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Theme:
**Revisiting the
Basics: Labour and
Intrapartum Care**

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From The President's Pen



Dear Members and Colleagues,

It gives me immense pleasure to present the first issue of the NARCHI Delhi Bulletin, marking another important milestone in our journey of academic excellence, professional engagement, and commitment to improving maternal and neonatal healthcare.

The practice of Obstetrics and Neonatology is continuously evolving, driven by advances in scientific evidence, technology, clinical protocols, and changing healthcare needs. As clinicians, it is our responsibility to remain updated, refine our skills, and translate evidence into safe and effective patient care. NARCHI Delhi has always been committed to promoting continuous learning, collaboration, and excellence in maternal and child health.

This inaugural issue focuses on “Revisiting the Basics: Labour and Intrapartum Care”—a theme that reflects the foundation of obstetric practice. A strong understanding of physiology of labour, timely interventions, and standardized care pathways remains central to improving maternal and neonatal outcomes.

The bulletin brings together valuable contributions from experts covering key areas of labour management, including labour curves and their clinical implications, induction of labour, intrapartum fetal surveillance, labour analgesia, labour room protocols, and the role of ultrasound in labour. It also highlights recent updates in obstetric practice, including the WHO 2025 recommendations on active management of the third stage of labour and practical insights into important medications such as Carbetocin and Atosiban.

Through this bulletin, we aim to create a platform that bridges knowledge, experience, and evidence-based practice. It will serve as a resource for obstetricians, neonatologists, trainees, and healthcare professionals by bringing together contemporary concepts, practical approaches, and academic discussions.

This initiative is a reflection of the collective efforts of our members and contributors. I extend my sincere appreciation to all authors, reviewers, and the editorial team for their dedication in bringing this issue to life.

NARCHI Delhi will continue to expand its academic activities through CMEs, workshops, skill-based training programs, webinars, and innovative educational initiatives focused on improving clinical competence and patient safety. Together, we will continue to strengthen our commitment towards excellence in maternal and child health.

I invite all members to actively engage with this bulletin, share their knowledge, and contribute towards building a vibrant academic community. Let us continue to learn, collaborate, and lead the way towards safer motherhood and healthier newborns.

With warm regards,

Dr Aruna Nigam

President
NARCHI Delhi 2026-2028

From The Secretary's Desk



Dear Colleagues,

It gives me immense pleasure to present the inaugural 'Quarterly Bulletin of NARCHI Delhi'. This bulletin is envisioned as a platform to keep our members connected with the academic, professional, and community initiatives of our chapter, while celebrating the collective efforts that strengthen our fraternity.

The theme for this year, "Nari, Navjaat, Nani", beautifully encapsulates the continuum of care that defines our specialty. From ensuring safe motherhood and nurturing the newborn to promoting healthy ageing and dignity for our elderly women, this theme reminds us that our commitment extends across every stage of a woman's life. It also reflects our shared responsibility to provide compassionate, evidence-based, and holistic healthcare.

NARCHI Delhi has always believed that continuous learning is the cornerstone of excellence in clinical practice. I encourage every member to actively participate in the CMEs, workshops, hands-on training programmes, journal discussions, and other academic activities being organized throughout the year. These events not only help us remain abreast of evolving evidence and technologies but also provide invaluable opportunities to interact with peers, mentors, and experts, fostering a vibrant culture of lifelong learning.

At the same time, our role as healthcare professionals extends beyond hospital walls. Through small but meaningful community outreach initiatives, health awareness programmes, and public engagement activities, we have the opportunity to give back to society and make a tangible difference in the lives of women and their families. I warmly invite all our members to join these initiatives. Every contribution, however modest, strengthens our collective impact and reflects the true spirit of our profession.

This bulletin belongs to every member of NARCHI Delhi. I encourage you to share your research, interesting clinical experiences, innovations, achievements, photographs, and reports of academic or community activities. Your contributions will enrich future editions and help us showcase the diverse talent and dedication within our chapter.

