate at 11-13 weeks of pregnancy:[3][3]

- **Maternal factors:** Includes factors like age, parity, prior history of preeclampsia, and medical conditions.
- **Biophysical markers:** uterine artery pulsatility index (PI)
- **Biochemical markers:** serum proteins like PAPP-A and sFlt-1 & PLGF\
- **MAP**

sFlt-1 (antiangiogenic) / **PlGF** proangiogenic) ratio is one of the standalone best suggested biomarker to rule out the risk of PE. It has high negative predictive value. Endoglin, Inhibin A, Activin A, VEGF, etc are other biomarkers under research. Research is emerging on placental gene expression, cell free DNA and plasma proteomic profiles

While Western models as FMF are ideal, resource constraints in India necessitate practical alternatives as

Portable BP device with color-coded risk alerts with ASHA & peripheral health workers; ideal for PHCs and rural outreach

PIERs (Pre-eclampsia Integrated Estimate of Risk) model aim to assess the probability of a woman developing complications from preeclampsia any gestational age and risk stratification

FullPIERs model includes web based calculator with five clinical and laboratory parameters at admission with age: [4][4]

1. Gestational age
2. Chest pain or dyspnea (shortness of breath)
3. Oxygen saturation (<97%)
4. Serum creatinine concentration (µmol/L)
5. Platelet count (×10y /L)
6. Aspartate aminotransferase (AST) or Alanine aminotransferase (ALT)

   Risk thresholds for full PIERs guide management:

   - < 10% risk → expectant management
   - ≥ 10% risk → closer surveillance / intervention

MiniPIERS model: good logistic regression based predictive tool for resource limited areas for adverse maternal outcomes within 48 hours of presentation and uses only clinical (non-lab) indicators from 20 weeks onwards. It includes: parity; gestational age on admission; systolic BP, headache/visual disturbances; chest pain/dyspnoea; epigastric pain, hyper-reflexia, and dipstick proteinuria.[5][5] miniPIERS risk e"25% is considered high risk and suggests the need for urgent referral or intervention

Preventive Strategies: [6][6]

Low-Dose Aspirin Prophylaxis : 150 mg once daily at bedtime be initiated early as 12 weeks, no later than 16 weeks & continued till 36 weeks in high risk cases identified using clinical or combined screening. ASPRE (Aspirin for Evidence-Based Preeclampsia Prevention) trial showed a 60% reduction in early-onset PE when aspirin started before 16 weeks. WHO recommends it.

1. Ensure initiation at the first ANC visit, counsel for compliance, and monitor
2. Calcium Supplementation: 1.5–2 g/day of elemental calcium in divided doses to All pregnant indian women (most are calcium deficient) as it Reduces smooth muscle contractility and vascular resistance.
3. Life style modifications: exercise, Yoga, balanced timely diet, Preconceptional counselling for appropriate weight, normal biochemistry, avoid smoking and alcohol.
4. Strict surveillance for High-Risk Women in all ANC visits with Frequent BP monitoring and urine dipstick testing & Fetal surveillance by Growth scans, Doppler studies along with Educating women for warning signs (headache, visual blurring, epigastric pain)

Systemic Challenges in India

1. Missed Early ANC Window : Late ANC registration eliminates opportunity for early screening
2. No risk assessment and non-measurement of even BP at ANC visits
3. Limited awareness for preventive aspects (150mg aspirin before 16 weeks)
4. Poor follow up counselling - Lack of early ultrasound and Doppler services

Solutions and Policy Recommendations

1. Sensitization of peripheral health workers ANMs/ASHA for PE risk factors & risk assessment and BP measurements with digital machines.
2. Integrate PE screening into PMSMA/LaQshya visits
3. Promote digital risk scoring tools compatible with mobile apps
4. Subsidize biochemical marker testing in district hospitals

Key Takeaways

- PE Screening Window : 11–13+6 weeks gestation
- Risk Stratification via combined models or clinical risk + Doppler
- Aspirin Prophylaxis - Start before 16 weeks in high-risk women
- Calcium Supplementation - 1.5–2 g/day for all pregnant women
- Monthly visits, BP/urine monitoring, growth scans
- Timely Referral : In cases of severe PE, fetal growth restriction, or HELLP or miniPIER score >25%

Evidence have proven:[7][7]

- Strict Bed rest and complete salt restriction is not of use in PE
- Vitamins like C, E and D are not much role in prevention of PE
- Diuretics should be avoided for prevention of PE or related complication
- Labetalol is the drug of choice to start with in case of Gestational HT and PE.

Conclusion

As we are committed for improving maternal and perinatal outcomes, evidence-based screening and preventive strategies are best tools. Early identification of high-risk women in first trimester, initiation of low-dose aspirin, and adherence to surveillance protocols and timely referall if high complication risk stratification based on mini or full PIERs model can significantly reduce the disease burden.

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> Motherhood is the biggest gamble in the world. It is the glorious Life force. It's huge and scary - it's an act of infinite optimism.
>
> *– Gilda Radner*

Nutritional Supplementation in Antenatal Care

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Introduction:

Maternal nutrition is crucial for fetal development and pregnancy outcomes. Inadequate intake of essential nutrients increases the risk of anemia, neural tube defects, and low birth weight. During pregnancy, the demand for micronutrients rises, requiring supplementation with iron, folic acid, calcium, vitamin D, and others. This chapter explores current recommendations for antenatal nutritional supplementation based on updated guidelines from international and national health authorities.

A. Physiological Changes in Pregnancy and Nutritional Demands:

1. Increased Metabolic Demands:

Pregnancy raises the basal metabolic rate to support fetal growth, placental function, and maternal tissue expansion. Increased cardiac and respiratory workload leads to higher energy and protein needs, especially during the second and third trimesters, to meet the growing demands of the fetus and prepare the mother for childbirth.

2. Changes in Absorption and Nutrient Requirements:

Iron and calcium absorption increases during pregnancy, meeting the rising needs for erythropoiesis and bone formation. Requirements for folic acid, vitamin D, B12, and iodine also rise. Slower gastrointestinal motility enhances nutrient absorption but may cause discomforts like nausea and constipation, necessitating dietary adjustments and targeted supplementation.

3. Weight Gain Recommendations:

Appropriate gestational weight gain is essential for optimal fetal growth and to reduce maternal complications. Recommendations vary based on prepregnancy BMI, with underweight women advised to gain more and obese women less. Monitoring weight gain helps guide nutritional counselling and detect risks such as intrauterine growth restriction or macrosomia.

Table 1: Recommended Total Weight Gain Based on Prepregnancy BMI

BMI (kg/m²)	Category	Recommended Weight Gain
< 18.5	Underweight	12.5 – 18 kg
18.5 – 24.9	Normal weight	11.5 – 16 kg
25 – 29.9	Overweight	7 – 11.5 kg
≥ 30	Obese	5 – 9 kg

Trimester-wise Nutritional Needs:

Nutritional requirements increase as pregnancy progresses. While the first trimester focuses on micronutrients like folic acid, later trimesters demand additional calories, protein, and minerals to support rapid fetal growth and maternal physiological changes.

Table 2: Trimester-wise Nutritional Recommendations

Trimester	Caloric Increase	Nutritional Focus
1st Trimester	None or minimal (~0 kcal/day)	Folic acid, vitamin B6, iron; manage nausea and vomiting
2nd Trimester	~340 kcal/day	Increased protein, iron, calcium, DHA for maternal tissue and fetal growth
3rd Trimester	~450 kcal/day	Iron, calcium, omega-3s; supports fetal fat accumulation and lactation prep

What are the Nutrient: Nutrient Supplement and Antenatal care:

Nutrients are substances obtained from food that are essential for the body's growth, development, energy production, and overall health. They help maintain the structure and function of tissues, regulate bodily processes, and provide energy. Nutrients are generally categorized into two main types: macronutrients and micronutrients.

Macronutrients:

Macronutrients—carbohydrates, proteins, and fats—are required in substantial quantities to support energy production and essential physiological functions. During pregnancy, adequate intake of these nutrients becomes increasingly important to meet the demands of fetal growth, placental development, maternal tissue accretion, and the heightened metabolic needs of gestation and parturition.

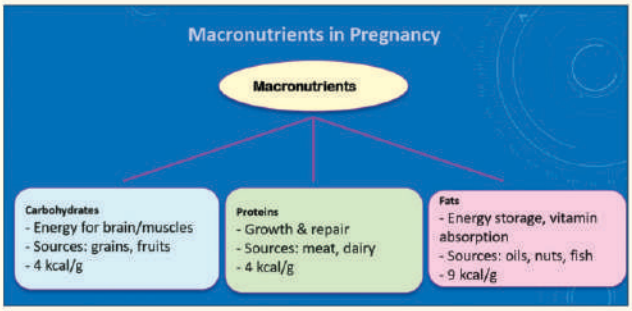

Figure 1: Macronutrients in pregnancy

Micronutrients:

Micronutrients, including vitamins and minerals, are essential for various physiological processes, although required in smaller amounts compared to macronutrients. During pregnancy, the demand for certain micronutrients—such as iron, calcium, folic acid, iodine, and vitamin D—significantly increases to support fetal development, prevent deficiencies, and maintain maternal health. These nutrients play crucial roles in cellular metabolism, immune function, and the formation of key organs and systems in the developing fetus.

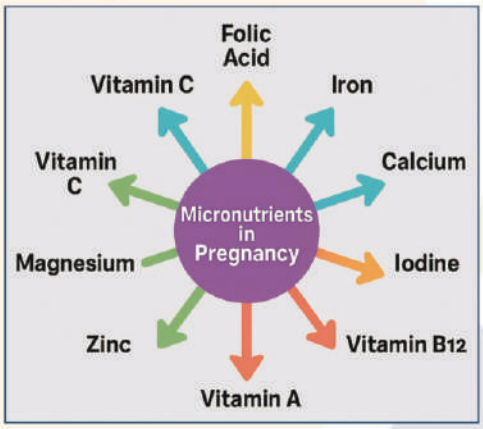

Figure 2: Micronutrients in pregnancy

1. Folic Acid:

Folic acid (vitamin B9) is essential for nucleotide synthesis, methylation reactions, and neural tube closure during early embryogenesis. A daily dose of 400–600 mcg, as recommended by WHO and ICMR, significantly reduces the risk of neural tube defects.

Folic acid supplementation	
Function	DNA synthesis, cell division, and neural tube development
Mechanism	Donates methyl groups in nucleotide biosynthesis and homocysteine metabolism
Role in NTD Prevention	Supports neural tube closure within the first 28 days of gestation
Recommended Dose	400–600 mcg daily preconceptionally and in 1st trimester; 500 mcg/day throughout pregnancy
Sources	Leafy greens, legumes, citrus fruits, fortified cereals
Govt Supply	IFA tablets: 100 mg elemental iron + 500 mcg folic acid
Common Brands in India	Folvite, Folisurge, Avfol
Caution	Over-supplementation may mask vitamin B12 deficiency

2. Iron:

Iron is vital in pregnancy for haemoglobin synthesis, oxygen transport, and fetal development. WHO/ICMR recommend 27 mg/day. Deficiency risks include anemia and low birth weight. IFA tablets (100 mg iron + 500 mcg folic acid) are widely used in India. Natural sources include red meat, poultry, fish, legumes, leafy greens, and fortified cereals.

Indication	Condition	Recommended Dose	Duration	Remarks
Prophylaxis (IFA Supplementation)	Non-anaemic pregnancy	100 mg elemental iron + 500 mcg folic acid daily	From 14–16 weeks until 180 days postpartum	As per MOHFW and WHO guidelines
Mild Anemia	Hb 10–10.9 g/dL	100 mg elemental iron twice daily	Minimum 3 months or until Hb normalizes	Oral iron preferred (ferrous salts)
Moderate Anemia	Hb 7–9.9 g/dL	100 mg elemental iron two to three times daily	Until Hb >11 g/dL, then switch to prophylactic	Consider IV iron if oral not tolerated
Severe Anemia	Hb <7 g/dL	Parenteral iron (iron sucrose/ferric carboxymaltose)	Based on total iron deficit	Blood transfusion if Hb<5 g/dL or symptomatic
Maintenance After Correction	Post-anemia correction	100 mg elemental iron daily	3 months minimum	Prevents recurrence, replenishes iron stores

3. **Calcium:** Calcium is vital during pregnancy for fetal bone and tooth development, muscle function, and preserving maternal bone health. The recommended dose is 1,000–1,500 mg/day, especially in populations with low dietary intake. It reduces the risk of pregnancy-induced hypertension and preeclampsia but excessive intake may interfere with iron and zinc absorption. Sources include dairy, leafy vegetables, almonds, and fortified foods. Available supplements include calcium carbonate and calcium citrate, with examples like Shelcal-500 and Ostocalcium.
4. **Vitamin D:** Facilitates calcium absorption, supports fetal skeletal development, and modulates immune function. Doses range from 600–2,000 IU/day. Sources include sunlight and fortified milk. Excess can cause hypercalcemia.
5. **Iodine:** Crucial for fetal brain and thyroid development. The recommended dose is 250 mcg/day. Sources include iodized salt, dairy, and fish. Excessive iodine may cause fetal goitre or hypothyroidism.
6. **Vitamin B12:** Essential for neural development, RBC formation, and DNA synthesis. The recommended dose is 2.6 mcg/day. Found in animal products. Deficiency may impair fetal neurodevelopment, especially in vegetarians.
7. **Vitamin A:** Supports embryonic growth, vision, immune function, and epithelial integrity. Recommended dose is 770 mcg/day. Excess intake (>10,000 IU/day) can lead to teratogenic risks and birth defects.
8. **Zinc:** Involved in DNA synthesis, immune function, and cellular growth. The recommended dose is 11–13 mg/day. Sources include meat, legumes, and seeds. Excess zinc may interfere with copper absorption.
9. **Magnesium:** Regulates muscle and nerve function, blood glucose, and protein synthesis. Recommended dose is 350–400 mg/day. High doses may cause diarrhea and interfere with calcium absorption.
10. **Vitamin C:** Enhances iron absorption, supports collagen synthesis, and immune function. Recommended dose is 85 mg/day. High doses (>2,000 mg/day) can cause GI distress and kidney stones.
11. **Omega-3 Fatty Acids:** Essential for fetal brain, eye, and neural development. Recommended dose is 200–300 mg DHA/day. Sources include fatty fish and flaxseeds. Risk of contamination in non-purified oils.

Micronutrient	Function	Dose	Advantages	Disadvantages	Sources	Forms
Calcium	Bone/teeth, muscle	1,000–1,500 mg	↓ Preeclampsia	Interferes with Fe/Zn	Dairy, greens	Carbonate/ citrate
Vitamin D	Ca absorption, immunity	600–2,000 IU	↓ GDM, preeclampsia	Hypercalcemia	Sunlight, fish	Cholecalciferol
Iodine	Brain/ thyroid	250 mcg	Prevents cretinism	Fetal goiter	Iodized salt, fish	Iodine+ folic acid
Vitamin B12	Neural, RBC	2.6 mcg	Prevents anemia	Veg deficiency	Meat, dairy	Methyl/cyano
Vitamin A	Growth, vision	770 mcg	↓ Night blindness	Birth defects	Liver, carrots	Retinol, beta-carotene
Zinc	DNA, cell growth	11–13 mg	↓ Preterm birth	GI upset	Meat, legumes	Sulfate, gluconate
Magnesium	Muscle, glucose	350–400 mg	↓ Cramps	Diarrhea	Nuts, grains	Citrate/oxide
Vitamin C	Iron, collagen	85 mg	↑ Iron absorption	GI distress	Citrus, peppers	Ascorbic acid
Omega-3 Fatty acid	Brain, neural	200–300 mg DHA	↓ Preterm birth	Contamination	Fish, flaxseed	DHA, fish oil

A well-balanced and nutrient-rich diet is essential during pregnancy to support both maternal health and optimal fetal development. Nutritional requirements increase to accommodate the physiological changes of pregnancy, with special emphasis on both macronutrients and a spectrum of critical micronutrients.

Key micronutrients include calcium, which is necessary for fetal bone and tooth development and maternal bone preservation; iron, vital for red blood cell formation and preventing anemia; and iodine, essential for fetal brain and thyroid development. Vitamin D supports calcium absorption and immune function, while vitamin A is important for vision, immune health, and embryonic growth. Other important micronutrients are vitamin B12 (for neural development and DNA synthesis), vitamin C (for iron absorption and collagen synthesis), zinc (for cellular growth and immune function), and magnesium (for muscle and nerve function).

Omega-3 fatty acids, particularly DHA, are crucial for fetal brain and eye development. Each of these nutrients has specific recommended daily intakes, and their sources range from dairy, meats, and fish to green leafy vegetables, nuts, seeds, and fortified foods. Supplementation is often advised, especially for nutrients difficult to obtain in adequate amounts from diet alone, such as iron, folic acid, and vitamin D.

Combined prenatal supplements can help cover a broad range of nutritional needs, but individualized assessment is important to address specific deficiencies. A balanced pregnancy diet, rich in fruits, vegetables, whole grains, lean proteins, and healthy fats, along with adequate hydration, forms the cornerstone of maternal and fetal well-being throughout gestation.

Key Points:

- Pregnancy increases metabolic rate and nutritional demands, especially for energy, protein, and micronutrients.
- Macronutrients provide energy and structure, while micronutrients support fetal development and maternal health.
- Folic acid (400–600 mcg/day) prevents neural tube defects and is included in IFA tablets widely supplied in India.
- Iron (27–100 mg/day) is crucial for hemoglobin synthesis, with dose adjustments based on anemia severity.
- Calcium (1,000–1,500 mg/day) supports fetal bone development and helps prevent preeclampsia, but should be timed separately from iron.
- Vitamin D (600–2,000 IU/day) and iodine (250 mcg/day) are vital for fetal skeletal and brain development.
- Other key micronutrients include vitamin B12, zinc, magnesium, vitamin A, vitamin C, and omega-3s, all supporting organogenesis, immunity, and neurodevelopment.

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"Antenatal Care is Vital for a Healthy Pregnancy and Safe Delivery."

Managing Common Symptoms of Pregnancy in Antenatal Care

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Introduction

Pregnancy represents one of the most profound physiological transformations in a woman's life, involving complex adaptations across nearly every organ system. While most of these changes are normal and essential to support fetal development, they often give rise to a range of symptoms that can significantly impact maternal wellbeing. Symptoms such as nausea, fatigue, back pain, and breathlessness are so common that they are often accepted as inevitable parts of pregnancy. However, for the pregnant individual, these experiences can cause considerable discomfort, anxiety, and, in some cases, functional impairment.

The role of the obstetric care provider extends beyond simply monitoring the progression of pregnancy to actively addressing these symptoms, alleviating discomfort, and distinguishing normal physiological changes from early indicators of potential pathology. Effective symptom management enhances maternal quality of life, promotes adherence to antenatal care, and can directly influence pregnancy outcomes by reducing stress and detecting complications early.

Importantly, the underlying mechanisms behind many of these symptoms are rooted in the hormonal and anatomical shifts of pregnancy. Hormones such as progesterone, estrogen, and human chorionic gonadotropin orchestrate these adaptations, while mechanical factors like the enlarging uterus contribute to vascular and musculoskeletal changes. A clear understanding of the physiological basis for each symptom enables clinicians to provide targeted, empathetic care, reinforcing the pregnant woman's trust and comfort during a uniquely vulnerable period.

Pregnancy is a dynamic physiological state characterized by multiple systemic changes, many of which manifest as common symptoms encountered during antenatal visits. A deep understanding of the mechanisms behind these symptoms enables clinicians to reassure patients, differentiate physiological changes from pathology, and intervene effectively when needed. Managing these symptoms empathetically forms a critical aspect of comprehensive antenatal care, especially in primary and secondary healthcare settings.

This article explores the most common symptoms encountered during pregnancy, explains the physiological changes driving them, and outlines evidence-based strategies for their effective management in routine clinical practice.

Nausea and Vomiting

Nausea and vomiting are among the most common symptoms experienced during pregnancy, affecting up to 80% of pregnant individuals. These symptoms typically begin around the sixth week of gestation, peak by the ninth to twelfth week, and usually resolve by the end of the first trimester, although in some cases they may persist longer. The exact cause of nausea and vomiting in pregnancy is not fully understood, but hormonal changes, particularly elevated levels of human chorionic gonadotropin (hCG), estrogen, and progesterone, are

considered major contributors. Progesterone also slows gastrointestinal motility by relaxing smooth muscle, further contributing to nausea. Heightened sensitivity to smells and tastes, as well as psychological factors like stress and anxiety, may exacerbate symptoms.

Most cases of nausea and vomiting are mild to moderate and self-limited, but a severe form called hyperemesis gravidarum affects approximately 0.3-2% of pregnancies. Hyperemesis gravidarum is characterized by persistent vomiting, significant weight loss (more than 5% of pre-pregnancy weight), dehydration, electrolyte imbalances, and nutritional deficiencies. While mild nausea and vomiting typically do not pose risks to the mother or fetus, severe cases can lead to serious complications if not promptly and appropriately managed.

Management of nausea and vomiting in pregnancy depends on the severity of symptoms. Initial strategies include lifestyle and dietary modifications, such as eating small, frequent meals, avoiding triggers like strong smells and spicy foods, and maintaining good hydration. Vitamin B6 (pyridoxine) alone or combined with doxylamine is considered the first-line pharmacological treatment. Other antiemetics such as metoclopramide, promethazine, or ondansetron may be used when necessary, with careful consideration of their safety profiles. In cases of hyperemesis gravidarum, hospitalization may be required for intravenous fluid therapy, electrolyte replacement, and nutritional support. Early recognition and effective management are essential to improving maternal comfort and ensuring favorable pregnancy outcomes. Most women experience a significant improvement in symptoms by mid-pregnancy, and with appropriate care, both maternal and fetal health are generally well preserved.

Fatigue

Fatigue is one of the earliest and most persistent symptoms of pregnancy. It results from a combination of hormonal changes—primarily elevated progesterone levels, increased metabolic demands, and psychological adaptation to pregnancy. Anemia and thyroid dysfunction can exacerbate fatigue and should be excluded when fatigue is severe. Management involves encouraging adequate rest, nutritional optimization, mild exercise, and screening for underlying causes if fatigue is profound or prolonged.

Back Pain

Low back and pelvic girdle pain during pregnancy result from hormonal effects, particularly relaxin-mediated ligamentous laxity, and mechanical strain caused by the enlarging uterus altering the maternal center of gravity. Postural adaptations, sedentary lifestyle, and musculoskeletal weakness further contribute. Management includes posture correction, pelvic support belts, physiotherapy, and back-strengthening exercises. Paracetamol remains the first-line pharmacologic agent for pain relief.

Constipation

Constipation in pregnancy is multifactorial: progesterone reduces gastrointestinal motility, the enlarging uterus mechanically compresses the colon, and iron supplementation exacerbates bowel sluggishness. Management emphasizes increasing fiber and fluid intake, regular physical activity, and the use of safe laxatives like bulk-forming agents (psyllium) or osmotic agents (lactulose) when dietary measures are insufficient.

Heartburn

Heartburn or gastroesophageal reflux occurs due to progesterone-induced relaxation of the lower esophageal sphincter and increased intra-abdominal pressure from the growing uterus. Symptoms are managed initially with lifestyle changes such as small & frequent meals, avoidance of late-night eating, and head-of-bed elevation. If needed, antacids, H2 receptor antagonists (famotidine), or proton pump inhibitors (omeprazole) may be used, all of which have reassuring safety profiles in pregnancy.

Urinary Frequency

Urinary frequency is most notable in early and late pregnancy. Early in pregnancy, hormonal influences and the anteverted uterus pressing against the bladder reduce its capacity. Later, fetal descent into the pelvis further compromises bladder volume. Reassurance is sufficient unless symptoms like dysuria or haematuria suggest urinary tract infection, in which case appropriate evaluation and treatment are warranted.

Breathlessness

Mild dyspnea is common and results from increased maternal oxygen consumption, heightened respiratory drive mediated by progesterone, and mechanical limitation from the enlarging uterus elevating the diaphragm. Breathlessness should be distinguished from pathological causes such as pulmonary embolism or cardiac dysfunction, which necessitate prompt investigation if symptoms are sudden, severe, or progressive.

Sleep Disturbances

Sleep disorders arise from physical discomfort, nocturia, hormonal changes, and anxiety. Sleep fragmentation becomes prominent in the third trimester due to fetal movements, frequent urination, and musculoskeletal discomfort. Management strategies include promoting good sleep hygiene, relaxation exercises, and, if necessary, short-term use of sedating antihistamines. Psychological support may be indicated when sleep disturbances are associated with mood disorders.

Increased Vaginal Discharge

Leukorrhea, a benign increase in vaginal discharge, is due to elevated estrogen levels and increased cervical gland secretions. It is typically thin, white, and odorless. Any discharge that is thick, curdy, foul-smelling, or associated with itching requires evaluation for infections such as candidiasis or bacterial vaginosis, which are managed with appropriate antifungal or antibiotic therapy.

Quickening

The perception of fetal movements, termed quickening, occurs around 18 weeks in primigravidas and earlier in multigravidas. It provides psychological reassurance to the mother and serves as a clinical marker for fetal wellbeing. Absence of fetal movements beyond 22 weeks necessitates further assessment through ultrasound to evaluate fetal viability and growth.

Breast Changes

Breast tenderness, fullness, and tingling occur early in pregnancy due to rising estrogen and progesterone levels stimulating ductal and lobular proliferation. These changes prepare the breast tissue for lactation and are among the first signs of pregnancy. Supportive bras and reassurance are typically sufficient to manage associated discomfort.

Lumbopelvic Discomfort

Pelvic girdle pain, encompassing symphysis pubis and sacroiliac joint discomfort, is common. Hormonal relaxation of ligaments combined with altered posture and weight bearing leads to this symptom. Targeted physiotherapy, pelvic support devices, and analgesics such as paracetamol are key elements of management.

Leg Cramps

Leg cramps, especially nocturnal, are common in pregnancy and are thought to stem from altered calcium and magnesium metabolism, as well as compression of nerves or vascular structures by the enlarging uterus. Stretching exercises, hydration, and calcium or magnesium supplementation often provide relief.

Varicose Veins and Haemorrhoids

Venous stasis due to progesterone-induced vasodilation and mechanical compression by the gravid uterus contribute to the development of varicose veins and haemorrhoids. Management involves leg elevation, compression stockings for varicosities, stool softeners, and local therapies for haemorrhoids to reduce discomfort.

Skin Changes

Hyperpigmentation, melasma, and striae gravidarum result from hormonal changes, particularly increased melanocyte-stimulating hormone and cortisone levels. Melasma benefits from sun protection measures, while moisturization may help alleviate the severity of striae. Pruritic conditions like PUPPP are treated with topical corticosteroids and antihistamines.

Edema

Physiological edema, particularly of the lower limbs, arises from increased capillary permeability, sodium retention, and uterine compression of venous return. Mild edema is managed conservatively with leg elevation and avoidance of prolonged standing. However, sudden, generalized edema warrants evaluation for preeclampsia, requiring blood pressure monitoring and proteinuria screening.

Headaches

Headaches during pregnancy are often benign and related to hormonal shifts or musculoskeletal tension. However, new-onset severe headaches—especially if associated with visual disturbances or hypertension—may signal preeclampsia or intracranial pathology and require urgent investigation.

Investigations and Diagnostic Purposes for Common Obstetric Symptoms

Symptom	First-line Management	When to Investigate or Refer
Nausea and Vomiting	Pyridoxine + Doxylamine; hydration	Hyperemesis gravidarum, dehydration
Urinary Frequency	Reassurance if early pregnancy	Rule out UTI if dysuria, urgency
GERD	Lifestyle changes, antacids	Persistent symptoms despite PPIs
Constipation	High-fiber diet, fluids	Severe constipation unresponsive to treatment
Fatigue	Iron, TSH check, nutrition	Severe anaemia, thyroid issues, depression
Lumbopelvic Pain	Physiotherapy, pelvic support	Severe pain or diastasis suspicion
Leg Cramps	Stretching, magnesium/calcium	Persistent swelling/pain (DVT suspicion)
Varicose Veins	Compression stockings, elevation	Ulcers, thrombophlebitis
Vaginal Discharge	Treat infections based on cause	Suspected membrane rupture
Sleep Disturbances	Sleep hygiene, CBT	Linked to depression/anxiety
Pruritus	Emollients, antihistamines	Suspected cholestasis (LFTs, bile acids)
Headaches	Paracetamol, BP monitoring	Preeclampsia, CVT suspicion
Breathlessness	Reassure if mild, CBC	PE or cardiac issues suspicion
Presumptive Signs	Supportive management	Persistent symptoms needing evaluation
Quickening	Expected between 16-20 weeks	No fetal movement by 22 weeks: ultrasound

Diagnostic Investigations for Evaluation of Common Obstetric Symptoms

Symptom	Investigations	Purpose
Nausea and Vomiting	CBC, Electrolytes, TSH, Ultrasound	Rule out hyperemesis, molar pregnancy
Urinary Frequency	Urinalysis, Urine culture	Detect UT]
GERD	None routinely	Investigate if atypical symptoms
Constipation	None routinely	X-ray if bowel obstruction suspected
Fatigue	CBC, TSH, Ferritin, Blood sugar, EPDS	Detect anaemia, thyroid disorders, depression
Lumbopelvic Pain	Clinical exam, X-ray if trauma	Assess severit
Leg Cramps	Electrolyte panel	Check calcium, magnesium deficiency
Varicose Veins	Doppler ultrasound	Rule out DVT
Vaginal Discharge	Swab microscopy, Culture	Identify infection
Sleep Disturbances	EPDS	Screen for mood disorders
Pruritus	Serum bile acids, LFTs	Detect cholestasis
Headaches	BP, Urine protein, MRI if needed	Detect preeclampsia, CVT
Breathlessness	CBC, Chest X-ray, ECG	Rule out anaemia, PE, heart disease
Presumptive Signs	Pregnancy test, Ultrasound	Confirm intrauterine pregnancy
Quickening	Ultrasound	Confirm fetal wellbeing

Conclusion

In conclusion, pregnancy initiates a remarkable series of physiological adaptations, each giving rise to a unique spectrum of symptoms that reflect the body's effort to nurture new life. Understanding these changes is crucial not only for alleviating discomforts but also for safeguarding maternal and fetal health. An empathetic, evidence-based approach to symptom management fosters a deeper connection between healthcare providers and expectant mothers, enhancing trust and promoting a sense of reassurance during a time of profound physical and emotional transformation. Regular antenatal visits serve as a vital platform for early detection of potential complications, while patient education empowers women to recognize warning signs

and engage actively in their care. Lifestyle counselling, tailored to individual needs and cultural contexts, further reinforces healthy behaviors that contribute to positive pregnancy outcomes. Through the integration of personalized care strategies, timely interventions, and continuous emotional support, obstetric teams can create an environment where both mother and child thrive. Ultimately, optimizing the pregnancy journey demands a holistic, vigilant, and compassionate approach—one that acknowledges the complexity of pregnancy while celebrating its profound significance in the continuum of life.

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Prescribing in Antenatal Care

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Introduction

Prescribing medications during pregnancy form a crucial pillar of antenatal care that requires careful consideration of both maternal health needs and foetal safety. The physiological changes of pregnancy, potential teratogenic effects of drugs, and the evolving evidence, making informed prescribing decisions remains a significant challenge for clinicians.[1,5]

Physiological Changes Affecting Drug Pharmacokinetics

Pregnancy induces significant physiological changes that alter drug absorption, distribution, metabolism, and excretion. The following table summarizes key pharmacokinetic changes during pregnancy:[6]

Pharmacokinetic Phase	Physiological changes in pregnancy	Effect on Drug Handling
Absorption	Slower emptying of stomach & reduced gut motility. Increase gastric pH. Nausea & Vomiting	Delayed Drug Absorption. Alter solubility/absorption of some drugs like weak acids. Lower Plasma Concentration of drug.
Distribution	Increase Plasma volume. Increase Body Fat. Decrease Plasma albumin	Dilution of Drugs. Alter distribution of lipophilic drugs. Increase Free (Active) drug level
Metabolism	Increase Activity of CYP3A4, CYP206. Decrease activity of CYP1A2.	Alter the rate of drug Metabolism
Excretion	Increase renal blood flow Increase GFR.	Increase renal clearance of drug Decrease half-life of Drug

Given these pharmacokinetic changes, it is crucial to monitor drug therapy carefully throughout pregnancy, using the lowest effective dose to achieve the desired therapeutic outcome whole minimizing foetal exposure.[3]

Placental Transfer

The Placenta is not just a passive barrier rather, it plays an active and dynamic role in drug transfer and foetal exposure.

Several factors influence the rate and extent of placental drug transfer, including gestational age, maternal and foetal metabolism, protein binding, ionization, lipid solubility and molecular weight of the drug.[2]

Placental Influence on Drug Prescribing During Pregnancy

Drug Transfer Across the Placenta

Most drugs cross the placenta via passive diffusion.

Factors influencing placental transfer:

- Molecular weight: drugs <500 Da cross more easily
- Lipid solubility: lipophilic drugs cross more readily

- Degree of ionization; non-ionized drugs cross more easily
- Protein binding: only free (unbound) drug crosses
- Placental transporters: some drugs are actively transported (e.g., via p-glycoprotein)

Placenta as a Semi-Permeable Barrier

Protects the fetus from some toxins and pathogens, but not all. Does not effectively block teratogenic drugs like thalidomide, isotretinoin, warfarin

Metabolic Role of Placenta

Has enzymes that can metabolize some drugs before they reach the fetus

Can either detoxify or activate certain compounds

Dynamic Changes Across Trimesters

Placental structure and blood flow change over time

The placenta allows selective drug passage but it cannot fully protect the foetus. Therefore, prescribing decisions must thoughtfully consider not only maternal health need but also the risk of foetal drug exposure and susceptibility.

Teratogenicity

A drug is identified as a teratogen when exposure during pregnancy results, either directly or indirectly, or in structural or functional abnormalities in the foetus or in the child after birth. Teratogenic effects vary widely, ranging from miscarriage to functional impairments or developmental disorders. The spectrum of adverse effect is outlined in Table

Table 1. Teratogenic Effect [2,5]

Spontaneous Abortion
Structural Malformations
Intrauterine Growth retardation
Foetal death
Functional impairment
Neuropsychological and behavioural abnormalities
Transplacental Carcinogenesis

Drugs with proven teratogenic and foetal effect in humans

The following table summarizes some drugs with proven teratogenic effects in human:

ACE inhibitors	Decreased skull ossification, renal tubular dysgenesis, oligohydramnios
Aminoglycosides	Deafness, vestibular damage
Androgenic drugs	Masculinisation of female foetuses
Beta blockers	Growth restriction, neonatal bradycardia and hypoglycaemia
Carbamazepine	Neural tube defects
Chloramphenicol	Grey baby syndrome
Ethanol	Foetal alcohol syndrome (pre- and postnatal growth restriction, CNS anomalies, characteristic facial features)
Indomethacin	Premature closure of ductus arteriosus, necrotizing enterocolitis, neonatal pulmonary hypertension
Lithium carbonate	Epstein's anomaly
Methotrexate	CNS and Limb Abnormalities
Misoprostol	Moebius syndrome
Opioids	Neonatal withdrawal symptoms when drugs are taken in late pregnancy
Retinoids	CNS, craniofacial and cardiovascular defects
Tetracycline	Anomalies of teeth and bone
Valproic acid	Neural tube defects, dysmorphic features, developmental delay
Warfarin	Skeletal and CNS defects, Dandy Walker syndrome

Awareness of these teratogenic risks is critical for clinicians when prescribing in pregnancy, particularly during periods of heightened foetal vulnerability. [2,5]

Timing of Exposure

The risk of teratogenicity varies by gestational age. The timing of exposure to a drug is a critical factor in determining the nature and extent of any adverse effects. The three important phases in human development are:

1. **Pre-embryonic phase:** This extends from conception to 17 days post conception. During this period any adverse effect is an 'all or none phenomenon' and the result of an insult will be either foetal death or intact survival through multiplication of the totipotent cells.
2. **Embryonic phase:** This extends from day 18 to day 55. It is the period of greatest vulnerability for the embryo due to rapidly differentiating tissues.
3. **Foetal phase:** This runs from gestational age of 8 weeks to term. The cerebral cortex and glomeruli continue to develop and remain susceptible to damage. Functional abnormalities such as deafness may occur and drugs that can cross the placenta may affect foetal growth and development.[2]

Timing & Teratogenic Risk in Pregnancy

Drug sensitivity varies by gestational age

First Trimester
(Weeks 1-12)

Stage : Organogeneseis

Risk : Highest vulnerability to congenital malformatons

Prescribing Tip : Avoid most drugs unless life-saving or essential

Second Trimester
(Functional maturation)

Risk : Fetal growth restriction. Subtle neurological or endocrine effects

Prescribing Tip : Use with caution; choose safest available

Third Trimester
(Final maturation & preparation for birth)

Risk : Preterm labor triggers. Neonatal toxicity (e.g., respiiratory depression, withdrawal symptoms)

Prescribing Tip : Avoid drugs that interfere with labor or neonatal adaptation

Principles of safe prescribing in Antenatal care

Prescribing medications during pregnancy demands a careful and thoughtful approach. The goal is to safeguard maternal health while minimizing any potential risks to fetal development. The following principles form the foundation for safe prescribing in antenatal care:

1. **Risk-Benefit Assessment**

   Every medication decision should be based on a clear risk-benefit analysis. The health of the mother must be prioritized, but any potential harm to the fetus should be minimized.

   Example: Untreated maternal hypertension or diabetes can pose greater risks to both mother and fetus than carefully chosen pharmacological treatment.[1]

2. **Drug Selection Based on Safety**

   Wherever possible, prefer medications with well-established safety profiles in pregnancy. If evidence is limited, clinicians should consult teratology information systems or reliable drug safety databases to make informed decisions.[3,4]

3. **Avoidance of Teratogenic Agents**

   Certain drugs are known to cause congenital anomalies and must be strictly avoided, particularly during first trimester.

   Examples: Isotretinoin (causes craniofacial and cardiac defects), Valproic acid (linked to neural tube defects).[2]

4. **Minimum Effective Dose for the Shortest Duration**

   The principle of 'less is more' applies. Prescribers should use the lowest effective dose for the shortest period necessary to achieve the desired therapeutic outcome. This minimizes fetal exposure without compromising maternal care.[3]

5. **Informed Consent and Patient Education**

   It is critical to involve pregnant individuals in the decision-making process by clearly explaining:

   - The rational for prescribing
   - Potential risks and benefits
   - Alternatives options available

   Obtaining informed consent empowers women and supports ethical medical practice, while fostering trust between clinician- patient relationship.[7]

Summary Box: Key Principles at a Glance

Principle	Core Message
Risk-Benefit Assessment	Benefit to mother must outweigh risk to fetus
Drug Selection Based on Safety	Prefer well-studied, pregnancy-safe drugs
Avoidance of Teratogenic Agents	Avoid drugs known for causing birth defects
Minimum Effective Dose	Use the smallest dose for the shortest necessary time
Informed Consent and Education	Empower patients through shared decision-making

Drug Safety Classification and Guidelines in pregnancy

Historically, the U.S. Food and drug Administration (FDA) categorized medications based on their risk to the foetus using a simple letter-based system (Categories A, B, C, D, and X). Although this system offered a basic framework for risk assessment, it was often criticized for oversimplifying complex information and leading to potential misinterpretation.

Recognizing these limitations, The FDA introduced, the Pregnancy and Lactation Labelling Rule (PLLR), which came into effective on June 30, 2015. The PLLR replaces the letter

categories with detailed narrative sections that provide comprehensive information about medication use during pregnancy and lactation, as well as considerations for reproductive potential. The three main sections under PLLR are:[4]

Pregnancy subsection: Risk summary, clinical considerations, and data on drug use in pregnancy.

Lactation subsection: Information on drug use during breastfeeding.

Females and males of reproductive potential subsection: Information on pregnancy testing, contraception, and infertility related to the drug.

This approach aims to provide clearer, evidence-based information to help healthcare providers and patients make informed decisions during pregnancy.

Comparison of the old FDA pregnancy letter categories classification versus the new Pregnancy and Lactation Labelling Rule (PLLR)

Aspect	Old Letter Categories	PLLR (Narrative Labeling)
Format	Single letter category indicating risk level	Detailed narrative sections with risk summary and data
Risk Communication	Simplistic, often misinterpreted grading system	Comprehensive, evidence-based discussion of risks and benefits
Sections/ Subsections	Pregnancy, Labor and Delivery, Nursing Mothers	Pregnancy, Lactation, Females and Males of Reproductive Potential
Pregnancy Section Content	Risk category letter only	Risk summary, clinical considerations, supporting data
Lactation Section	Nursing Mothers	Lactation: drug levels in milk, effects on infant
New Section	None	Females and Males of Reproductive Potential: contraception, pregnancy testing, infertility
Update Frequency	Static categories, rarely updated	Labels updated as new information becomes available
Implementation Date	Before June 30, 2015	Effective June 30, 2015, for new drugs and phased for older
Purpose	Categorize foetal risk broadly	Assist Healthcare providers with detailed counselling information

Key consideration for Safe & effective Prescribing in contemporary Antenatal Care

When discussing prescribing in antenatal care in the present scenario, key important points include:

Tailored, patient-centred care: Prenatal care should be individualized based on comprehensive assessment of medical, social, and structural factors ideally before 10 weeks gestation. This includes shared decision-making with the pregnant individual to develop a personalized care plan rather than a one-size-fits-all approach.

Risk assessment and monitoring: Adjust the frequency of visits and monitoring based on the patient's risk level. Low-risk patients may have fewer in-person visits supplemented by telemedicine or alternative modalities, while high-risk patients require more frequent follow-up and potential specialist referrals.

Medication safety and timing: Consider risks during pregnancy when prescribing, ideally making medication adjustments before conception to minimize foetal exposure. Avoid polypharmacy and aim for psychiatric or medical stability before pregnancy when possible.