I extend my heartfelt gratitude to our President, Executive Committee, Editorial Team, and every member whose enthusiasm and support have made this first issue possible. Their commitment has laid the foundation for what I am confident will become a valuable and enduring tradition.

As we move forward together, let us continue to uphold the highest standards of ethics, professionalism, scientific inquiry, and compassionate care. Let us learn together, serve together, and grow together, keeping "Nari, Navjaat, Nani" at the heart of all that we do.

I wish you an enriching read and look forward to your active participation in the many academic and community initiatives that NARCHI Delhi has planned in the months ahead.

Warm regards,

Dr Sumedha Sharma

Secretary, NARCHI Delhi

From The Editorial Board



Dear NARCHI members

I extend my sincere gratitude to the team of NARCHI for the confidence reposed in me and for providing the opportunity to serve as the Editor of the NARCHI bulletins. Their vision and unwavering support have been instrumental in bringing together this comprehensive resource for clinicians and trainees alike. It is a privilege to present the first issue of the present team, dedicated to the theme of **"Revisiting the Basics: Labour and Intrapartum Care"** a subject that lies at the heart of safe motherhood and quality obstetric care.

This issue presents a thoughtfully curated collection of articles covering the essential aspects of contemporary labour ward management.

While knowledge forms the foundation of good clinical practice, its true value lies in consistent implementation. The greatest challenge before us is not merely staying abreast of current recommendations, but integrating them into our day-to-day practice. Standardized protocols, meticulous documentation, effective communication, regular audits, and continuous skill enhancement are indispensable in translating evidence into improved patient outcomes. Every labour ward should strive to foster a culture of adherence to evidence-based guidelines, multidisciplinary collaboration, and compassionate, respectful maternity care.

I extend my heartfelt appreciation to all the authors whose expertise and dedication have made this publication possible. It is our hope that this issue serves not only as an academic reference but also as a practical guide that inspires clinicians to critically evaluate and strengthen their routine labour ward practices.

Dr Arpita De

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2026-2028

The Evolution of Labour Curve in Obstetrics

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Introduction

Labour is one of the most intricate and dynamic physiological processes encountered in clinical medicine. Its progression is influenced by a complex interplay of maternal, fetal, and uterine factors, making its prediction and management a central concern. Over the decades, clinicians have relied on structured models to monitor labour and guide clinical decision-making, with the aim of ensuring optimal maternal and neonatal outcomes. Among these models, the concept of the labour curve has played a pivotal role in shaping obstetric practice. Traditionally, labour progression has been assessed based on expected patterns of cervical dilation over time. However, advancements in research methodologies and the availability of large-scale obstetric data have challenged longstanding assumptions about labour progression. Contemporary studies have demonstrated that labour is far more variable than previously believed, prompting a paradigm shift toward individualized and evidence-based care. This article explores the evolution of the labour curve, tracing its origins from the classical Friedman model to the contemporary Zhang model. It examines the limitations of traditional approaches, highlights insights from modern research, and discusses their clinical implications.

Friedman's Labour Curve

The modern understanding of labour progression can be traced back to the seminal work of Emanuel Friedman in the 1950s. He described the mean, 5th and 95th centile criteria for normal labour progress in his study of 500 nulliparous and 500 parous women admitted to the Sloane Hospital for Women in New York.¹⁻³ Friedman introduced the concept of the cervicograph by graphically plotting cervical dilation against time. The labour curve derived from Friedman's observation was called the 'Friedman curve'. Characteristics of the Friedman curve are as follows:

First stage:

- The first stage of labour comprised the Latent and an Active Phase. The Active phase was further divided into Acceleration, Maximum Slope and Deceleration phases.
- The Latent phase was characterized by a slow rate of cervical dilation until 3–4 cm.

- The Active phase was featured by a rapid rate of cervical dilatation. The minimum rates (5th percentile) of normal cervical dilation during the active phase of labour for nulliparous women were 1.2 cm/hour and for parous women were 1.5 cm/hour.
- The Deceleration phase was featured by a slow rate of cervical dilation at approximately 9 cm.