Use of updated labelling and guidelines: Follow current FDA pregnancy and lactation labelling resources which no longer use letter categories but provide detailed risk information for medications.

Addressing social determinants and unmet needs: Prenatal care should include referral or coordination for social support services to address barriers such as transportation, childcare, or socioeconomic factors that affect care access and outcomes.

Preconception counselling: For conditions like diabetes, counselling and optimization of health before pregnancy reduce risks of complications and congenital anomalies.

In summary, prescribing in antenatal care today emphasizes individualized, evidence-based, and safe medication use integrated with broader tailored prenatal care models that address medical and social needs to improve maternal and foetal outcome.[1,7]

Newer Safe Drugs in Pregnancy (by Category)

Antiemetics (for nausea & vomiting)

Doxylamine + Pyridoxine (Doxinate)

- FDA-approved for morning sickness.
- First-line option.

Ondansetron

Previously a suggest low risk in second and third trimesters.[7]

Antibiotics

Cephalosporins (cefixime, Cefuroxime)

Broad -spectrum infections.

Safe in all trimesters.

Azithromycin

Use in Respiratory& STIs

Safe after First trimester.

Amoxicillin-clavulanate (Augmentin)

In UTI, Sinusitis, dental infection.

Safe in pregnancy.

Avoid in PPROM.[7]

Important Note on PPROM Cases:

A 2001 ORACLE study raised concerns that Augmentin use in PPROM (preterm premature rupture of membranes) might be associated with an increased risk of necrotizing enterocolitis (NEC) in newborns.

Thus, it should be avoided in PPROM unless absolutely necessary.

Nitrofurantoin

- Urinary tract infection
- Safe in all trimester but avoid Near Term.

After 37 weeks of pregnancy and during labour as may cause haemolytic anaemia in the newborn and can affect neonatal red blood cells due to immature enzyme systems.

Fosfomycin

- Single dose
- Safe and effective treatment for UTI

Analgesics

Paracetamol

- First line analgesic throughout pregnancy

Low dose NSAIDS

- Can use with caution in 2nd trimester
- Avoid in 1st & 3rd trimester.

In first trimester there is increased risk of miscarriage and possible teratogenic effect (though rare and dose-dependent).

In third trimester - Increased risk of Premature closure of ductus arteriosus, oligohydramnios, increased risk of neonatal pulmonary hypertension.

Topical Lidocaine (patches, gels)

- Safe for local pain relief.

Thromboprophylaxis(anticoagulant)

Low molecular weight Heparin

- Drug of choice for thromboprophylaxis in pregnancy.

Aspirin

- Safe for use in prevention of preeclampsia and FGR

Fondaparinux

Sometimes used in heparin allergy or HIT (heparin induced thrombocytopenia), under close supervision

Antihypertensive drugs

Labetalol

- First line antihypertensive in pregnancy

Nifedipine (extended-release)

- Preferred for chronic hypertension or acute BP control.

Methyldopa

- Time-tested and still used safely.

Diabetes Medications

Insulin Analogues (e.g., Lispro, Apart)

- Safer and more predictable than regular insulin.

Metformin

- Increasingly used in GDM and PCOS;
- Data supports safety.

Glyburide (Glibenclamide)

- An oral option for gestational diabetes, though insulin is preferred if control is poor.

Antidepressants / Mental Health

Sertraline (SSRI)

- considered safest in pregnancy.

Fluoxetine

- Used for persistent depression/anxiety with careful monitoring.[7,8]

Antithyroid Drug

Propylthiouracil /Methimazole

In First trimester:

- Propylthiouracil is preferred drug.
- Methimazole can cause congenital malformation in first trimester (e.g. aplasia cutis, choanal /oesophageal atresia)

In second and third trimester:

Switch from PTU to methimazole is recommended.

Long term PTU use increases risk of maternal liver toxicity.

Steroid medication

Prednisolone

- Can use in maternal autoimmune conditions, severe hyperemesis gravidarum, Asthama exacerbation and adrenal Insuffiency especially after the first trimester
- Use for short term in low to moderate doses.
- Inactivated by placenta so minimal foetal exposure

Dexamethasone

- For foetal lung maturity.

Betamethasone

- For foetal lung maturity

Drug Used in SLE

Hydroxychloroquine

- Safe and strongly recommended
- Reduces flares, improves outcomes, and lowers neonatal lupus risk.

Azathioprine

Generally safe immunosuppressive can be continued if required.[10]

Chemotherapeutic Drugs

- Avoid in first trimester
- Can be given in 2nd and 3rd trimester with careful monitoring.
- Usually withheld after 35 weeks to avoid maternal/foetal bone marrow suppression during delivery.

Safe chemotherapeutic agents are:

Alkylating agents (Cyclophosphamide)

Anthracyclines (Doxorubicin,Epirubicin)

Antimetabolites (5-Flurouracil)

Taxanes (Paclitaxel,docetaxel)

Platinum compound (Carboplatin,Cisplatin)[7]

Vaccines in pregnancy

Safe and essential - Tetanus Toxoid, Tdap, Influenza (inactivated)[8]

Conditionally Safe - Hepatitis, Rabies, Typhoid,

Contraindicated - all live vaccines like MMR, varicella, BCG

Challenges in Antenatal Prescribing

1. **Limited Research and Data -** Pregnant women are often excluded from clinical trials due to ethical and legal concerns, leading to a scarcity of high-quality data on medication safety (Chambers et al., 2008). As a result, prescribing often relies on observational studies and post-marketing surveillance.[5]
2. **Ethical Dilemmas and Legal Concerns -** Prescribers must navigate ethical tensions between maternal autonomy and foetal safety. Proper documentation, patient counselling, and shared decision-making are essential.[5]
3. **Cultural and Societal Influences -** Cultural beliefs may lead some pregnant individuals to resist medical treatment. Clinicians must address these sensitively while emphasizing evidence-based care.[5]

Advances in Antenatal Pharmacology

- **Pharmacogenomics -** Emerging studies explore how genetic differences affect drug metabolism during pregnancy, opening the door to personalized medicine.[6]
- **Electronic Prescribing Systems -** These reduce medication errors by flagging contraindications and drug interactions, especially useful in high-risk pregnancies.
- **Digital Health Tools -** Apps that track medications and provide gestational alerts are becoming valuable in maternal healthcare delivery.[7]

Future Directions

There is a pressing need for:

- More pregnancy-inclusive clinical research.
- Improved pharmacovigilance and registries to track medication safety.
- Enhanced education for healthcare providers on antenatal pharmacotherapy.
- Development of decision support tools

integrating latest evidence.

Conclusion

Prescribing in antenatal care is a nuanced process demanding up-to-date knowledge, clinical judgment, and patient partnership. By adhering to evidence-based principles and guidelines, clinicians can optimize maternal health while safeguarding foetal development, ultimately improving pregnancy outcomes.

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> It seems that many health professionals involved in antenatal care have not realized that one of their role should be to protect the emotional state of pregnant women.
>
> *- Michel Odent*

Genetic Aneuploidy Screening : Current Status & Way Forward

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Background

In humans, each somatic cell comprises 46 chromosomes, consisting of 22 pairs of autosomes and one pair of sex chromosomes. Chromosomal abnormalities occur in approximately 1 in 150 live births. These anomalies encompass aneuploidy, which is characterized by the presence of one or more extra or missing chromosomes, as well as translocations, duplications, and deletions.

Aneuploidy, defined as an abnormal number of chromosomes, is a major factor in early pregnancy loss, stillbirth, congenital abnormalities, and impaired neurodevelopmental outcomes in children. Prenatal screening for aneuploidy aims to detect common chromosomal disorders:

- Trisomy 21 (Down syndrome) – Occurs in approximately 1 in every 700 live births.
- Trisomy 18 (Edwards syndrome) is the second most prevalent trisomy, occurring in approximately 1 out of every 3,000 live births.
- Trisomy 13 (Patau syndrome) – Approximately 1 out of every 6,000 live births.
- Sex chromosome aneuploidies – e.g. Turner syndrome and Klinefelter syndrome.

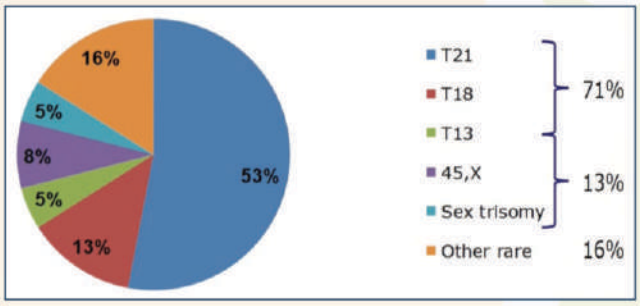


Fig.1.Percentage of reported chromosomal abnormalities[1]

Screening and Diagnostic Testing

Prenatal aneuploidy screening should be made available to all pregnant individuals, irrespective of maternal age. The screening options include:

i. Serum screening (Dual marker in first trimester/Quadruple test in second trimester)
ii. Nuchal translucency (NT) ultrasound
iii. Combined first trimester screening: NT with Dual marker
iv. Combined first and second trimester screening test
v. Genetic sonogram

1. **Cell-free DNA (cfDNA) ing, testing-** Known as Non-Invasive Prenatal Testing (NIPT)

All patients electing to undergo screening or testing should be provided with counselling that addresses the risks, benefits, and limitations associated with their chosen procedures. When screening results indicate abnormalities, diagnostic procedure like chorionic villus sampling or amniocentesis is recommended. Importantly, only one screening strategy should be used at a time to avoid confusing or conflicting results.[2]

First trimester screening:

First trimester screening allows for earlier diagnosis. It includes:

- **Ultrasound:** This procedure evaluates nuchal translucency (NT) between 11 weeks and 13 weeks 6 days of gestation, with a crown-rump length ranging from 45 to 84 mm. If it is increased more than 99th centile, it is associated with aneuploidies or structural malformations[3]. Nuchal translucency (NT) screening alone identifies approximately 70% of Down syndrome cases, with a false-positive rate of 5%[4].
- **Double marker:** Two serum markers—free Beta human chorionic gonadotropin (hCG) and pregnancy-associated plasma protein A (PAPP-A)— are measured, and the risk of aneuploidy is calculated considering factors such as age, ethnicity, weight of fetuses, diabetes, and smoking status. The detection rate of trisomy 21 increases to 82%-87% with a false positive rate of 5% when nuchal translucency (NT) measurement is combined with dual marker testing[2].

Pregnancies involving fetal trisomy 21 are typically associated with elevated levels of hCG and reduced levels of PAPP-A. In cases of trisomy 18 and trisomy 13, both analytes generally present at lower levels.

Table 1. Dual marker Serum analytes in Aneuploidy

Disorder	PAPP-A	B-hCG
Trisomy 21	↓ (0.5 MoM)	↑ (2 MoM)
Trisomy 18	↓ (0.2 MoM)	↓ (0.2 MoM)
Trisomy 13	↓ (0.3 MoM)	↓ (0.5 MoM)

Second trimester screening: It is done with quadruple marker screen between 15- 20 weeks. The assessment includes serum analytes such as maternal serum alpha-fetoprotein (MSAFP), hCG, unconjugated estriol (uE3), and dimeric inhibin A. This test does not necessitate ultrasonography for measurement of nuchal translucency. Additionally, it provides information on the risk of open fetal neural tube defects, as well as risk assessment for trisomy 21 and trisomy 18. Second trimester screening is generally intended for patients at low risk who did not undergo first trimester screening. The detection rate of the quadruple screen for trisomy 21 is 80%, with a 5% false positive rate. In instances of fetal trisomy 21 or 18, levels of maternal serum alpha-fetoprotein (MSAFP) and unconjugated estriol (uE3) are found to be lower than average. Additionally, human chorionic gonadotropin (hCG) levels are typically elevated in cases of trisomy 21, but reduced in cases of trisomy 18. Inhibin A is increased in cases of fetal trisomy 21 but is not significantly affected in trisomy 18.. Very low uE3 levels may point to rare genetic disorders, including steroid sulfatase deficiency or Smith-Lemli-Opitz syndrome.

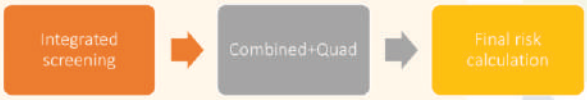
Table 2. Quadruple marker Serum analytes in Aneuploidy

Disorder	hCG	AFP	uE3	Inhibin A
Trisomy 21	↑	↓	↓	↑
Trisomy 18	↓	↓	↓	N
Trisomy 13	N	Small	N	N
Neural tube Defect	N	↑	N	

Combined screening tests:

These tests can be classified as integrated, sequential, or contingent screenings, and involve the use of serum analytes, nuchal translucency (NT), or both. They provide incresed detection rate for trisomy 21, 18, and 13 compared to one-step screening tests.

1. *Integrated screening:* It is done in 2 steps. In first step, NT is measured along with beta hCG and PAPP-A at 11- 13weeks 6 days and results are not disclosed. In second step, serum analytes of second trimester screening test are measured at 15-20 weeks. Single test result is given in second trimester. Disadvantage includes late availability of results and drop outs for second step.



2. *Sequential screening:* It is also done in 2 steps. First, the patient receives an estimated risk assessment upon completion of the first-trimester combined screening. If the results from the first-trimester screening indicate a high risk of aneuploidy, the patient is informed of the test results and offered additional testing options, such as invasive testing or cell-free DNA analysis. The patient is also informed about the test results, and analyte screening is planned for the second trimester to provide a final combined numerical risk assessment.

3. *Contingent Screening:* In the initial step, first

trimester screening is conducted and patients are classified into high, intermediate, and low risk based on the test results. Patients identified as high risk are offered additional testing, while those at low risk are advised that no further screening is required. Patients categorized as intermediate risk are recommended for second trimester screening. The results of both screenings are then combined, and the final risk assessment is communicated to the patient.

Second trimester ultrasound/genetic sonogram: Fetuses with trimosy 13 or trisomy 18 typically present major structural anomalies observable through ultrasonography (USG). USG demonstrates a sensitivity of 50-60% for the detection of trisomy 21. A range of "soft markers" refers to nonspecific physical traits that are more frequently found in fetuses with Down syndrome and indicate an increased risk of trisomy 21 when observed during second-trimester ultrasonography. This method is utilized to adjust the risk assessment for fetal T21 by evaluating the occurrence of these soft markers.

Non-Invasive Prenatal Testing (NIPT)

This screening test identifies DNA fragments primarily originated from apoptotic trophoblasts or placental cells going through automatic cell death. It analyzes fetal cell-free DNA circulating in maternal blood and can be conducted any time after 10 weeks of gestation. It is advisable to perform an ultrasound prior to confirm number of fetus, period of gestation and to look for any major anomalies detectable in the first trimester. In cases where a cystic hygroma or anomaly is detected, patients may opt for diagnostic testing instead of screening, thereby enabling earlier prenatal diagnosis.

Non-invasive prenatal testing (NIPT) is the most sensitive and specific screening method for common aneuploidies. As NIPT is a screening test that may produce false-positive or false-negative results, positive findings necessitate confirmation through invasive diagnostic procedures.

Circulating DNA originates from placental trophoblasts, which may exhibit placental mosaicism and not accurately represent the fetal phenotype. Chorionic villus sampling (CVS) collects tissue from the same source as circulating DNA, while a karyotype obtained through amniocentesis is derived directly from the fetus. Therefore, amniocentesis is generally preferred for confirmation.

Due to its high sensitivity, NIPT can be used as a secondary screening tool for individuals with high-risk results from first or second-trimester serum screening, particularly those wishing to avoid invasive testing. However, a negative NIPT result in this context does not eliminate the risk of aneuploidy and a positive test result requires further invasive testing for confirmation.

Table 3. Characteristics of serum screening test for aneuploidy

Screening test	Detection rate of Trisomy 21 (%)	Screen Positive rate (%)
First trimester screen		
NT alone	64-70	5
Combined screening	80-84	5
Quadruple Screen	80-82	5
Integrated Screening	94-96	5
Sequential Screening		
Stepwise	92-97	5.1
Contingent	91-95	4.5
Cell free DNA	99	0.1

Limitations of NIPT

The accuracy of Non-Invasive Prenatal Testing (NIPT) is contingent upon the fetal fraction, which refers to the percentage of cell-free DNA (cfDNA) in maternal blood that originates from the placenta. This percentage typically ranges between 3% and 13%, depending on factors such as maternal body mass index, gestational age, and other biological variables[6]. A minimum fetal fraction of 4% is generally required to ensure reliable test interpretation.

In 2–4% of pregnancies, cfDNA testing yields a "no-call" or indeterminate result, often due to low fetal fraction. These cases carry an increased risk of chromosomal abnormalities[7]. Factors contributing to false positive result include maternal occult malignancy, undiagnosed translocations, maternal mosaicism, confined placental mosaicism and vanishing twin.

Special Considerations:

Twin Pregnancies

Non-invasive prenatal testing can be conducted in twin pregnancies. NIPT for trisomy 21, trisomy 18, and trisomy 13 in twin pregnancies exhibits screening characteristics comparable to those in singleton pregnancies and approximates the performance in single gestations.

Copy number variant (CNVs)

The term "copy number variation" (CNV) refers to segmental genomic imbalances, including microdeletions and microduplications, however excludes numerical chromosome imbalances. Non-invasive prenatal testing (NIPT) can detect microdeletions as well as larger genomic deletions and duplications. The 22q11.2 deletion syndrome (22q11.2DS) is the maximum prevalent pathogenic CNV identified during prenatal screening. Current evidence is lacking to support routine testing for CNVs other than 22q11.2.[8]

Cell-free fetal DNA in maternal plasma is utilized to genotype the fetus at the Rh locus thus testing the baby blood group in Rh negative pregnancy. Sequencing tests for panels of genes to determine single gene disorders and sequencing of the entire fetal genome is being explored on a research basis. Refinements in the analysis of cell free DNA will likely make noninvasive testing for many other genetic disorders available in the future. In conclusion, although NIPS performance characteristics are superior to traditional screening methods for common aneuploidies, this technology cannot yet replace prenatal diagnosis.

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Optimizing Number and Use of Ultrasound in Universal Antenatal Care

Introduction

Maternal and neonatal outcomes are among the most critical indicators of a nation's health. Improving these outcomes relies on the provision of high-quality antenatal care that is guided by evidence-based practices and the efficient use of available diagnostic tools. Ultrasonography (USG) is now a cornerstone of antenatal care, providing crucial insights into fetal development and the early identification of potential complications.

Routine ultrasound enables accurate gestational dating and timely detection of conditions such as congenital anomalies, multiple pregnancies, placenta previa, and ectopic gestations—all of which can pose significant risks if left undiagnosed. Although congenital anomalies affect only 2–4% of births, they account for a disproportionate share of perinatal morbidity and mortality. Early identification through ultrasound allows for appropriate clinical decision-making, including the potential for in-utero interventions, referral to specialised care, and better delivery planning.

This chapter explores strategies for optimising both the number and timing of antenatal ultrasound scans. The aim is to enhance clinical outcomes while ensuring that services remain accessible, equitable, and cost-effective across varying levels of the healthcare system.

Prevalence in India

India faces the highest prevalence of birth defects worldwide, impacting about 1 in every 33 infants and leading to nearly 3.2 million cases of disability each year. High-risk pregnancies are prevalent in about 15% of cases, yet only 4% are diagnosed before delivery. In many regions, women receive no ultrasound during pregnancy, leading to late detection of complications—often only at the time of delivery—while in contrast, some urban or private facilities perform ultrasounds frequently, even weekly in the final month.

Access to ultrasound is marked by stark socioeconomic disparities. According to NFHS-3 data, only 24% of pregnant women had an ultrasound, with just 4% in the lowest wealth quintile compared to 62% in the highest. This highlights a significant gap in equitable access to essential antenatal services.

Unlike many high-income countries that recommend standardized scans—such as two routine ultrasounds in Europe and Canada (dating at 8–14 weeks and anomaly scan at 18–20 weeks)—India currently lacks uniform national guidelines for the number, timing, and reporting of antenatal ultrasounds.

To address this, the Government of India established an expert committee to formulate evidence-based national guidelines.

How to optimize number and use of ultrasound

To maximise the clinical value of ultrasonography in pregnancy while ensuring efficient use of resources, it is essential to define an optimal number and timing of scans based on key diagnostic objectives. An ideal

minimum number of ultrasound scans should be strategically scheduled to achieve the following:

- **Accurate determination of gestational age,** particularly in the first trimester, to guide appropriate obstetric management and reduce the risk of post-term or preterm interventions.
- **Identification of the number of fetuses,** enabling early detection and management of multiple gestations.
- **Screening for congenital anomalies** within the legal gestational age limit for medical termination of pregnancy, to support informed decision-making and referral to appropriate care.
- **Assessment of placental location and abnormalities,** such as placenta previa or abruption risks.
- **Evaluation of amniotic fluid volume,** identifying oligohydramnios or polyhydramnios that may affect fetal well-being.
- **Exclusion of ectopic pregnancy,** particularly in early scans, to prevent maternal morbidity or mortality.
- **Measurement of cervical length,** which can assist in predicting the risk of preterm labour in selected cases.

The timing of these scans should ensure that key findings are available before the legally permissible gestational age for medical termination of pregnancy, as defined by regional laws and regulations. Standardising the purpose and schedule of routine ultrasounds will promote early risk identification, improve pregnancy outcomes, and support the rational use of diagnostic resources.

Antenatal ultrasound should be performed following "ALARA" principle that states total exposure should remain as low as reasonably achievable.

Standardizing Ultrasound in Prenatal Care for Improved Outcomes

The World Health Organization's 2016 guidelines on antenatal care advise a single ultrasound before 24 weeks of pregnancy to accurately determine gestational age, identify fetal anomalies or multiple pregnancies, and enhance the overall maternal experience. Routine ultrasounds after 24 weeks are not recommended if an early scan was conducted; however, in cases where no early scan is done, a later ultrasound may help assess fetal number, position, and placental placement. Early ultrasounds, when properly performed, improve the accuracy of gestational dating, aiding in the management of both preterm and post-term pregnancies. Successful implementation of these guidelines depends on strong healthcare infrastructure, including adequate ultrasound services, referral systems, and management protocols. In low-resource settings, expanding access to recommended ultrasound services poses several challenges, including those related to logistics, infrastructure, workforce, and funding.

Criteria for Referral to Higher Centers for Advanced Ultrasound Assessment

In the context of optimizing ultrasound use within universal antenatal care, certain clinical scenarios necessitate referral to higher centers equipped with advanced technology and specialized expertise. These criteria include:

- **Inadequate Image Quality:** When initial ultrasound images are inconclusive due to technical limitations, maternal habitus, or suboptimal fetal positioning, referral ensures accurate assessment.
- **Suspicious or Abnormal Findings:** Any findings suggestive of fetal anomalies, abnormal growth patterns, or soft markers for genetic syndromes should prompt detailed evaluation at a specialized center.
- **Need for Expertise and Advanced Equipment:** Complex clinical situations such as multiple pregnancies or suspected structural abnormalities may require evaluation by trained fetal medicine specialists using high-resolution or 3D/4D imaging equipment.
- **Unavailability of Doppler Facilities:** When Doppler studies are clinically indicated (e.g., for assessing fetal well-being in growth restriction or pre-eclampsia) but not available locally, referral is essential.
- **Requirement for Specialized Investigations:** Indications for fetal neurosonography or fetal echocardiography—such as suspected CNS or cardiac anomalies—require referral to centers with appropriate capabilities and trained personnel.

Such referrals play a critical role in ensuring accurate diagnosis, timely interventions, and improved maternal-fetal outcomes within a streamlined and efficient antenatal care framework.

Optimising Ultrasound Use: Ensuring Quality, Consistency, and Clinical Value

Effective use of ultrasonography in antenatal care extends beyond access—it requires optimisation through quality assurance at every level. Ensuring that ultrasound contributes meaningfully to maternal and fetal health outcomes involves the following key components:

1. **Skilled Workforce and Training -** Proper training and certification of sonographers and medical professionals are essential. Competency in image acquisition, anatomical interpretation, and recognition of abnormalities must be emphasized in both undergraduate and postgraduate medical education. Regular hands-on training, mentorship, and assessments can ensure consistent and accurate use of ultrasound in clinical settings.

   Who will perform Obstetric USG? In India

   Under the PCPNDT Act and Rules, the following professionals are qualified to perform obstetric ultrasounds:

   - Radiologists with PG degrees in Ultrasonography, Radiology, or Imaging Sciences
   - Gynecologists with PG qualification in Obstetrics and Gynecology
   - Registered Medical Practitioners (RMPs) who have completed six months of training as per the 2014 PCPNDT (Six Months Training) Rules
   - RMPs with prior experience (one year or six-month government training) in Obs/Gyn ultrasounds before the 2014 rules must have passed the competency exam by January 1, 2017, as outlined in Schedule II of the same rules

2. **Appropriate and Well-Maintained Equipment -** The reliability of ultrasound findings depends heavily on the quality and maintenance of the equipment. Facilities must be equipped with modern, functional ultrasound machines capable of high-resolution imaging. In resource-limited settings, portable or point-of-care ultrasound devices can help bridge access gaps if appropriately used.

   Basic obstetric ultrasound equipment should include:

   - Real-time grayscale imaging
   - Transabdominal (3–5 MHz) and transvaginal probes
   - Adjustable acoustic power with display indicators
   - Freeze-frame and electronic calipers
   - Obstetric software presets for gestational age estimation
   - Image storage or printing capability
   - Regular maintenance for optimal performance

   Advanced features like Doppler or 3D/4D are not necessary for routine scans, but a transvaginal probe can aid in difficult cases when anatomy isn't clearly visible with transabdominal scanning.

   The ultrasound machine must be registered with the appropriate authority under the PC&PNDT Act and Rules in India, and all documentation must be kept in accordance with the Act's requirements.

3. **Standardised Protocols and Guidelines -** Implementing clear, evidence-based protocols for image acquisition, reporting, and interpretation is crucial. Standardisation reduces inter-operator variability, enhances diagnostic accuracy, and ensures uniformity of care across different healthcare levels and regions. Protocols should align with national guidelines while allowing flexibility for context-specific application.

   Consent and Reporting for Obstetric Ultrasound - As per the PC&PNDT Act and Rules, written informed consent must be obtained from the woman undergoing obstetric ultrasound using Form F. Women should be clearly informed about the purpose of the ultrasound, potential findings, and the certainty of the results. The couple should also be counseled on the implications of detecting any fetal abnormalities and all healthcare facilities offering ultrasound services are required to maintain records required as per PC&PNDT Act.

4. **Continuous Medical Education (CME) and Quality Improvement -** Ongoing education and periodic skill refreshers through CME programs help providers stay

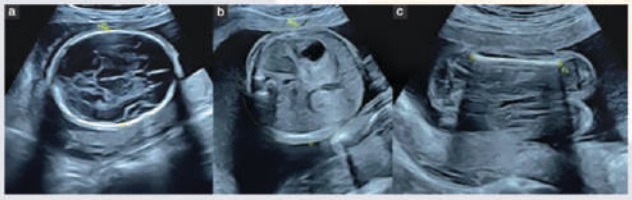
updated with advancements in technology and practice. Peer review mechanisms, audits, and participation in professional networks can further support quality improvement and accountability.

By investing in these optimisation strategies, India can enhance the utility of ultrasound as a safe, cost-effective, and clinically impactful tool in universal antenatal care.

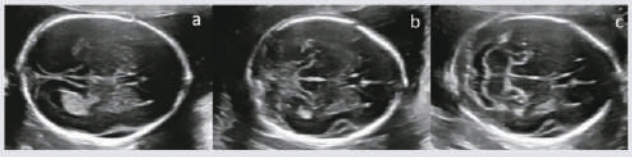
Limitations of Mid-trimester (18-24 weeks) scan

- **Gestational Dating Accuracy:** Ultrasound dating becomes unreliable after 24 weeks and should not influence clinical decisions. An estimated due date (EDD) established earlier should not be altered in later scans.
- **Detection Limitations:** Ultrasound cannot identify all fetal abnormalities. Some conditions especially neurological ones, may appear later in pregnancy or after birth while a few may evolve with advancing gestational age like skeletal dysplasia, ventriculomegaly and certain cardiac defects
- **Chromosomal Abnormalities:** Ultrasound cannot confirm chromosomal disorders. Soft markers may suggest increased risk but are not diagnostic. Only chromosomal testing through invasive procedures can provide a definitive diagnosis and should be reserved for high-risk cases.
- **Placental Location:** Placental position can change as the pregnancy progresses. Early findings of a low-lying placenta should not be labeled as placenta previa. Instead, the distance from the internal os should be documented when relevant.

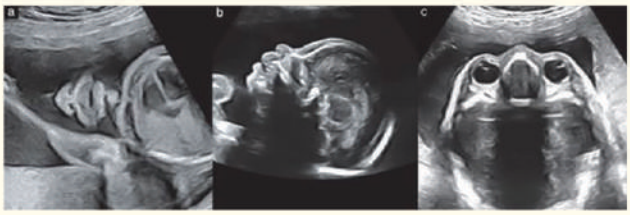
Reference Image Gallery:



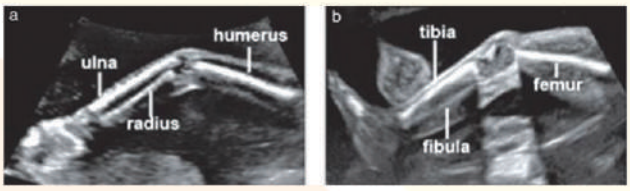
(a) Head Circumference (HC), (b) Abdominal Circumference (AC) and (c) Femur Length (FL).



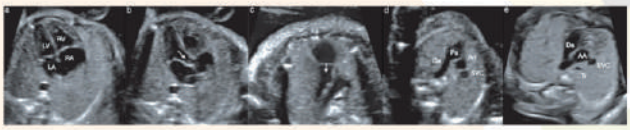
(a) Transventricular, (b) Transthalamic, (c) Transcerebellar



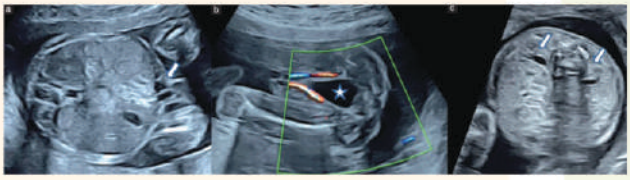
Fetal Face: (a) Coronal, (b) Sagittal (c) Transverse



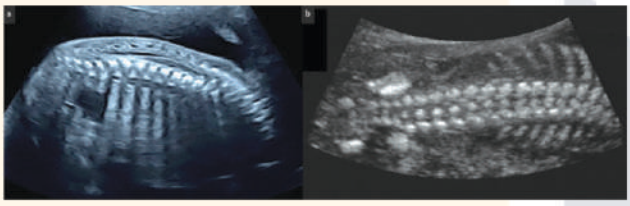
Limbs: (a) Upper limb (b) Lower limb



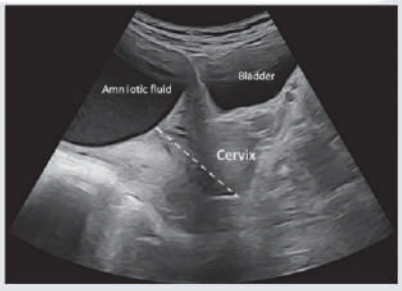
Fetal Heart



(a)Fetal cord insertion site
(b) Bladder with umbilical arteries (c) Kidneys



Fetal Spine: (a) Sagittal section, (b) Coronal Section



Cervical Length Evaluation

Suggested Anomaly Scan Reporting Template (18 to 24 Weeks)

Patient Information

Name of Patient	
Age	
ID Number	
Date of Exam	
Referring Physician	
Indication for Scan	
Obstetric History	
Clinical History	
LMP / GA by LMP / EDD	
Corrected GA (if any)	

Observations

Number of Fetuses	
Presentation	
Cardiac Activity	☐ Present ☐ Absent
Placental Position	
Single Deepest Pocket (cm)	
AFI (cm)	
Umbilical Cord (Insertion / Vessels)	

Biometry

Parameter	Measurement (mm)	GA (weeks)
BPD		
HC		
AC		
FL		
EFW (grams & percentile)		

Fetal Anatomy

Head

Midline Falx	☐ Normal	☐ Abnormal
CSP	☐ Normal	☐ Abnormal
Lateral Ventricles	☐ Normal	☐ Abnormal
Posterior Fossa	☐ Normal	☐ Abnormal
Trans-Cerebellar Diameter	☐ Normal	☐ Abnormal
Cisterna Magna	☐ Normal	☐ Abnormal
Other Abnormal Findings		

Spine

Vertebrae	☐ Normal	☐ Abnormal
Spinal Canal	☐ Normal	☐ Abnormal
Other Abnormal Findings		

Face

Nose	☐ Normal	☐ Abnormal
Mouth	☐ Normal	☐ Abnormal
Other Abnormal Findings		

Thirax

Both Lungs	☐ Normal	☐ Abnormal
Pleural Effusion	☐ Normal	☐ Abnormal
Pericardial Effusion	☐ Normal	☐ Abnormal
Mass / Lesion		

Heart

Position	☐ Normal	☐ Abnormal
Situs	☐ Normal	☐ Abnormal
Size	☐ Normal	☐ Abnormal
4-Chamber View	☐ Normal	☐ Abnormal
3 Vessel View	☐ Normal	☐ Abnormal
Heart Rate	☐ Normal	☐ Abnormal
Rhythm	☐ Normal	☐ Abnormal
Other Abnormal Findings		

Abdomen

Situs	☐ Normal	☐ Abnormal
Stomach	☐ Normal	☐ Abnormal
Kidneys	☐ Normal	☐ Abnormal
Urinary Bladder	☐ Normal	☐ Abnormal
Cord Insertion	☐ Normal	☐ Abnormal
Cord Vessels	☐ Normal	☐ Abnormal
Abdominal Wall	☐ Normal	☐ Abnormal
Ascites	☐ Normal	☐ Abnormal
Other Abnormal Findings		

Limbs

Upper Limb (segments, hands)	☐ Normal	☐ Abnormal
Lower Limb (segments, feet)	☐ Normal	☐ Abnormal
Other Abnormal Findings		

Conclusion

Overall Examination	☐ Normal	☐ Abnormal
Follow-up Plan	☐ No further scan	☐ Follow-up in _____ weeks
Referral	☐ Not required	☐ Referred to: _____
Other Notes		

Annexure

1. **ISUOG Practice Guidelines (updated): performance of the routine mid-trimester fetal ultrasound scan (First published: 20 May 2022)**
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2. **WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience:** Ultrasound Examination Highlights and Key Messages from the World Health Organization's 2016 Global Recommendations January 2018
3. **Approved guidelines on use of ultrasonography during pregnancy NHM (National Health Mission)** Ministry of Health and Family Welfare Govt. of India
4. **ICRI guidelines on Second trimester anomaly scan (18 to 24 weeks) July 2020**
   Dr. V. R. Rajendra Dr. Mohamed Fouzi Dr. Juvaina P. Dr. Srinivas S. Dr. Karthik Senthilvel Dr. Shailesh Lunawat
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Maternal Screening in Antenatal Care : A Comprehensive Overview

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Introduction

Maternal screening in antenatal care is a cornerstone of modern obstetrics, aimed at identifying risks and conditions that could adversely affect the health of the mother, fetus, or both during pregnancy. The objective of screening is to detect potential problems early so they can be managed effectively, thereby reducing morbidity and mortality rates. These screenings range from blood tests and ultrasounds to genetic testing and infectious disease screenings. With timely and accurate screening, healthcare providers can offer appropriate interventions, counseling, and informed decision-making support.

This article provides a comprehensive look at the types, importance, and implications of maternal screening in antenatal care, focusing on best practices and evidence-based guidelines.

The Importance of Maternal Screening

Antenatal screening plays a vital role in detecting congenital anomalies, identifying high-risk pregnancies, monitoring maternal health, planning appropriate interventions, and providing psychological support to expectant parents[1]. Screening is not diagnostic but helps identify women who may benefit from further diagnostic testing or specialized care. It is critical that these screenings are non-invasive, evidence-based, cost-effective, and acceptable to patients.

Timing and Frequency of Screening

Antenatal screening is typically structured around three trimesters:

- **First Trimester (0–13 weeks):** Initial evaluations, dating scans, and early genetic screening.
- **Second Trimester (14–27 weeks):** Anatomical surveys, glucose screening, and continued monitoring.
- **Third Trimester (28 weeks to delivery):** Monitoring fetal well-being and preparation for birth.

Each stage involves specific tests designed to address the risks prevalent at that stage of pregnancy[2].

Types of Maternal Screening

1. **Medical History and Physical Examination -** The first step in antenatal screening is a detailed medical and obstetric history. This helps identify women at risk of complications like preeclampsia, gestational diabetes, or preterm labor[3].

   A physical examination assesses BMI, blood pressure, and other vitals, laying the foundation for personalized care.

2. **Blood Tests** - Routine antenatal blood tests are conducted early and periodically:
   - **CBC** to de ction tests, particularly in regions with high hypothyroidism prevalence.

- **Blood group and Rh typing** to manage Rh incompatibility.
- **Blood sugar levels** to screen for gestational diabetes.
- **Thyroid function tests,** particularly in regions with high hypothyroidism prevalence.
- **Serologic tests** for infections such as HIV, hepatitis B and C, syphilis, and rubella[4,5].

3. **Urinalysis -** Urine testing detects:
   - **Proteinuria** (suggestive of preeclampsia),
   - **Glycosuria** (indicative of gestational diabetes),
   - **Bacteriuria,** which may increase the risk of preterm labor if untreated (6).
4. **Ultrasound Screening** - Ultrasound is essential in assessing fetal development and maternal structures:
   - **First trimester:** Dating scan and viability.
   - **Nuchal translucency:** Assesses chromosomal abnormality risk[7].
   - **Second trimester:** Anomaly scan for structural defects.
   - **Third trimester:** Growth and well-being scans[8].
5. **Genetic and Chromosomal Screening -** Genetic screening offers risk assessment for conditions like Down syndrome and trisomy 18.
   - **First trimester combined test:** Nuchal translucency and serum markers (PAPP-A and hCG).
   - **Non-invasive prenatal testing (NIPT):** Uses cell-free fetal DNA from maternal blood[9].
   - **Quad screen in second trimester:** Assesses AFP, hCG, estriol, and inhibin A[10].
6. **Infectious Disease Screening -** Maternal infections can have severe consequences if undetected:
   - **HIV:** Early ART reduces perinatal transmission.
   - **Hepatitis B/C:** Screening enables neonatal immunoprophylaxis.
   - **Syphilis:** Treated early to prevent congenital syphilis.
   - **Rubella:** Serologic testing to ensure immunity[11].
   - **GBS:** Screened in late pregnancy; positive cases receive intrapartum antibiotics[12].
7. **Gestational Diabetes Screening** - Between 24–28 weeks, women undergo:
   - **Two-step screening:** 50g GCT followed by 100g OGTT.
   - **One-step screening:** 75g OGTT based on WHO or IADPSG guidelines[13].

   High-risk women (obesity, PCOS, strong family history) may require early screening.
8. **Hypertensive Disorders Screening -** Hypertension during pregnancy may signal gestational hypertension, preeclampsia, or chronic hypertension. Screening includes:
   - Regular blood pressure monitoring,
   - Urinalysis for protein,
   - Uterine artery Doppler in second trimester to predict preeclampsia[14].
9. **Mental Health Screening -** Screening tools like the Edinburgh Postnatal Depression Scale (EPDS) help identify antenatal and postpartum depression[15]. Counseling for substance abuse and domestic violence is also essential.
10. **Fetal Well-being Assessments -** For high-risk pregnancies:
    - **Non-stress tests (NST)** monitor fetal heart rate.
    - **Biophysical profile (BPP)** combines ultrasound and NST.
    - **Doppler studies** assess blood flow in fetal and uteroplacental vessels (16).

Counseling and Informed Consent

All screening should involve pre- and post-test counseling. Parents must understand the purpose, limitations, and implications of results, especially with genetic and invasive diagnostic procedures[17].

Challenges in Maternal Screening

Key barriers include:

- Inadequate access in low-resource settings,
- Cultural/religious resistance,
- Cost of advanced tests like NIPT,
- False positives causing anxiety,
- Lack of trained personnel[18].

These need addressing through better infrastructure, training, and education.

Future Directions

Emerging technologies are enhancing screening:

- **Expanded carrier screening (ECS)** covers a broad range of genetic conditions.
- **Next-generation sequencing (NGS)** offers detailed chromosomal analysis.
- **Artificial intelligence (AI)** aids ultrasound interpretation.
- **Telehealth** expands access to rural and underserved areas (19,20).

Conclusion

Maternal screening is fundamental to antenatal care, enabling early detection and intervention for a wide range of conditions. It improves pregnancy outcomes through timely management and empowers expectant parents with knowledge and options. Overcoming barriers to screening and integrating innovation into practice will further enhance maternal and fetal health globally.

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Clinical Approach to Bleeding in Pregnancy

1. Bleeding during early pregnancy

Vaginal bleeding occurring before 13 weeks gestation is called early pregnancy bleeding (also known as first trimester bleeding). Its quite common and can occur in up to 25% of pregnancies.[1] Many individuals with first trimester bleeding experience no additional complications. However, 50% of pregnancies with first trimester bleeding end in miscarriage.[2]

Typical causes of early pregnancy bleeding include

- **Miscarriage/Early pregnancy loss:** This is one of the most common causes of early pregnancy bleeding and occurs in 10% of all pregnancies.[3] Bleeding may be accompanied by uterine cramps. Miscarriages are often further subcategorized but all types can present with early pregnancy bleeding:
  - **Threatened miscarriage:** presents with symptoms such as vaginal bleeding and uterine cramping suggesting early pregnancy loss. However, upon examination the cervical os (uterine opening) is closed and on ultrasound, cardiac activity is present
  - **Incomplete miscarriage:** This situation arises when pregnancy loss has been confirmed, but the cervical opening remains dilated and some products of conception have been expelled partially.
  - **Complete miscarriage:** All products of conception have been expelled naturally without any medical intervention (surgery or medication).
  - **Septic miscarriage:** Patient presents with bleeding and symptoms of infections such as fever, chills, vaginal discharge.
- **Ectopic pregnancy** is defined as a pregnancy that takes place outside the uterus, with the fallopian tube being the most common location. (Fig 1). It occurs in 2% of all pregnancies. It be life threatening if the ectopic pregnancy ruptures.