Second stage:

- The maximum durations (95th percentile) for the second stage were 2.9 hours for nulliparous women and 1.1 hours for multiparous women. These durations were further prolonged with epidural anaesthesia.
- The resulting labour curve had a classic Sigmoid shape as depicted in Figure. 1

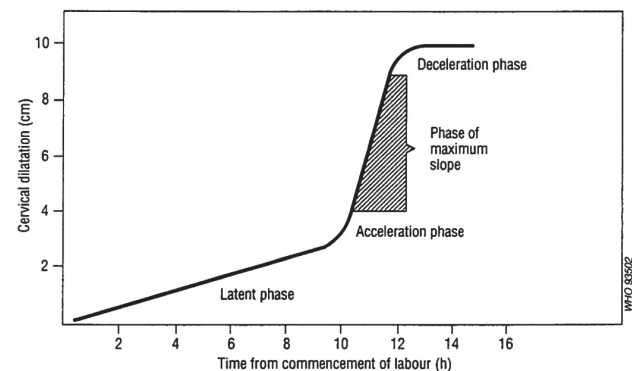


Figure 1. The Friedman Labour Curve

Friedman's model quickly gained widespread acceptance due to its simplicity and clinical utility. It provided clear benchmarks for assessing labour progress and identifying deviations from the expected pattern. These deviations were often interpreted as pathological, leading to diagnoses such as labour dystocia or failure to progress. Consequently, the Friedman curve became deeply embedded in obstetric practice and influenced labour management for several decades.

However, there were several limitations to the Friedman labour curve.

- The study sample size was relatively small and lacked diversity in terms of age, ethnicity, body mass index and comorbid conditions. Moreover, it comprised only low-risk pregnancies.

- Obstetric practise has undergone substantial changes since the mid-20th century, which alone could influence the course of labour progression and therefore limit the applicability of the Friedman model. Examples include the increasing use of epidural anaesthesia, labour induction and augmentation, and advancements in fetal monitoring.⁴
- The Friedman model over-relied on cervical dilation as an indicator of labour progression, and neglected other factors including fetal descent, uterine contractility, and maternal factors, thereby, increasing the risks of inaccurate and incomplete assessments.⁵
- The Friedman curve established strict benchmarks for “normal” labour progression. Deviations from these expectations—such as slower dilation—were often interpreted as abnormal, leading to diagnoses of labour arrest or failure to progress. As a result, this model significantly influenced the use of interventions, such as oxytocin administration and caesarean deliveries.⁶⁻⁹ In fact, many of these interventions were unnecessary, especially when labour could have progressed normally if additional time was given.
- Friedman et al gave no consideration to the effect of labour induction on labour progression.

Zhang’s Labour Curve

In 2010, Zhang et al published their study using data from the Consortium of Safe Labour. Their study was derived from data from 62,415 pregnant women in 19 hospitals in the United States.^{10,11} These were singleton pregnancies with spontaneous onset of labour, culminating in a cephalic vaginal birth and normal neonatal outcomes. This contemporary labour curve differed in several ways from the historic Friedman curve. Zhang et al demonstrated that labour progression was non-linear, and challenged the concept of the fixed cervical dilatation rate observed by Friedman et al. In fact, Zhang et al described a gradual acceleration of cervical dilation with periods of slower and faster progression. The labour progress was also highly variable; even among women with similar characteristics, the rate of cervical dilation varied significantly.¹⁰⁻¹²

Important observations from the Zhang et al study include:

First stage:

- The First stage comprised a Latent phase and an Active phase. The Deceleration phase was removed.
- The most striking difference from the Friedman curve was the usage of an advanced cervical dilation cutoff to define the onset of the active first stage of labour. The inflection point for cervical dilation was 5 cm in parous women and 6 cm or more in nulliparous women. In other words, the latent phase was defined up to a cervical dilation of 6 cm, during which both nulliparous and multiparous women progressed at a similar rate (i.e., over 6 hours from 4 to 5 cm of cervical dilation and over 3 hours from 5 to 6 cm of cervical dilation). Therefore, the rate of cervical dilation between 4 and 6 cm in the Zhang model (up to 9 hours) was much slower compared to the Friedman model (up to 2-3 hours), and represented a normal finding (the latent phase), rather than a protracted first stage of labour.
- The onset of active phase of first stage of labour was defined at 6 cm of cervical dilation, during which the cervix dilated more rapidly. This rate of dilatation was faster compared to the Friedman et al model and in parous women. A persistent slow cervical dilation of <1-2 cm/hour beyond 6 cm dilatation, therefore, represented an abnormal active first stage of labour.
- The 95th centile for labour duration between 4 and 10 cm cervical dilation was higher than the Friedman curve, regardless of maternal and pregnancy characteristics.