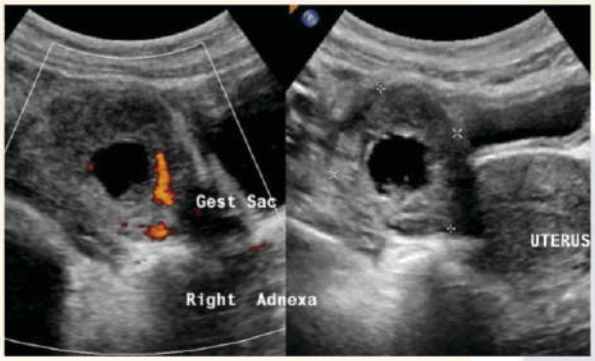


Fig 1. Empty uterine cavity with an ectopic sac in the right adnexa.

- **Implantation bleeding** is light bleeding or spotting that happens when a fertilized egg attaches to the uterine lining, typically occurring 10 to 14 days after ovulation. It occurs in about 1 in 4 pregnancies, is shorter and lighter than a menstrual period, and is generally not a cause for concern in early pregnancy bleeding.
- **Subchorionic hematoma** is the accumulation of blood (hematoma) situated between the chorion (the membrane encasing the fetus) and the wall of uterus (Fig 2). It may manifest as vaginal bleeding or be discovered incidentally during a routine obstetric ultrasound.

Typically, subchorionic hematomas resolve on their own without any medical intervention; however, they can elevate the risk of pregnancy complications, including preterm delivery, miscarriage, and placental abruption.[5]

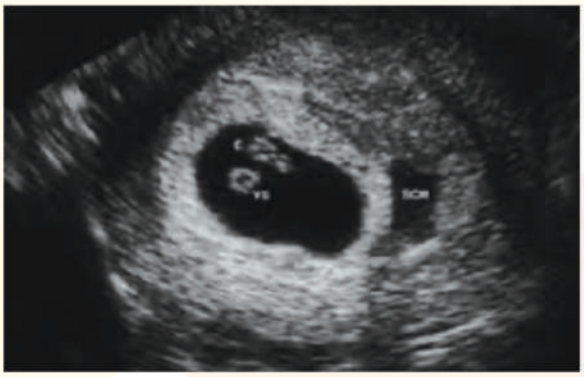


Fig 2. Subchorionic haemorrhage

- **Gestational trophoblastic disease (GTD)** refers to tumors that can develop following pregnancy. Most of these tumors are benign (noncancerous) but some are malignant (cancerous).

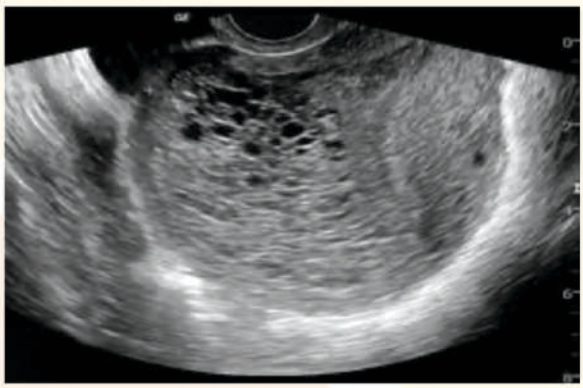
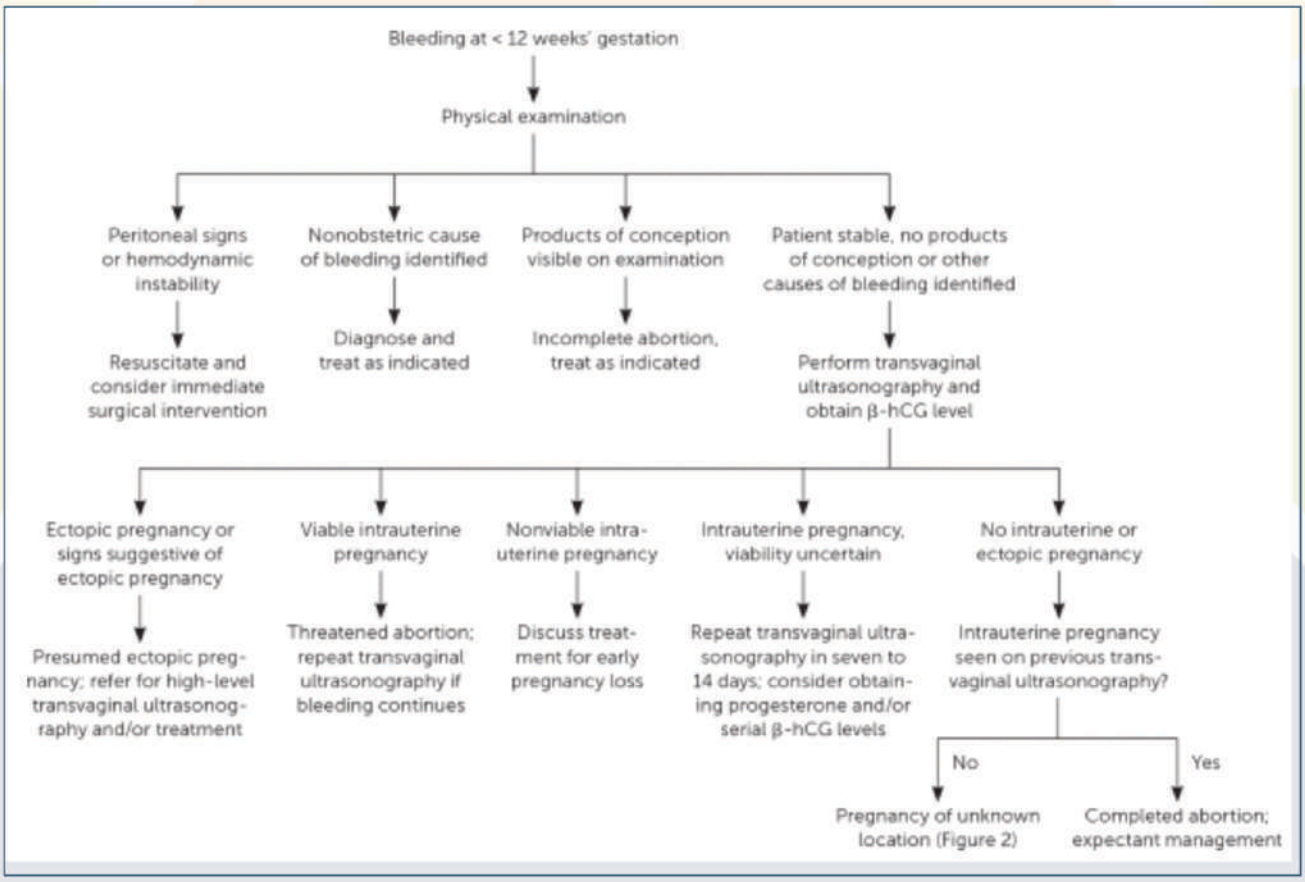


Fig 3. Cluster of grapes appearance in complete mole.



- **Cervical changes:** During pregnancy, vascularity increases in the cervix which can cause light bleeding after events such as intercourse, pelvic exams, and pap smears. Cervical polyps can also bleed during pregnancy.
- Infections such as sexually transmitted infections (STIs) (chlamydia, gonorrhea) or urinary tract infections can sometimes cause light bleeding.

Management -

Vaginal bleeding in early pregnancy necessitates immediate attention.

1. History and Physical Examination

- *Menstrual history* - LMP and regularity of cycles to know the gestational age.
- *Prior ultrasonography* - If a gestational sac is initially visualized with or without a yolk sac, and after a specified time (e.g., 2 weeks for a gestational without a yolk sac or at least 11 days for a sac with a yolk sac), no embryo with a heartbeat is seen, it's suggestive of a missed abortion.
- Pain and bleeding levels: Bleeding that is as heavy as or heavier than a menstrual period, especially when accompanied by pain, is linked to a greater risk of early pregnancy loss. Heavy bleeding is defined as soaking more than two sanitary pads per hour for two consecutive hours.
- Signs and symptoms of hypovolemia: Vital indicators of hemodynamic instability, including hypotension or tachycardia, as well as physical examination signs like cold, clammy skin, require immediate evaluation.
- A speculum examination is conducted to identify non-obstetric causes of bleeding, for example- vaginitis, cervicitis, or cervical polyp.

2. Laboratory Testing

Imaging - Transvaginal ultrasound is the preferred method of imaging for evaluating first trimester bleeding. Ultrasound using an abdominal probe can sometimes complement the findings with the transvaginal probe.

Blood investigations - A complete blood count, along with Rh factor testing, serum beta-hCG levels, bleeding time, and clotting time, should be performed. Rho(D) immune globulin may also be given within 72 hours of early pregnancy loss, particularly later in the first trimester, although the risk of alloimmunization is assumed to be low, between 1.5% and 2%. A dose of 50 or 120 mcg is recommended before 12 weeks period of gestation, while 300 mcg can be given if lower doses are unavailable. After 12 weeks, a 300-mcg dose is advised.

Human Chorionic Gonadotropin - The b subunit of human chorionic gonadotropin (β-HCG) can be checked in a pregnant woman's plasma as soon as eight days after ovulation. The rate of β-HCG increase become less rapid as the levels rise. In women who have a viable intrauterine pregnancy, initial β-HCG levels of less than 1,500 mIU/mL, between 1,500 to 3,000 mIU/mL, or more than 3,000 mIU/mL will increase over 48 hours by at least 49%, 40%, or 33%, respectively.6 A slower rate of increase may indicate early pregnancy loss or ectopic pregnancy. By around 10 weeks of gestation, β-HCG levels typically plateau or decrease, after which serial ultrasonography becomes the preferred diagnostic approach.

Progesterone - Measuring serum progesterone can be helpful in differentiating between a viable and nonviable early pregnancy, particularly when ultrasonography results are inconclusive. A progesterone level of less than 6 ng/mL (19.1 nmol/L) reliably rules out a viable pregnancy, with a negative predictive value of 99%.[7] However, a low progesterone level alone cannot differentiate between an intrauterine and ectopic pregnancy.

3. Treatment

Treatment depends on the underlying cause. Symptomatic treatment with analgesics, tranaxemic acid iv fluids is given. There is no role of strict bed rest.

Medical management or suction evacuation is done in cases of missed/ incomplete abortion. Ectopic pregnancies are managed with methotrexate or laparotomy.

Progesterone supplementation may help in patients presenting with threatened abortion, however a significant improvement is not noted.[8] A specific subgroup of women who have a history of one or more previous miscarriages and are experiencing vaginal bleeding in their current pregnancy may find it beneficial to receive progesterone.

2. Bleeding during later pregnancy

3 to 4% of women may have vaginal bleeding in the later part of pregnancy. Common causes of bleeding during late pregnancy are-

Management

1. History and Clinical Examination-

Assessment of blood loss through physical examination by noting the amount, duration, colour of bleeding (dark or fresh red) and checking pulse, bp and fetal heart must be started concomitantly as any bleeding late in pregnancy demands urgent evaluation and treatment . Associated complains like

Start of Labour(most common)	Placenta previa Fig. 4	Placental abruption Fig. 5	Vasa previa	Rupture uterus
In late pregnancy, mucus plug is released—a collection of mucus found in the cervix—through the vagina. This small discharge of blood is known as the "show," which is mixed with mucus from the vagina. It occurs when small veins are torn as the cervix starts to open (dilate), allowing the fetus to move through the birth canal.	• In placenta previa, the placenta attaches to the lower portion of the uterus rather than the upper part. This condition can partially or completely obstruct the cervix and may lead to heavy bleeding as the cervix starts to dilate. Placenta previa contributes to about 20% of bleeding in late pregnancy and is most common in the third trimester.	Placental abruption is the most common life-threatening cause of bleeding during late pregnancy, accounting for roughly 30% of cases. placenta separates from the uterus before delivery. The exact reasons are often unclear, but it may result from insufficient blood flow to the placenta or trauma. The bleeding may be more severe than it seems because some or most of the blood could be trapped behind the placenta and not visible.	Vasa previa is an uncommon condition where fetal blood vessels (connected to the umbilical cord) run across the cervix[9], obstructing the fetus's path during delivery. When labor begins, these fragile blood vessels may rupture, leading to a reduction in blood supply to the fetus. Since the fetus has a relatively limited volume of blood, the loss of even a small amount can be critical, or potentially fatal.	Rupture of the uterus may occur during labor. It almost always occurs in women with a previous uterine surgery (such as myomectomy, previous caesarean) or in uterus with a scar tissue as in multiple previous D & Cs.Rarely it can happen in grand multipara or following inadvertent administration of uterotonics.

Fig 4. Placenta previa on ultrasound. Lower edge of placenta is reaching os.

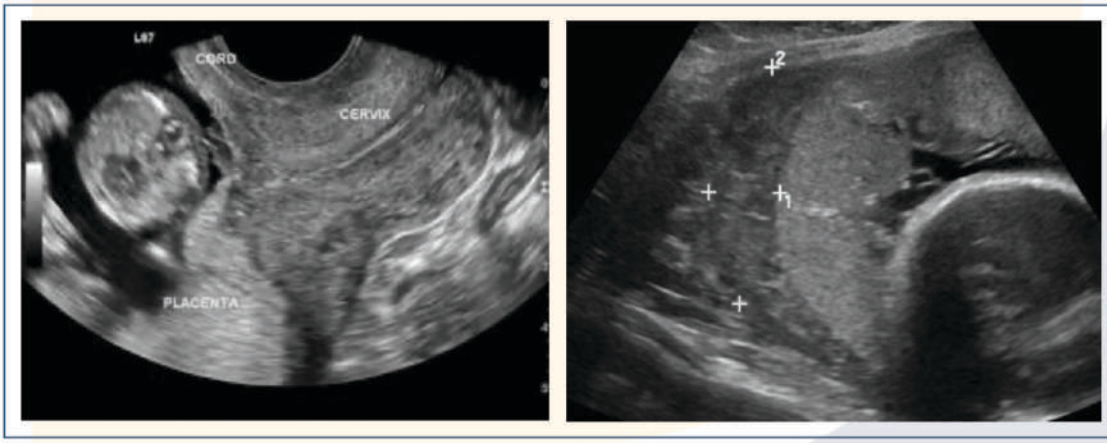


Fig. 5. Placental abruption appears a hypoechoic zone beyond placenta

bleeding, leaking, discharge, adequacy of fetal movements and similar bleeding episode in the past must be clearly elucidated.

Bleeding is usually painful in placental abruption and painless in placenta previa.

Warning signs-

The following symptoms are concerning:

- A tense and / or tender uterus
- Absence fetal heartbeat or bradycardia
- Cessation of labor and loss of uterine muscle tone
- Feeling faint, lightheaded, or experiencing tachycardia

Clinical recommendations	Evidence rating
A gentle speculum examination can be performed safely before localisation of placenta before ultrasound, but a digital examination should be avoided until placenta previa is ruled out.	C
Rh negative should receive Rho(D) immune globulin (Rhogam) if they experience bleeding in late pregnancy. Kleihauer-Betke test should be performed to determine the appropriate dose.	C
Placenta previa is a common incidental ûnding in early and mid trimester scans and should be confirmed in the third trimester.	A
Corticosteroids should be administered for fetal lung maturity to women who have bleeding at 24 to 34 weeks' gestation.	A
Outpatient management of placenta previa can be carried out in selected patients who do not have active bleeding and who can rapidly access a hospital with emergency services.	A
MRI pelvis should be done to rule out adherent placenta spectrum in case of any suspicion.[10]	C

2. Tests

- Fetal heart rate monitoring / NST
- Ultrasound
- Complete blood cell count
- Bleeding time/ clotting time/ INR
- Blood type and Rh status

*Ultrasonography is not always effective in identifying a placental abruption. The assessment for placental abruption and uterine rupture relies on the findings from a physical examination, along with information regarding risk factors.

3. Treatment

Initial management should focus on stabilizing the mother's hemodynamic status and assessing fetal well-being. If bleeding is severe, intravenous fluids and/or blood transfusions may be necessary.

The underlying disorder causing the bleeding should be treated. For cases of placental abruption or placenta previa, if the bleeding is minimal and delivery is not required, and both the mother and fetus are stable, inpatient monitoring is recommended. If the bleeding ceases, the woman may be discharged. However, if the bleeding persists or worsens, or if the pregnancy is near term, the baby should be delivered. In the case of placenta previa, a cesarean delivery is necessary, while women with placental abruption may undergo either vaginal or cesarean delivery.

In instances of heavy bleeding, serial evaluations of hematocrit and coagulation studies should be conducted to check for the presence of disseminated intravascular coagulation. Tocolysis is generally contraindicated except in mild abruption before 34 weeks of gestation, where it may be employed to facilitate the administration of corticosteroids. Deûnitive management should never be postponed for ultrasound conûrmation since ultrasonography is not reliable for diagnosing abruption; acute blood clots and the placenta appear hyperechoic on ultrasound and are difficult to differentiate.

If vasa previa is diagnosed, a cesarean section is typically performed before labor begins, usually between 34 to 37 weeks of pregnancy. However, if bleeding occurs in a patient with vasa previa, an immediate cesarean delivery may be required. In cases of uterine rupture, the baby is delivered without delay, and the uterus is surgically repaired.

Take home messages-

1. Bleeding during pregnancy is always dealt as as emergency except when the amount is very less as minor spotting during ûrst trimester.
2. Always check the blood group and administer anti D in case of Rh negative mothers.
3. Ultrasound is the mainstay of diagnosis.
4. bhcg levels can help to determine management in early pregnancy if ultrasound is inconclusive.
5. Initial supportive treatment should be started without waiting for ultrasound.
6. A non reassuring fetal heart rate or maternal hemodynamic compromise demands urgent delivery after stabilisation.

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"When motherhood becomes the fruit of a deep yearning, not the result of ignorance or accident, its children will become the foundation of a new race."

- Margaret Singer

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Acute Pain in Abdomen in Pregnancy : Key Practice Points

Introduction

Acute abdominal pain in pregnancy is often considered an enigma challenging the OBGY specialists, with the **anatomical and physiological changes of pregnancy affecting the diagnostic work up. However, early recognition and intervention treating this presentation as an obstetric emergency remain the key to optimising the outcomes.** It is estimated that up to **1–2% of pregnant women will require non-obstetric surgical intervention** (e.g. appendectomy or cholecystectomy) during pregnancy.

This review briefly outlines key practice points in evaluating and managing acute abdominal pain in pregnancy, including differential diagnoses by trimester, clinical diagnostic clues, recommended investigations, management principles, and current guideline recommendations (ACOG and RCOG).

Differential Diagnosis by Trimester

The causes of acute abdominal pain in pregnancy can be broadly divided into obstetric, gynecologic (non-obstetric), gastrointestinal (GI), urinary, and other systemic causes. Importantly, the differential diagnosis shifts with each trimester, as certain conditions are more prevalent at different stages. Below is an overview of key differentials in each trimester along with typical associated features:

Table 1 : Causes of acute abdominal pain in different trimesters of pregnancy

	Trimester 1	Trimester 2	Trimester 3
Obstetric causes	Ectopic pregnancy Abortion : incomplete, threatened, septic, inevitable	Placental abruption Preterm Labour	Placental abruption Labour Uterine rupture HELLP
Gynecologic causes	Ovarian torsion Ruptured ovarian cyst or corpus luteum	Ovarian torsion Degenerating fibroid	Ovarian torsion Degenerating fibroid
Gastrointestinal causes	Acute appendicitis Gastroenteritis Peptic ulcer disease Intestinal obstruction	Acute appendicitis Gastroenteritis Peptic ulcer disease Intestinal obstruction	Acute appendicitis Gastroenteritis Peptic ulcer disease Intestinal obstruction
Urinary causes	UTI Pyelonehritis Ureteric colic	UTI Pyelonehritis Ureteric colic	UTI Pyelonehritis Ureteric colic
Musculo skeletal	Round ligament pain	Round ligament pain Abdominal trauma	

Key Point: Always maintain a broad differential diagnosis for a pregnant patient with abdominal pain. Never attribute pain solely to "normal pregnancy changes" without careful evaluation, especially if pain is severe or persistent. Even common benign pains (like round ligament pain or Braxton-Hicks contractions) should be diagnosed by exclusion, after ruling out dangerous causes.

Clinical Signs and Clues to Etiology

A thorough clinical assessment can often provide clues to the underlying cause of abdominal pain in pregnancy. Try to consider the pain characteristics (location, radiation, quality, timing), associated symptoms, and physical exam findings, including obstetric examination.

Presence of Vaginal Bleeding: Abdominal pain accompanied by vaginal bleeding strongly suggests an obstetric etiology. In the first trimester, bleeding + pain raises concern for abortion or ectopic pregnancy. Look for both signs of internal bleeding and hypovolemia as well (dizziness, or syncope) In the second or third trimester, vaginal bleeding with pain points to possible placental abruption (especially with a firm, tender uterus). In contrast, most non-obstetric causes (appendicitis, GI, urinary) will not cause vaginal bleeding. Always perform a speculum and pelvic exam (if not contraindicated) to assess for bleeding or amniotic fluid leakage in pregnant patients with abdominal pain.

Pain Location and Radiation: The location of maximal pain can guide the differential:

- **Right Lower Quadrant (RLQ) pain:** Common in appendicitis (though in later pregnancy the appendix may shift upward). RLQ pain in first trimester is very suspicious for appendicitis or ovarian torsion on the right side. RLQ or right flank pain in third trimester could still be appendicitis despite the uterine displacement . Also consider round ligament pain on the right side (a common location) – which is usually positional and short-lived rather than progressive.
- **Right Upper Quadrant (RUQ) pain:** Suggests hepatobiliary causes – cholecystitis or biliary colic (especially if postprandial or associated with nausea/vomiting). RUQ pain with systemic symptoms in late pregnancy suggests HELLP syndrome or AFLP (look for hypertension, abnormal labs). RUQ or epigastric tenderness in a hypertensive pregnant patient is a red flag for severe preeclampsia/HELLP. RUQ pain is accompanied by fever or leukocytosis suggests an inflammatory or infective etiology.
- **Left Upper Quadrant (LUQ) pain:** Uncommon as a primary location, but consider splenic infarct (in sickle cell disease), splenic artery aneurysm rupture (sudden severe pain with shock in third trimester), or referred pain from left kidney stones or pancreatitis (though pancreatitis is usually epigastric).
- **Diffuse or Periumbilical pain:** Early diffuse pain that later localizes to RLQ is classic for appendicitis (periumbilical visceral pain progressing to localized peritoneal pain). Persistent diffuse abdominal pain with guarding suggests peritonitis from any cause (e.g. ruptured viscus, generalized infection) and in pregnancy could be due to a perforated appendix, ruptured uterus, or severe abruption with hemoperitoneum. Diffuse crampy pain that comes and goes could be intestinal (bowel obstruction or gastroenteritis) or uterine contractions – careful exam and monitoring help differentiate.
- **Pelvic (supra-pubic) pain:** Common in gynecologic and obstetric causes. Labor contractions typically cause lower abdominal and pelvic pain radiating to the back. Pelvic pain with cervical motion tenderness on exam is concerning for ectopic pregnancy or septic miscarriage in early pregnancy. A distended tender bladder (palpable) might indicate urinary retention or obstruction.
- **Fever and Infection Signs:** The presence of fever, chills, or elevated white blood cell count suggests an infectious cause. Appendicitis can cause low-grade fever, but high fever with abdominal pain is more suggestive of pyelonephritis, cholecystitis, pancreatitis, appendiceal abscess, or pelvic infection (e.g. septic abortion or chorioamnionitis). Chorioamnionitis (intra-amniotic infection) in second/third trimester causes fever, uterine fundal tenderness, maternal tachycardia and often fetal tachycardia – distinguishing it from purely surgical causes. Pyelonephritis is often marked by costovertebral angle tenderness and high fever. Pancreatitis may cause fever with epigastric tenderness and elevated pancreatic enzymes. Obstetric causes like abruption or HELLP usually do not cause fever (unless there is a concurrent infection); thus a febrile patient with abdominal pain likely has a non-obstetric infection or an obstetric infection (such as chorioamnionitis).
- **Gastrointestinal Symptoms:** Associated GI symptoms can provide clues. Persistent

nausea and vomiting beyond typical morning sickness, especially if pain is significant, may indicate appendicitis (which often causes anorexia and nausea), cholecystitis (often with vomiting), or intestinal obstruction (vomiting with distension). Diarrhea might suggest gastroenteritis or inflammatory bowel disease flare, whereas the absence of bowel movements and flatus points to obstruction or ileus. In contrast, obstetric causes (like abruption or labor) usually do not primarily cause GI symptoms such as vomiting or diarrhea, so the presence of these might tilt towards a GI etiology.

- **Urinary Symptoms:** Dysuria, urinary frequency, or urgency may indicate a UTI progressing to pyelonephritis. Colic from ureteric stones can cause hematuria, and the pain often radiates from flank to groin. In pregnancy, mild hydronephrosis is normal, but severe flank pain with hematuria is strongly suggestive of a ureteral stone. Obstetric causes rarely cause hematuria or dysuria, so these symptoms are useful to point toward a urinary tract source of pain. It is advisable to perform a urinalysis in the evaluation of pregnant patients with abdominal pain.
- **Uterine Contractions or Irritability:** On abdominal palpation, a tense, tender uterus that is firm between contractions suggests placental abruption – especially if accompanied by vaginal bleeding or fetal heart rate abnormalities. Palpable uterine contractions that come and go could indicate preterm labor; monitoring will show regular uterine activity if so. Tenderness localized to a fibroid (a firm mass on the uterus) may indicate fibroid degeneration. If the uterine tenderness is much less than the abdominal wall consider a surgical abdomen (like appendicitis or perforated ulcer) as opposed to a uterine cause.
- **Shoulder Tip Pain:** Referred shoulder tip pain (particularly the right shoulder) in a pregnant patient with abdominal pain is a classic sign of peritoneal irritation of the diaphragm by blood – most commonly from a ruptured ectopic pregnancy, ruptured spleen or liver, or in diaphragmatic perforation (e.g. perforated ulcer). This sign should prompt emergency imaging or surgical evaluation.
- **Vital Signs and Shock:** Tachycardia and hypotension in a pregnant patient with abdominal pain indicate a potential hemorrhagic shock (e.g. ruptured ectopic, splenic artery aneurysm, uterine rupture, massive abruption) or septic shock (e.g. severe pyelonephritis or sepsis). Orthostatic vital sign changes or fainting episodes also suggest significant internal bleeding. In later pregnancy maternal blood volume is expanded and young patients may not show hypotension until a large volume is lost – so relative tachycardia or other subtle signs of hypoperfusion (pallor, agitation) should be taken seriously.
- In summary, careful history and physical examination in the pregnant patient can narrow the differential diagnosis. Clues such as vaginal bleeding, fever, specific pain location, or associated urinary or GI symptoms should be integrated with knowledge of pregnancy-related conditions. Nonetheless, the overlap of symptoms and altered physiology in pregnancy means clinical assessment is not foolproof – hence **a low threshold for further investigation** is warranted when clinical suspicion remains high.

Investigative Approach and the Role of Imaging

Prompt investigations are critical to establish a diagnosis while simultaneously monitoring maternal and fetal well-being. This involves laboratory tests, obstetric evaluation, and judicious use of imaging, balancing diagnostic benefit with fetal safety.

Laboratory Studies:

- **Complete blood count (CBC)** (leukocytosis suggesting infection, or hemoconcentration suggesting dehydration, and to note the hemoglobin in case of hemorrhage).
- **Blood type and screen and Rh status** is crucial if an intra-abdominal hemorrhage (e.g. ectopic, abruption) is suspected, in anticipation of possible transfusion, and Rh status should be checked to administer Rh immunoglobulin if needed (e.g. in trauma or ectopic pregnancy).
- **Serum beta-hCG** quantitative test is essential in early pregnancy with abdominal pain if viability or location of pregnancy is unclear – it assists in interpreting ultrasound findings (e.g. discriminatory zone for intrauterine pregnancy).

- Serum **electrolytes and creatinine** (especially if vomiting or to evaluate renal function before contrast imaging),
- **liver function tests (LFTs)** and **amylase/lipase** (RUQ or epigastric pain to evaluate hepatitis, HELLP, or pancreatitis),
- **coagulation panel** if HELLP syndrome or AFLP is in question.
- In cases of possible preeclampsia (e.g. RUQ pain with hypertension), obtain blood pressure, urine protein, platelets, and LFTs immediately.
- **C-reactive protein (CRP)** is sometimes used as an adjunct in diagnosing appendicitis or infection, but in pregnancy its utility is limited by lack of specificity.
- **Urinalysis** should be performed on all patients to screen for infection or hematuria; urine culture follows if UTI is suspected.

Obstetric Evaluation:

- **An obstetric ultrasound** is indicated in any pregnant patient with undifferentiated abdominal pain to assess the pregnancy and will evaluate fetal heart rate and well-being, placental location (to check for placenta previa or abruption signs), and amniotic fluid volume.
- **Fetal heart rate monitoring** (cardiotocography) is advised for viable fetuses (usually ≥24 weeks) during and after the acute evaluation, as maternal abdominal catastrophes often affect the fetus. For instance, continuous electronic fetal monitoring can detect fetal distress due to abruption or maternal shock and may influence management (e.g. need for emergency delivery.
- Uterine activity monitoring is useful if preterm labor is a consideration.
- A sterile speculum exam may be performed to assess for amniotic fluid or blood and to visualize the cervix (e.g. dilated in miscarriage or labor).
- Careful **pelvic examination** can identify cervical motion tenderness (suggestive of ectopic or infection) or adnexal masses.

Imaging Studies: Ultrasonography (US) is the first-line imaging modality for pregnant patients with abdominal pain, given its safety profile , being highly useful for evaluating obstetric as well non obstetric causes. If an ultrasound is not revealing a clear cause and clinical suspicion remains, do not hesitate to proceed to further imaging – normal ultrasound does not rule out appendicitis or other surgical conditions.

Magnetic Resonance Imaging (MRI): MRI has emerged as an extremely valuable tool in the evaluation of acute abdomen during pregnancy. It provides excellent visualization of soft tissues and is not associated with ionizing radiation exposure.MRI is particularly useful when ultrasound is inconclusive. Studies have shown non contrast MRI can accurately diagnose appendicitis, cholecystitis, kidney stones, and even placental abnormalities without exposing the fetus to radiation. MRI can be performed in any trimester; per ACOG and radiology guidelines, no special precautions are needed for MRI in the first trimester, as no evidence of fetal harm has been demonstrated. One precaution: MRI contrast (gadolinium) is generally avoided in pregnancy. Gadolinium crosses the placenta and has theoretical risks; hence, it is only used if absolutely essential for diagnosis, and even then with caution.

Computed Tomography (CT): Situations where CT might be used include trauma (CT of abdomen for internal injuries), suspected pulmonary embolism (CT pulmonary angiography or V/Q scan,) or when MRI is not available and an urgent diagnosis of appendicitis or obstruction is needed. If CT is used, efforts are made to minimize dose. ACOG emphasizes that if CT is necessary for an accurate or timely diagnosis, it should not be withheld – the maternal benefit outweighs the theoretical fetal risk in acute emergencies. As a reference, fetal exposure from an abdominal CT is often on the order of a few milligray (mGy), well under the <50 mGy threshold associated with fetal effects

Other Imaging: X-rays: Plain abdominal X-rays are rarely the first choice but can detect bowel obstruction (multiple air-fluid levels) or free intraperitoneal air (from perforation). A chest X-ray may be done to evaluate referred pain or respiratory causes (e.g. pneumonia causing abdominal pain). If these X-rays are needed, they deliver a very low dose of radiation (with abdominal shielding for chest X-ray), and are considered safe in pregnancy

Nuclear medicine scans: Occasionally used, for example a hepatobiliary (HIDA) scan for biliary dyskinesia or a ventilation-perfusion (V/Q) scan for pulmonary embolism. These impart low fetal radiation (often <5 mGy) and

can be done if indicated Again, the guiding principle is to obtain whatever imaging is critical for the mother's diagnosis and treatment, because maternal well-being is paramount for fetal well-being

Management Principles

Management of acute abdomen in pregnancy requires a coordinated approach that addresses the cause of pain, maternal-fetal safety, and timing of interventions. Key principles include prompt resuscitation, involvement of appropriate specialists, careful monitoring, and adherence to the rule that necessary treatment should not be postponed due to pregnancy.

Initial Stabilization: For any pregnant woman presenting with signs of an acute abdomen, start with the basics of ABC (Airway, Breathing, Circulation). Provide supplemental oxygen as needed (to ensure fetal oxygenation). Establish IV access and begin intravenous fluids (e.g. crystalloid) especially if there are signs of hypovolemia (tachycardia or hypotension). Draw blood for labs and hold blood in case transfusion is needed. If hemorrhagic shock is suspected (e.g. ruptured ectopic or abruption), aggressive fluid resuscitation and blood product availability are critical while simultaneously preparing for surgical intervention. Left lateral tilt positioning (15–30°) of the mother (especially beyond 20 weeks) can improve venous return by relieving aortocaval compression by the gravid uterus. While evaluating, continuous fetal heart monitoring (if viable gestational age) can provide an indicator of how the fetus is tolerating the maternal condition

Analgesia: Do not withhold analgesics in a pregnant patient with severe abdominal pain. Adequate pain control not only is humane but also facilitates proper examination (an extremely distressed patient cannot be evaluated or managed optimally). Avoid NSAIDs in the late second and third trimester (due to risk of premature ductus arteriosus closure and oligohydramnios), but a single dose in early pregnancy if needed (and if no other option) is not absolutely contraindicated. Acetaminophen (paracetamol) is the analgesic of choice for mild to moderate pain and is safe in all trimesters at recommended doses. For refractory pain, especially of surgical causes, patient-controlled analgesia or an epidural (if not contraindicated) can be considered once the patient is admitted and under observation. Effective analgesia will not impede diagnostic evaluation; rather, it can help by alleviating pain-related tachycardia or guarding that confound assessment.

Continuous or frequent fetal heart rate monitoring is recommended for viable fetuses, particularly if the mother undergoes any procedure or if she is unstable. If the patient is e"23–24 weeks and in a setting of potential emergency surgery, ensure that a neonatal team is on standby and that the facility has capability for emergency cesarean delivery if needed. In cases like trauma or surgical emergencies where the fetus might need urgent delivery (for maternal rescue or due to fetal compromise), having an operating room prepared for simultaneous cesarean delivery can be life-saving. However, the primary focus should remain on stabilizing the mother – as maternal survival and stability are the first steps in ensuring fetal survival.

Decision for Surgical Intervention: A fundamental rule in management is that a pregnant woman should never be denied an indicated surgery or have it inappropriately delayed due to pregnancy. If a surgical condition is diagnosed (e.g. appendicitis, torsion, ectopic rupture, bowel obstruction, etc.), timely surgical intervention is crucial. There is no absolute contraindication to surgery in any trimester. If surgery is elective and can be postponed safely (e.g. cholelithiasis without current cholecystitis), it should be deferred until postpartum. But for urgent and emergent conditions, proceed immediately. For emergencies, the urgency of the condition dictates timing, not the trimester. It is worth noting that anesthesia in modern practice is quite safe in pregnancy – no currently used anesthetic agents are proven teratogens in humans at standard doses. Surgical planning should involve the obstetric team: if near viability and the abdomen will already be open, one might consider simultaneous delivery if that improves overall outcomes (for example, in a 34-week patient with a dire surgical abdomen, a cesarean delivery could be performed at the time of laparotomy if the uterus is obstructing surgical access or if fetal distress is noted). These decisions are case-specific and multidisciplinary.

Antibiotics and Other Medications: Use antibiotics liberally when indicated (e.g. broad-spectrum antibiotics for suspected perforation, ruptured membranes with infection, or in appendicitis to cover peritoneal contamination). Many antibiotics are safe in pregnancy (beta-

lactams, metronidazole, etc., are category B). Avoid tetracyclines and fluoroquinolones unless no alternative. In trauma or surgical bleeding scenarios with maternal hemorrhage, Rh immunoglobulin should be given to Rh-negative mothers to prevent alloimmunization. Also, remember venous thromboembolism prophylaxis in pregnant surgical patients: pregnancy is a hypercoagulable state, and surgery further increases risk. ACOG recommends that pregnant women undergoing surgery be screened for VTE risk and receive appropriate prophylaxis (e.g. pneumatic compression devices intraop and prophylactic heparin if risk is high and bleeding is controlled).

When to Involve Consultants or Transfer: If a hospital does not have appropriate surgical or neonatal support, a pregnant patient with a surgical emergency should be stabilised and transferred early – ideally before decompensation. as appropriate. Multidisciplinary input often improves outcomes.

Practical Tips: Outpatient vs. Inpatient Management

When to Manage as Outpatient: After a thorough evaluation, if a serious pathology has been ruled out and the patient's condition is stable with pain well-controlled, outpatient management may be appropriate. Examples include mild cases of round ligament pain, Braxton-Hicks contractions causing discomfort (and not true preterm labor), or a diagnosed uncomplicated UTI (presenting as mild abdominal discomfort) that can be treated with oral antibiotics. For outpatient management:

- **Ensure close follow-up:** Instruct her on signs and symptoms that warrant immediate return (e.g. increased pain, onset of fever, vaginal bleeding, vomiting, or any new concerning symptoms). Provide easy access if her condition worsens.
- Pain management and hydration: Advise appropriate with careful counseling. Encourage hydration and rest.
- **Outpatient diagnostics:** In some cases, outpatient follow-up tests are arranged. For example, in early pregnancy with pain but indeterminate ultrasound, one might arrange serial beta-hCG measurements and a repeat ultrasound in 2 days (if ectopic is considered low risk at present). Make sure the patient understands the importance of follow-up in such scenarios – missing a follow-up can be dangerous if an ectopic was evolving.
- **Written instructions:** Provide written instructions detailing the care plan and warning signs. Given the anxiety that pain can cause, ensure the patient and family understand that if anything changes, they should not delay returning for care.

When to Admit to Inpatient: Any pregnant patient with undifferentiated moderate-to-severe abdominal pain should ideally be observed in the hospital until a clear diagnosis and improvement are achieved. Indications for admission include:

- **Need for further workup or observation:** If the diagnosis is uncertain and pain is significant, hospital observation is warranted for serial exams and expedited testing (e.g. observation for possible appendicitis or evolving abruption).
- **Inability to tolerate oral intake or need for IV medications:** Persistent vomiting or need for IV pain control is a reason for admission.
- **Signs of possible surgical emergency :** suspected ruptured ectopic pregnancy, Ovarian torsion , appendicitis, cholecystitis, or bowel obstruction all require admission and surgical consultation. Placental abruption (even a mild one) should prompt admission for monitoring, as should preterm labor. HELLP syndrome or severe preeclampsia obviously require admission and often immediate delivery.
- **Maternal hemodynamic changes or fetal compromise:** If there are any abnormal vital signs (tachycardia, hypotension) that might indicate an ongoing process, or if the fetal heart tracing is non-reassuring, admission and likely intervention is needed.

Communication and Patient Support: is an integral part of management and should not be overlooked , keep the patient informed about what is being done and involve her in decision-making . Given the possible need for urgent decisions (like surgery), ensure the patient (and family, if appropriate) understand the situation and have had their questions addressed as much as possible.

Documentation: Document your clinical findings, differentials and plan of management clearly

In summary, current guidelines urge early recognition and intervention for obstetric emergencies (ectopic pregnancy, abruption, uterine rupture) and do not advocate conservative delays for surgical conditions (appendicitis, torsion, etc.) due to pregnancy. A recurring theme in both ACOG and RCOG directives is: "Prioritize the mother's life and health – treat the pregnancy as a factor, not a barrier." They also encourage the use of modern diagnostics (imaging, minimally invasive surgery) to improve diagnostic accuracy and outcomes. Adhering to these guidelines ensures evidence-based, standardized care. Obstetricians should stay updated with revisions to these guidelines (for example, ACOG Committee Opinions are periodically reaffirmed or updated, and NICE/RCOG guidelines get revised as new evidence emerges). By following such guidelines, clinicians can confidently manage acute abdominal pain in pregnancy, knowing their approach is supported by expert consensus and data.

Conclusion

- Acute abdominal pain in pregnancy demands a blend of obstetric insight and general surgical acumen. Obstetricians should be prepared to evaluate any pregnant patient with abdominal pain as an emergency, rule out the most dangerous causes first, and coordinate care that safeguards both mother and baby.
- A broad differential diagnosis of obstetric and non-obstetric causes can be obtained by a vigilant differential by trimester (ruling out ectopic pregnancy in early gestation, and placental abruption in late gestation, among others), using clinical clues (such as bleeding, location of pain, and associated symptoms) to guide the workup
- Perform timely ultrasound and lab tests, monitor the fetus as needed, and escalate to advanced imaging (MRI, CT) promptly when indicated. Current guidelines reassure that ultrasound and MRI are safe first-line modalities and that even CT scans, if truly needed, are acceptable with appropriate precautions.
- Management hinges on treating the underlying cause of pain swiftly while providing supportive care to mother and fetus. Maternal stabilization and definitive treatment take priority.
- ACOG's Committee Opinion on nonobstetric surgery reinforces that necessary surgery should proceed irrespective of gestational age.
- If unsure, it is safer to observe in the hospital than to miss a brewing emergency
- Good outcomes are achieved through a multidisciplinary approach, involving obstetricians, surgeons, anesthesiologists, radiologists, and neonatologists as needed
- Close monitoring, clear communication, and patient-centered care (educating and involving the expectant mother in decisions) are essential throughout this process.

Suggested Reading :

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Respectful Mother, Baby, and Family- Centered Maternity Care in India : The New Concept and a Human Rights Approach

Introduction

Respectful Mother, Baby, and Family-Centered Maternity Care (RMC) is essential for quality maternal and newborn healthcare, ensuring dignity, compassion, and empowerment throughout pregnancy, childbirth, and postpartum periods. India has made significant strides in improving maternal health outcomes, but disparities persist. India's progress, challenges, and recommendations for promoting RMC are being stressed for providing quality maternity services.

Background

India's Maternal Mortality Ratio (MMR) has declined significantly, from 212 deaths per 100,000 live births in 2007-09 to 122 deaths per 100,000 live births in 2015-17 (SRS, 2020). Despite progress, India still accounts for 17% of global maternal deaths (WHO, 2019). The 2016 National Health Policy emphasized respectful, patient-centered care.

Latest Guidelines and Initiatives

1. **National Health Mission (NHM) Guidelines (2019):** Emphasize respectful care, dignity, and compassion.
2. **LaQshya Program (2018):** Improves quality of care in labor rooms.
3. **Respectful Maternity Care Charter (2020):** Outlines RMC principles.
4. **Integrated Child Health and Immunization Program:** Community-based care.
5. **Janani Suraksha Yojana (JSY):** Conditional cash transfer scheme.

Respectful Mother, Baby, and Family-Centered Maternity Care: 12 Points developed by *The White Ribbon Alliance*, a Global coalition advocating for women's and newborn's health, are as follows :

1. Freedom from Harm and Discrimination

- No physical, verbal, or emotional abuse
- Protection from discrimination based on age, ethnicity, socioeconomic status, or health conditions
- Respect for women's autonomy and decision-making

2. Respectful Communication

- Clear, concise, and culturally sensitive communication
- Active listening and empathy
- Involving women in care decisions and explaining treatment options

3. Autonomy and Informed Consent

- Women's right to make informed decisions about care

- Full disclosure of treatment options and potential risks
- Obtaining informed consent before procedures or interventions

4. Right to Privacy and Confidentiality

- Protection of personal and medical information
- Private consultations and examinations
- Confidentiality in documentation and record-keeping

5. Dignity and Respect

- Treating women with kindness, compassion, and respect
- Recognizing women's dignity and autonomy
- Avoiding dehumanizing or humiliating treatment

6. Emotional Support and Comfort

- Providing emotional support during labor, delivery, and postpartum
- Offering comfort measures (e.g., pain management, warmth etc.)
- Involving family members or support persons

7. Right to Companion of Choice

- Allowing women to choose a birth companion
- Ensuring companion's presence during labor, delivery, and postpartum
- Respecting companion's role in supporting the woman

8. Cultural Sensitivity and Support

- Respecting women's cultural backgrounds and preferences
- Providing culturally sensitive care
- Involving traditional birth attendants or cultural support persons

9. Safe and Evidence-Based Care

- Adhering to evidence-based practices and guidelines
- Ensuring safety and quality of care
- Monitoring and addressing complications promptly

10. Accountability and Quality Care

- Regular monitoring and evaluation of care
- Addressing concerns and complaints promptly
- Ensuring accountability and transparency

11. Continuity of Care

- Seamless transition between healthcare providers
- Continuity of care during antenatal, intrapartum, and postpartum periods
- Coordination between healthcare teams

12. Universal Access

- Ensuring access to respectful maternity care for all women
- Addressing disparities and inequalities
- Providing care regardless of socioeconomic status, geography, or health conditions

These principles highlight the importance of respectful, dignified, and evidence-based care for women throughout their maternity journey.

Additional Pearls

RMC also emphasizes on:

- **Mother-friendly care :** Support for breastfeeding, pain management, and empowerment.
- **Baby-friendly care :** Skin-to-skin contact, delayed cord clamping, and breastfeeding support.
- **Family-centered care :** Involving family members in care decisions.

Challenges

Incorporating RMC principles requires:

- Healthcare provider training
- Infrastructure and resource allocation
- Community engagement and awareness
- Policy support and accountability mechanisms
- Socio-Cultural Barriers

Recommendations

1. Healthcare Provider Training- incorporating ASHA workers
2. Infrastructure and Resource Allocation
3. Community Engagement
4. Monitoring and Evaluation
5. Policy Support

Conclusion

Respectful Mother, Baby, and Family-Centered Maternity Care is crucial for improving maternal and newborn health outcomes. India's commitment to RMC is evident, but challenges persist. Addressing infrastructure, training, and community engagement will ensure dignified, empowering experiences for mothers, babies, and families.

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> "No Woman can call herself free until she choose consciously whether she will or will not be a mother."

How do I Manage - Previous Stillbirth

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Background and Burden of Stillbirths

In 2023, nearly 2 million babies were stillborn globally at or after 28 weeks of pregnancy, equating to about 5,000 females facing the tragic event of stillbirth each day. 1 Approximately one third of stillbirths take place in low-income countries, and mostly happens in Africa and South Asia.2 Stillbirth can be classified based on the timing of the death: antepartum or intrapartum (Foetus dies before the commencement of labour or during labour. Most of these stillbirths are preventable with quality antenatal care and the aid of skilled health care personnel to provide optimal intrapartum care. Almost 49% of stillbirths are attributed to intrapartum complications such as birth asphyxia, prolonged labour, birth injury, malpresentation, umbilical cord prolapse and shoulder dystocia.

Management of women with history of stillbirth

History of still birth in previous pregnancy is the single most imperative risk factor for repeated stillbirth, with an estimated stillbirth rate of 9-20 per 1000 live births & stillbirths.[3,4,5] However, the risk of repetition is determined by the cause that led to the previous loss, therefore, complete evaluation of the mother and the stillborn baby at the time of delivery is most crucial in guiding the care in subsequent pregnancies (Table 1).[3,4,5] Detailed history, maternal and fetal evaluation, genetic testing, feto-maternal haemorrhage, including placental examination and fetal autopsy, play an important role at the time of delivery in reaching the cause of death.[3,4,5] In our routine practice, we usually come across women with history of stillbirth for which cause is not documented or seems unexplained or investigated, which poses a challenge to manage subsequent pregnancies.

How do I manage Women with previous stillbirth (Table 2)[3]

- They require special attention and specific tests based on their prior loss. Treatable causes, such as antiphospholipid antibody syndrome or maternal vascular malperfusion, should be addressed well before planning pregnancy to achieve a favourable outcome.[3]
- During the preconception period, they should also be screened for the known risk factors for stillbirth, such as obesity, smoking, diabetes mellitus and autoimmune disorders, which can be addressed and optimized before planning a subsequent pregnancy.
- These women need empathetic care beside medical treatment, which would also help them relieve their apprehension of recurrence.[3]
- Cases where there is sign of intra uterine growth restriction or history suggestive of early severe preeclampsia and cases of unexplained or uninvestigated stillbirths can be attributed to placental insufficiency and may help from low-dose aspirin.[3] It is recommended to start Low-dose aspirin before 16 weeks of pregnancy and to continue till delivery.[3]
- Women who experience stillbirth related to birth defects need genetic counselling and should be advised to take folic acid atleast 3 months

Table 1: Maternal and foetal evaluation at the time of foetal death

Maternal evaluation	Fetal evaluation after birth
Review the history (presenting symptoms, obstetric history, past history) again and look for the risk factors	External examination of fetus, placenta & cord to look for any externally visible birth defects or any birth trauma
Investigations in all cases	**Investigations**
• Complete blood count • Biochemistry including bile salts • Coagulation profile • Blood group & Antibody titres • Hemoglobin electrophoresis • Random blood glucose • Glycocylated Hemoglobin • Thyroid function • Kleihauer betke test • Serology for viral screen, syphilis, tropical infection	• Cord blood ABG, Hemogram, platelet count • Infantogram/X ray • Autopsy including histopathological examination • Fetal & placental microbiology
In selected cases	**In selected cases**
• Maternal Bacteriology – maternal fever, flu like symptoms, abnormal liquor, prolonged leaking PV • Maternal thrombophilia screen • Anti-red cell antibody serology • Maternal anti –Ro & anti –La Antibodies • Maternal alloimmune antiplatelet antibodies • Parental karyotype (Indications) - Fetal unbalanced translocation - Other fetal aneuploidy - Fetal abnormality on autopsy - Previous unexplained stillbirth	• Fetal & placental tissue for karyotype (selected cases)

before pregnancy specifically in women with history of neural tube defects.

- Some biochemical parameters, like low pregnancy-associated plasma protein-A (PAP-A) and percentile of uterine artery Doppler are linked with stillbirths.6 However, these tests have poor predictive values and are not recommended routinely.
- There is limited data regarding the number and frequency of antenatal checkups, but women with previous loss require more vigilant monitoring, additional ultrasounds for foetal growth and emotional support during their pregnancy.[3] There is no clear evidence whether increased surveillance and repeated sonography would benefit these women or simply contribute to heightened anxiety.[3]
- Regarding the timing of delivery, each case should be individualized, keeping in mind the gestation of previous stillbirth and the situations during previous delivery. The sensitive state of the mother should also be considered while deciding termination of before 39 weeks of pregnancy. It should be a shared decision after providing the evidence-based information about the risk of stillbirth in continuing the pregnancy versus neonatal problems related with induction of labour before 39 weeks, like transient tachypnoea of the newborn and need for admission to Intensive care unit, etc.
- Mode of delivery: No evidence supports a particular mode of delivery concerning perinatal outcomes. It should be a shared decision between the woman and her healthcare provider.
- Psychological support should be an essential component of care, throughout their pregnancy. However, it is often observed that these needs are overlooked, with care providers placing greater emphasis on preventing medical complications rather than addressing emotional well-being.

Table 2: Approach to a woman with a previous stillbirth

Pre-conception care
• Detailed history and clinical examination • Review the records (autopsy findings, placental examination report, karyotype) • Assign the cause for previous stillbirth • Rule out underlying chronic diseases Hypertension, diabetes mellitus, Thyroid disorders.Folic acid supplementation • Reassurance and psychosocial support to woman and her family
During subsequent pregnancy at booking
First trimester • Ultrasound – Confirmation of pregnancy and dating • Folic acid to continue, low-dose aspirin in indicated cases • Aneuploidy screening (11- 13 weeks) • Glucose tolerance test, Thyroid function • Reassurance and psychosocial support to the woman and her family
Second trimester • Level II ultrasound (cervical length monitoring in cases of previous history of cervical incompetence or prematurity-related loss) • Aneuploidy screening Uterine artery Doppler (optional) • Reassurance and psychosocial support to the woman and her family
Third trimester • Glucose tolerance test (3rd trimester/ 24-28 weeks) • Ultrasound for serial growth monitoring (28 weeks onwards, every 2 weeks) • Daily fetal movement count (28 weeks) • Non-stress test (optional) • Reassurance and psychosocial support to the woman and her family
Delivery
Induction at 39 weeks or earlier if indicated, but not before 37 weeks of gestation
Mode of delivery
• Vaginal delivery preferably after informed consent of a woman • Cesarean delivery where induction is contraindicated

Conclusion

Women in subsequent pregnancy following stillbirth require individualized, tailored care considering the cause of the previous loss. Along with antenatal care, psychological support plays an important role as the impact of previous loss may continue with nervousness, sadness, sorrow and post traumatic tension in subsequent pregnancy as well. Decisions regarding the timing and mode of delivery should be made collaboratively between the woman and her healthcare provider, based on informed choice and the best available evidence.

Key points

1. History of still birth in previous pregnancy is the single most imperative factor for repeated stillbirth.
2. Detailed history, maternal and fetal evaluation, genetic testing, feto-maternal haemorrhage, including placental examination and fetal autopsy, play an

important role at the time of delivery in reaching the cause of death.

3. Cases of unexplained or uninvestigated stillbirths can be attributed to placental insufficiency and may value from low-dose aspirin.
4. Women with previous loss should be provided with passionate and psycho social support all through their pregnancy.
5. Each case must be personalized rendering to the reason of stillbirth, problems of index pregnancy and emotional response of the woman.

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> Improved maternal health benefits the whole of society.
>
> *- Isabella Lovin*

How do I Manage – Previous Fetal Growth Restriction

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Introduction

Fetal Growth Restriction, or FGR, represents a significant challenge in modern obstetrics affecting 5–10% of pregnancies, it is a major contributor to perinatal morbidity and mortality. Its early detection is critical, as failure to identify and manage these pregnancies can result in stillbirth, preterm birth, and long-term developmental delays.

Previous FGR as a Risk Factor

A history of FGR in a past pregnancy is considered a significant risk factor and is defined by:

- Birth weight below the 3rd centile.
- Early-onset preeclampsia or FGR requiring delivery before 34 weeks of gestation.
- Birth weight below the 10th centile associated with placental insufficiency

Pregnancy with previous history of FGR is a high risk pregnancy and recurrence risk of developing FGR in present pregnancy is 25%.

Definitions[1,2]

Fetal Growth Restriction (FGR) is characterized by:

- AC or EFW below the 3rd centile; or
- AC or EFW less than the 10th centile in combination with abnormal Doppler findings.

FGR is further classified by gestational age at onset:

- **Early-onset FGR** occurs before 32 weeks of gestation.
- **Late-onset FGR** occurs at or beyond 32 weeks of gestation.

According to the Delphi consensus[3], the diagnostic criteria differ slightly between early and late onset FGR:

- **Early-onset FGR (<32 weeks):** AC/EFW <3rd centile or umbilical artery (UA) absent end-diastolic flow (AEDF); or two of the following—AC/EFW <10th centile, uterine artery pulsatility index (UtA-PI) >95th centile, AC/EFW centile crossing >2 quartiles on growth chart.
- **Late-onset FGR (≥32 weeks):** AC/EFW <3rd centile; or AC/EFW <10th centile with cerebroplacental ratio (CPR) <5th centile or UA-PI >95th centile.

Risk Factors for FGR[4,5]

Maternal Factors: These include primiparity or high parity, ethnic background (higher risk in black populations), malnutrition, low maternal weight, less fruit intake, strong daily exercise, limits of maternal age, previous IUGR. Assisted reproductive techniques, uterine anomalies, low socioeconomic status, low PAPP-A levels, and systemic medical disorders

such as SLE, diabetes, renal disease, cyanotic heart disease, or autoimmune diseases also increase risk.

Paternal Factors: A paternal history of low birth weight may contribute.

Fetal Factors: Female fetuses, chromosomal anomalies (e.g., aneuploidies, microdeletions), genetic syndromes, congenital anomalies, intrauterine infections (e.g., CMV, toxoplasmosis, rubella, syphilis), and multiple gestations are implicated.

Placental Factors: Abnormal placental development (e.g., placental hypoplasia, chorangiomatosis, abnormal insertion or shape), maternal vascular lesions (e.g., infarcts, retroplacental hemorrhage), fetal vascular abnormalities (e.g., hypercoiling, true knots, single umbilical artery), and inflammatory conditions (e.g., chorioamnionitis) are key contributors.

Environmental Factors: Exposure to tobacco, alcohol, drugs, high altitudes, radiation, and teratogens (e.g., methotrexate, antiepileptics, warfarin) are known risks.

Management of pregnancy with history of previous FGR— My Institutional protocol

The management of such patient is done by integrating the guidelines of different societies with the available resources as follows:

- Optimization of medical disorders like Hypertension, SLE, Diabetes, Renal diseases etc. is done prior to conception.
- The confirmation of gestational age is essential by confirming date of last menstrual period and early dating scan.
- A detailed history of previous pregnancy has to be elicited whether it was early onset FGR or late onset FGR or there was any other risk factors for FGR.
- Any chronic maternal illness is documented and optimized by multidisciplinary team approach ideally prior to pregnancy or whenever the patient presents.
- If there is any history of substance abuse,the patient is councelled about cessation of same and life style modification.
- Chromosomal anomalies and maternal infection (TORCH) are ruled out and genetic counseling done if it was previous early FGR
- All routine antenatal investigations along with those pertaining to particular medical disorder are sent and a complete general physical examination is conducted.
- In cases of history of recurrent FGR and on clinical suspicion, APLA profile, Nonspecific antinuclear antibody (ANA) for initial screening, Anti dsDNA antibody - specific for diagnosis of SLE is suggested.
- Down syndrome screening at 11 to 13 weeks plus 6 days of gestational age by combined screening methods is done. Uterine artery doppler can also be done.
- Low-dose aspirin (75–150 mg at night) is started between 12 and 16 weeks of pregnancy.[7]
- Detailed anatomic survey including structural anomalies, soft markers, disorders of amniotic fluid, fetal echocardiography is perfomed in targeted scan around 20 weeks of gestation along with uterine artery doppler scan. High mean pulsatility index (above 95th percentile) of uterine artery denotes inadequate vascularization of the placenta.
- These patients need more frequent antenatal visits, two weekly till 32 weeks and weekly till date of delivery.
- At every visit growth will be monitored via customized growth charts which includes maternal height, weight, parity and ethinicity.
- At every visit symphisio-fudal height (SFH) is measured from 24 weeks onwards. If there is any deviation in customized growth chart and SFH, ultrasound should be performed.
- Adequate rest ,high protein diet and strict daily fetal kick counts is advised to the patient.
- Patients should be monitored with biometry , AFI,biophysical profile (BPP) and doppler studies if needed (umblical artery , middle cerebral artery, ductus venosus and cerebro placental ratio).

Fall of > 50 percentiles for AC or EFW between 2 consecutive scans is considered as reduced growth velocity.

- If computarised CTG is available, can be used. It is identified as better modality to detect short term variability and fetal hypoia.
- In case FGR is diagnosed at any point, they are managed as per the set protocols for

FGR incorporating the Barcelona Criteria6. (Table I)

- The timing of delivery is optimized by severity of FGR, and period of gestation of diagnosis. Biophysical profile along with Doppler flow of ductus venosus in preterm and middle cerebral artery in near term fetuses is helpful in deciding the time and mode of delivery.
- In case preterm delivery is mandatory, corticosteroid cover is given if delivery before 34 weeks and injection $MgSO_4$ for neuroprotection upto 32 weeks of pregnancy.
- Neonatologist should be present at the time of delivery.
- If only PI is raised in umblical artery or there is AEDF, short induction of trial with strict monitoring can be done.
- In cases of very preterm and extreme preterm babies,delivery should be conducted where appropriate nursery facilty is available and intrauterine transfer may be considered.

Table I : Management of FGR according to severity[6]

	Monitoring	Delivery
EFW <3rd centile, EFW <10th centile with CPR <5th centile, UA- PI >95th centile, or MCA-PI <5th centile.	Weekly monitoring is required Growth scan Two weekly ~ Doppler (UA, MCA) 1–2 times in a week, BPP/ NST 1-2 times in a week	Delivery is planned at 37 weeks via induction.
UA-AEDF	Surveillance biweekly	Delivery is recommended at 34-36 weeks
UA reversed end-diastolic velocity (REDV) or DV-PI> 95th centile	Monitoring every 1–2 days	Delivery at 30-32 weeks prefeably via cesarean section
DV reversed a-wave, abnormal CTG (short- term variability <3 ms), or recurrent decelerations	Monitoring every 12 hours	Delivery indicated by 28 weeks prefeably via cesarean section

RCOG GUIDELINES FOR FGR[1] (2024)

- *Patient:* Pregnant woman diagnosed with FGR
- *Gestational Age Range:* Categorized into <32 weeks, 32–36+6 weeks, and ≥37 weeks
- *Monitoring Tools:* Umbilical Artery Doppler, Ductus Venosus Doppler, Middle Cerebral Artery Doppler, Cerebroplacental Ratio, Computerized CTG

1. Early FGR (24+0 to 31+6 weeks gestation):

Surveillance: Fortnightly EFW and weekly Umbilical artery doppler. DV Doppler/cCTG, Minimum twice weekly if AEDF/REDF present.

Delivery Criteria:

- *24–25+6 weeks:* Individualized care if AEDF/REDF in umbilical artery.
- *26–28+6 weeks:* Deliver if ductus venosus a-wave absent or STV< 2.6 ms.
- *29–31+6 weeks:* Deliver if ductus venosus a-wave absent or STV< 3.0 ms.

Deliver by:

- *32 weeks:* if REDF in umbilical artery (consider from 30 weeks).
- *34 weeks:* if AEDF (consider from 32 weeks if other risk factors).

2. FGR from 32+0 to 36+6 weeks:

Surveillance: Fortnightly EFW and weekly Doppler. Monitor Umbilical Artery PI >95th centile, conduct cCTG twice weekly.

Delivery Criteria:

- *32–33+6 weeks:* Deliver if DV a-wave absent or STV < 3.5 ms.
- *34–36+6 weeks:* Deliver if STV < 4.5 ms or AEDF.

Delivery by 36–36+6 weeks if Umbilical Artery PI >95th centile.

3. Term Pregnancies (≥37 weeks):

Surveillance: Fortnightly EFW and weekly Umbilical artery doppler.

Delivery Criteria:

- 37–38+6 weeks
- If AC/EFW <3rd centile, FGR cannot be excluded — discuss and plan delivery.

Deliver if cerebral redistribution or abnormal Doppler.

>39 weeks: Deliver if SGA.

Note: If MCA or CPR <5th centile, increase frequency of surveillance.

Do not initiate delivery before 37 weeks solely based on MCA/CPR without other criteria.

Key Points

Fetal growth assessment is the key objective of prenatal care with previous history of FGR.

- Elicit detail history of FGR at first ante natal visit.
- Multidisciplinary approach for any chronic maternal illness.
- Regular scans to monitor the fetal growth.
- Preventive measures with low dose aspirin and life style modification.
- Delivery plan according to degree of growth restriction and gestational age at diagnosis.

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लड़की - लड़का एक समान, पढ़े लिखे और पावें ज्ञान।
विवाह हो सही उम्र पर, खुशियाँ रहें हमेशा घर पर।
माँ बनने से पहले अच्छा स्वास्थ्य, सभी का हो यही उद्देश्य।
पूरा पोषण - पूरा ध्यान, शिशु होवे स्वस्थ बुद्धिमान।
सही समय पर हो सारी जाँच, पहुँचे स्वास्थ्य कर्मी के पास।
सुरक्षित प्रसव सुरक्षित स्वास्थ्य, सबसे जरूरी यह सवाल।
शिशु व माँ का पूरा पोषण, हो हर घर में यह नियम।
छोटा परिवार - सुखी परिवार, युग युग का है यह संदेश।

NIGF Virtual Republic Day Oration

- **NIGF celebrated Republic Day 26 January 2025 by organizing NIGF Republic Day Oration by Dr Achla Batra - Vice President NIGF on subject of Optimizing Obstetric Outcome**
- **On the occasion of Republic Day NIGF 5th NIGF Bulletin was released on theme of Infection in Obs & Gynaec**
- **Dr Sadhana Gupta & Dr Meenakshi Chauhan edited the bulletin with excellent contribution from all authors.**
- **NIGF Precis Writing Competition was organized on subject of "Five Most Important & Urgent Change in Medical Education System in India".**
- **Excellent participation & Innovative Entries by NIGF members.**

NIGF Precis Writing Contest (25 Jan 2025)		
Rank	Name	Final Socre
1	Sunanda Gupta	157
2	Ruchit	153
3	Sarika Gautam	151.5
4	ITISHREE JENA	145.75
5	Monika Gupta	145
6	Rita Singh	142.5
7	Manisha Agarwal	141.5
8	Raj Shekhar Yadav	140
9	Sanskriti Batra	138
10	Sumita Verma	136

1st Winner
Dr Sunanda Gupta

Changes in medical education

1. Establish skill based lab training for surgical procedures especially in Ob/Gyn and general surgical emergency procedures
2. Incorporate a course on managerial skills and accounting to prepare students for administrative tasks needed in healthcare industry. Doctors are unduly put under pressure by administrators due to lack of knowledge in this area.
3. Give weightage to MBBS marks in PG admissions to encourage students to attend classes and focus on acquiring basic education. Students focus on studying for PG entrance during MBBS as supplementary exams have no negative effects on PG entrance
4. Increase emphasis on the behavioural aspects of patient-doctor interactions to improve patient outcomes
5. Strict adherence to wards and OPD clinics and internship attendance to ensure that students acquire hands on experience in all departments

Dr. Sunanda Gupta Sent from my iPhone

Hearty Congratulation

2nd Winner
Dr Ruchit

Five Most Important & Urgent Changes in Medical Education System in India

1. Competency based Curriculum development in Medical Education with uniformity across the nation.
2. Mastery Learning for all. It can offer a powerful approach to all the students with the successful and rewarding learning experience ; now allowed to only a few.
3. Short Term Humanitarian Medical Volunteerism; keeping in mind ethical responsibilities in patient care, professional responsibility to community and population & institutional responsibility towards trainees.
4. A Key focus on Health Informatics Development like healthcare informatics, medical informatics, nursing informatics, clinical or biomedical informatics. It will apply knowledge of computer science, information sciences, behavioral sciences, concerned with applying information in healthcare, typically at the patient level. It will strengthen efficiency, reducing costs, identifying new opportunities and improving clinical care of individuals.
5. Interprofessional Education (IPE); when students from two or more professions learn together can improve the health and safety of patients. It is part of the inter professional collaboration in order to provide something that somebody else cannot provide.

Ruchit
MBBS Student, Batch 2024
University College of Medical Sciences & GTB Hospital Dilshad Garden, Delhi

3rd Winner
Dr. Sarika Gautam

"Five Most Important & Urgent Changes in Medical Education System in India"

1. Integration of Modern Technology:

Integrating cutting-edge technology into medical education is pivotal to keeping pace with the ever-evolving healthcare landscape. Incorporating advanced simulation-based tools, artificial intelligence, and telemedicine modules into the curriculum equips students with real-world clinical exposure. These advancements facilitate experiential learning, enhance diagnostic precision, and bridge the gaps between urban and rural healthcare training.

2. Global Collaboration Opportunities:

Fostering global partnerships with renowned universities and healthcare institutions can revolutionize medical education in India. Exchange programs, collaborative research projects, and international workshops expose students to diverse practices and innovations. Such initiatives broaden perspectives, enhance global competence, and elevate India's reputation in the global medical fraternity.

3. Mitigating Faculty Deficiencies:

Addressing the acute shortage of qualified educators is essential. Offering competitive salaries and attractive incentives, particularly in rural and government colleges, can attract and retain proficient faculty. Promoting continuous professional development and recognizing teaching excellence will further strengthen the academic framework.

4. Mandatory Soft Skills Training:

Soft skills are indispensable in healthcare yet often neglected. Introducing modules on empathy, ethical decision-making, and effective communication enhances doctor-patient relationships. Simulated exercises and role-playing cultivate compassionate, patient-centered care while emphasizing the human side of medicine.

5. Focus on Research and Innovation:

Cultivating a culture of research is crucial to addressing healthcare challenges. Mandatory research projects, supported by adequate funding and expert mentorship, foster innovation. Engaging in conferences, publishing findings, and collaborative projects empowers students to become pioneers in medical advancement.

4th Winner
Dr ITISHREE JENA

FIVE MOST IMPORTANT AND URGENT CHANGES IN MEDICAL EDUCATION SYSTEM IN INDIA.

Dr Itishree Jena , JR3, SNMC AGRA.

1. Integration of Technology and AI in Medical Training

- Incorporating VR and AR into medical education can revolutionize how students learn anatomy, surgical procedures, and patient care. These technologies provide immersive experiences, enabling students to practice in a controlled, risk-free environment.
- AI-driven simulation tools can help students practice decision-making in clinical scenarios, improving diagnostic accuracy and clinical skills before encountering real patients.
- With the rise of telehealth, integrating telemedicine modules into the curriculum will prepare students for modern, remote patient care.

2. Interdisciplinary and Collaborative Learning

Encouraging interdisciplinary teamwork between medical students, nursing students, pharmacists, and other healthcare professionals fosters collaboration and holistic patient care. This approach promotes communication, respect for different roles, and improves teamwork skills, which are essential in modern healthcare environments.

3. Focus on Primary Care and Community-Based Education

- Expanding medical education to focus on primary care in rural and underserved regions helps bridge the healthcare gap. By immersing students in these environments through internships or community-based education, they become more attuned to the unique challenges and develop a commitment to serving these populations.
- Incorporating public health and preventive medicine into medical training will allow future doctors to address health disparities more effectively and promote health education at the community level.

4. Curriculum Reforms: Patient-Centered and Compassionate Care

- Medical education should place greater emphasis on empathy, communication, and cultural competency. Providing students with the tools to engage with diverse patient populations fosters trust and improves outcomes.
- Moving beyond traditional biomedical training to include ethics, mental health, and social determinants of health ensures that future healthcare providers are equipped to deliver comprehensive and compassionate care.

5. Continuous Professional Development and Lifelong Learning

- Developing an education system that is more flexible and adaptable will allow healthcare professionals to continue learning throughout their careers. Implementing platforms for online learning, certifications, and short courses will help professionals stay up-to-date with emerging medical technologies and practices.
- Strengthening mentorship initiatives, where experienced doctors guide students through practical learning, helps bridge the gap between theoretical knowledge and real-world practice.

5th Winner
Dr Monika Gupta

REFORMING MEDICAL EDUCATION IN INDIA: FIVE CRITICAL TRANSFORMATIONS

India's medical education system is at a crossroads, requiring significant reforms to meet the growing demands of healthcare delivery. Below are five transformative changes needed to reshape the system and ensure better outcomes:

1. Revamping the Curriculum

The current medical syllabus requires a comprehensive overhaul to align with international standards. Emphasis must be placed on emerging disciplines such as telemedicine, artificial intelligence in healthcare, and genomic medicine. Integrating interdisciplinary subjects—like public health, medical research, and clinical management—will create a more holistic framework for future medical professionals.

2. Fostering Practical Training

Medical education in India often prioritizes theoretical knowledge over practical application, leaving students underprepared for real-life scenarios. Introducing modern learning methods such as simulation-based exercises, advanced clinical rotations, and community-focused internships can bridge this gap. These hands-on experiences are essential for nurturing confident and competent healthcare providers.

3. Improving Faculty Expertise

A shortage of skilled and trained educators is a major obstacle to quality medical education. To address this, it is crucial to implement targeted faculty development programs that emphasize innovative teaching methods, updated clinical practices, and cutting-edge research. These initiatives will empower educators to create a more dynamic learning environment for students.

4. Bringing Rural Healthcare to the Forefront

The unequal distribution of medical professionals has left rural areas severely underserved. Introducing mandatory rural internships, along with incentives such as financial benefits or career advancement opportunities, can encourage graduates to serve in remote regions. These measures will help create a healthcare workforce attuned to grassroots-level challenges.

5. Enhancing Oversight and Infrastructure

Inconsistent quality standards and insufficient infrastructure in medical institutions undermine education. Establishing robust regulatory frameworks, investing in modern facilities, and fostering partnerships with the private sector can address these issues. By standardizing quality and improving resources, medical education can become more equitable and effective.

CONCLUSION:-

Reforming India's medical education system is not just a necessity but an urgent priority. By adopting these transformative measures, the nation can build a healthcare education model that meets both domestic needs and global benchmarks, ensuring a brighter future for medical professionals and the communities they serve.

Hearty Congratulation

6th Winner
Dr Rita Singh

Five most importantand urgent changes in medicaleducation system in India:

India's medical education system requires urgent reforms to meet modern healthcare demands. Five critical changes can significantly improve the system:

1. Orientation Programs: Introducing orientation programs can prepare students for their medical journey by focusing on ethics, communication, teamwork, and stress management, ensuring holistic development and resilience.

2. Interactive Study Methods: Moving beyond rote learning, adopting case-based learning, simulations, virtual reality (VR), and online platforms can make education engaging and improve conceptual understanding. These methods can transform how anatomy, surgery, and clinical procedures are taught.

3. Incorporating Technology: With rapid advancements in healthcare technology, courses on artificial intelligence (AI), machine learning, telemedicine, and robotic surgery are essential. Training in these areas will prepare doctors for modern healthcare challenges.

4. Hospital and Social Management: Adding modules on hospital administration, public health, healthcare laws, government schemes, and media management will equip doctors to manage healthcare facilities effectively and interact confidently with the public and media.

5. Shortened Study Duration: The lengthy education pathway to super-specialization hampers work-life balance. Streamlining the curriculum without compromising quality can allow doctors to begin their careers earlier while maintaining a healthy personal life.

These reforms will produce well-rounded, socially responsible, and technologically adept doctors, enhancing healthcare delivery and professional satisfaction. By embracing these changes, India's medical education system can set a global benchmark for excellence.

7th Winner
Dr Manisha Agarwal

India produces nearly 90,000 medical graduates annually, yet the healthcare system faces a mismatch between education and ground realities. Here are five critical changes needed:

1. Curriculum Overhaul with Practical Emphasis

The curriculum is outdated and theory-heavy. For example, the WHO recommends at least 30% clinical training during undergraduate education, but many Indian institutions fall short. Increasing hands-on exposure to primary care and emergencies can bridge this gap.

2. Focus on Primary Healthcare and Rural Medicine

With 66% of India's population living in rural areas, there's an acute shortage of doctors. Yet, most graduates aim for specialties in urban settings. Compulsory rural internships and inclusion of community health subjects in exams can direct attention to these underserved regions.

3. Incorporation of Digital Health and AI

The telemedicine market in India is expected to reach $5.4 billion by 2025. Incorporating digital tools and AI into the curriculum will empower future doctors to offer remote consultations and data-driven care, especially in remote locations.

4. Faculty Development

A 2023 study found that 40% of medical colleges lack adequately trained faculty. Regular skill-upgrade workshops and better pay structures can address this.

5. Mental Health Support for Students

Medical students face intense pressure, with 30% experiencing burnout, according to a Lancet study. Introducing counseling services and mandatory wellness programs can enhance their resilience and reduce dropout rates.

Implementing these reforms will align India's medical education with global standards and address its unique healthcare challenges effectively.

8th Winner
Dr Raj Shekhar Yadav

Revolutionizing Medical Education in India: 5 Urgent Reforms

India's medical education system is at a crossroads. To ensure that future generations of doctors are equipped to provide world-class healthcare, we must implement drastic reforms. Here are the top 5 changes that demand immediate attention:

1. *Redefine NEET Qualifying Criteria*: Switch from 50th percentile to 50% percentage, and limit NEET UG attempts to three. It's unrealistic to expect students who scored 18% in NEET UG to achieve 50% in subsequent exams.

2. *Subsidize Medical Education*: The government must subsidize medical education, eliminating exorbitant fees. Doctors who spend crores on education cannot be expected to serve humanity selflessly.

3. *Ban Private Practice for Medical Teachers*: Prohibit private practice, ensuring teachers focus solely on teaching and research. Provide them with handsome salaries to compensate.

4. *Strengthen Existing Medical Colleges*: With India achieving the WHO-prescribed doctor-patient ratio, new medical colleges are unnecessary. The government must focus on fortifying existing institutions.

5. *Abolish NRI and Management Quotas*: Eliminate these quotas, which allow undeserving students to secure medical seats based on their financial resources. Merit, not money, should be the sole criterion.

Implementing these reforms will revolutionize India's medical education system, ensuring that future doctors are equipped to provide top-notch healthcare. The time for change is now.

Dr Raj Shekhar Yadav
MBBS,MD
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9th Winner
Dr Sanskriti Batra

FIVE MOST IMPORTANT AND URGENT CHANGES IN MEDICAL EDUCATION SYSTEM IN INDIA

Standardization of Medical Education

The minimum eligibility and passing marks for all medical courses should be 50%. Reducing it further or switching to a percentile system undermines the credibility of medical education. All medical courses should be standardized across India with a common UG and PG exit exam. The DNB and MD/MS degrees should eventually be merged under a unified board with a single nomenclature.

Revamping medical curriculum

The curricular load of MBBS should be reduced by applying modern tools to inculcate analytical knowledge rather than promoting memory based teaching and examination. The training should be aimed at 'qualification' and not at 'subjective examination based certification'. Many unwarranted details in UG courses must be erased. Other essential aspects such as communication, documentation, and key non technical skills should be emphasised to make good doctors, and not just clinicians.

Strengthening of infrastructure

Mushrooming of medical institutions without dependable infrastructure is unprofitable. Prioritize clinical postings, which are increasingly getting sidelined due to the intense premature focus on PG entrance, affecting production of competent graduates.

Promoting evidence based learning

Instead of limiting learning to outdated textbooks, evidence based learning should be promoted, especially in postgraduate courses. Participation in QIPs and audits should be made mandatory, extending beyond the confines of dissertation.

Work-life balance

While knowledge and growth require dedication and sincere effort, the toll on mental health and the increasing suicide rates cannot be overlooked. Glorifying of inhuman working hours and conditions needs to be discouraged.

10th Winner
Dr Sumita Verma

Changes needed in Medical Education

01. Premedical course consisting of two yrs, Anatomy, Physiology, Biochemistry must after school.
02. Entry age minimum Nineteen yrs, Course length seven yrs. All entrants to pass out as Post Graduate.
03. First four yrs, General Medicine, Obstetric & Gynae, Pathology, Social & Preventive Medicine, ENT, Pediatrics with an Examination at the end of four yrs and the course divided into appropriate semesters. Special emphasis on ward teaching and practical aspects.
04. Last three years as post graduate fellows in subject of choice on basis of exam result of first four year to be known as residency with all getting admission. Aspecial category of family medicine to be created to accumodate all those who do not get admission in specific branches. All passing out as post graduates. Medical teaching course of one year to prepare future teachers.
05. Superspeciality after appropriate exam and optional for post graduates opting for academics and they can only work in government or Super speciality hospital with research units and to be paid handsomely.

State Chapter Activities

- **Rajasthan & Haryana Chapter of NIGF organized virtual academic programs on theme of a. Menopause b. Critical Obstetrics**
- **Well chosen subject with excellent inputs from faculties Hearty congratulations**
- **UP Chapter organized virtual academic program on Cervical Cancer Awareness, Prevention and Screening. Hearty congratulation to Dr Deepti Chaturvedi.**

NIGF celebrated Women's Day, A program coordinated by Dr Taru Chhaya & Rajasthan Chapter of NIGF on topic of crossing barriers to positive life style and health facilities by Women.

Mentors, Seniors as well young members gave innovative inputs & shared ground realities.

Program was highly appreciated with great viewers interaction

Kanoon ki Pathshala

Convenor

Dr Sadhana Gupta • Dr Sangeeta Gupta

Advisor

Dr Sharda Jain

- NIGF Kanoon Ki Pathshala is regular in imparting lessons on important medicolegal areas in obstetric & Gynecology practice
- Subjects covered

Medicolegal Issues in Hysterectomy

- Key speaker was Dr Monika Gupta
- Moderator - Prof. Dr. Sangeeta Arya

Medicolegal Issues in Unexplained Still Birth

- Key speaker – Dr Nidhi Khera
- Moderator – Dr Babita Shukla

Medicolegal Issues in Birth Asphyxia

- Key speaker – Dr Shalini Tripathi
- Moderator – Dr Shakuntla Kumar

Legal Aspects of Sterilization in India

- Key Speaker & Moderator – Dr Neelam Jain
- Crisp and clear deliberation by our Key Note Speaker, Moderator and Faculties
- Recording link is available on NIGF face book page

Expert Speaks Series

- **NIGF expert Speaks Series on 27th Feb on Non-immune Hydrops Fetalis by Prof. Dr. Sangeeta Yadav**
- **On 20th March on Epithelial Ovarian Cancer Comprehensive Approach for Precision Medicine by Dr Mala Srivastava.**
- **Recording link available for those who have missed.**

NIGF Diamond Oration

NIGF celebrated India Safe Motherhood Day on 11 April with NIGF Diamond Oration by Vice President NIGF Prof Jaya Chaturvedi on theme of advocating for safer Motherhood & highlighting importance of maternal health care.

Insightful oration with sharing of many innovative for saving mothers esp in difficult geographical terrain.

Quiz

NIGF quiz is going on every 2nd and 4th Sunday on diverse subject.

Quiz coordinator Dr Taru Chhaya is doing great job with fine sets of questions.

We heartily congratulate NIGF members for participation in great numbers.

All central as well state chapter winners get certification regularly.

Physical CMEs under NIGF Banner

- **NIGF Rajasthan Society organized Physical CME at Sri Ganganagar on topic of Reproductive Immunology on 1st Feb 2025.**
- **And another CME was on 12th April 2025 on IVF**
- **Both Meeting was well attended**
- **NIGF Rajasthan Chapter celebrated Nurses Day on 12th May 2025**
- **Cervical cancer vaccination awareness program done for the Nursing Staff**
- **Hearty congratulations to Rajasthan Chapter esp Dr Monika Gupta, Dr Taru Chhaya under dynamic leadership of Prof Veena Acharya.**

- **NIGF UP Chapter organized physical CME on 10th May at Gorakhpur on very important subject of Vitamin D Deficiency, & supplementation across the ages in Indian population.**
- **Dr Sadhana Gupta Pres NIGF delivered key note on subject followed by case-based panel discussion by Dr Babita Shukla**
- **Highlight of meeting was participation of doctors from other specialties as well great audience participation**

Do join for

NIGF 3rd ANNUAL CONFERENCE

at

Hotel Natraj Sarovar Portico, Jhansi

on

19-20 July, 2025

Please visit website
https://www.nigfconference2025.com/

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2nd Issue of NIGF Bulletin – Anemia Free India

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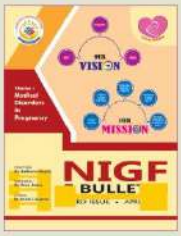

3rd Issue of NIGF Bulletin – Medical Disorders in Pregnancy

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5th Issue of NIGF Bulletin – Infection in Obs & Gynaec

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