Second stage

- The 95th centile for labour duration during the second stage of labour was 2.8 hours for nulliparous women and 1.3 hours for multiparous women. However, the durations varied with the type of anaesthesia, as well as the presence of diabetes, macrosomia, chorioamnionitis, the duration of the first stage of labour, maternal height, fetal station, and induction of labour.

The labour curve described by Zhang et al is a hyperbolic curve. (**Figure 2**)

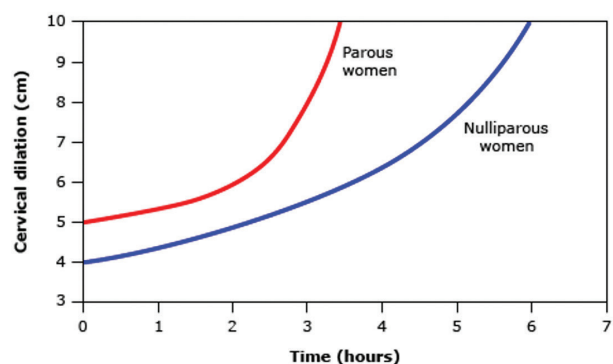


Figure 2. The Zhang Labour curve. Note the gradual and dynamic pattern of labour progression, with the active phase beginning at 5-6 cm of cervical dilation and no consistent deceleration phase.

After Zhang's et al published their study, several authors undertook studies on the progress of labour in induced labour. They reported that the latent phase of labour (up to a cervical dilation of 6 cm) was significantly longer in patients undergoing induction of labour compared to spontaneous labour, however, the active and second stages were comparable or shorter.¹³⁻¹⁶

Partograph

A partograph is a graphical representation of labour progress over time. As evidence on the labour curve grew, the partograph saw various modifications.

a. The Friedman Cervicograph: The original partograph by Friedman et al which focussed on cervicography.¹⁻³

b. Philpott's modification of the Friedman's Cervicograph (1972) – In their extensive research on primigravida from Central and Southern Africa, Philpott and Castle constructed a nomogram for cervical dilation and identified deviations from the normal. They introduced the concept of action and alert line to the Friedman Cervicograph, included patient details, and also added the relationship of the presenting part to the maternal pelvis.¹⁷

c. The WHO Colour Coded Partograph (1991-1993) Between 1991 and 1993, the WHO, in collaboration with the Maternal and Child Health research groups, developed a simple partograph that was accessible to the Auxiliary Nurse-Midwives and health workers in rural, low-resource settings as India, Indonesia and parts of Africa. The area to the left of the alert line was coloured Green and represented normal labour progress. The area between the alert and action lines was coloured Yellow and indicated that labour progress was slow, thereby representing the critical window for decision making (e.g., referral to a higher level of care from a rural clinic or reevaluation of the maternal condition at a hospital-level health facility). The area to the right of the action line was coloured Red and represented the stalling of labour progress and an increased risk of obstructed labour, uterine rupture and fetal distress.¹⁸

d. The WHO Composite Partograph (1994)

In 1987, the WHO launched the 'Safe Motherhood Initiative' in Nairobi to create a mandate for a global labour monitoring tool. A year later, an informal working group at the WHO created the first managerial guidelines and the blueprint of the tool in 1988. Between 1990 and 1991, the WHO conducted a massive multicentre trial in Southeast

Asia involving 35,484 pregnant women to test the efficacy of this newly devised partograph. In 1994, the WHO officially launched its Composite Partograph.¹⁹

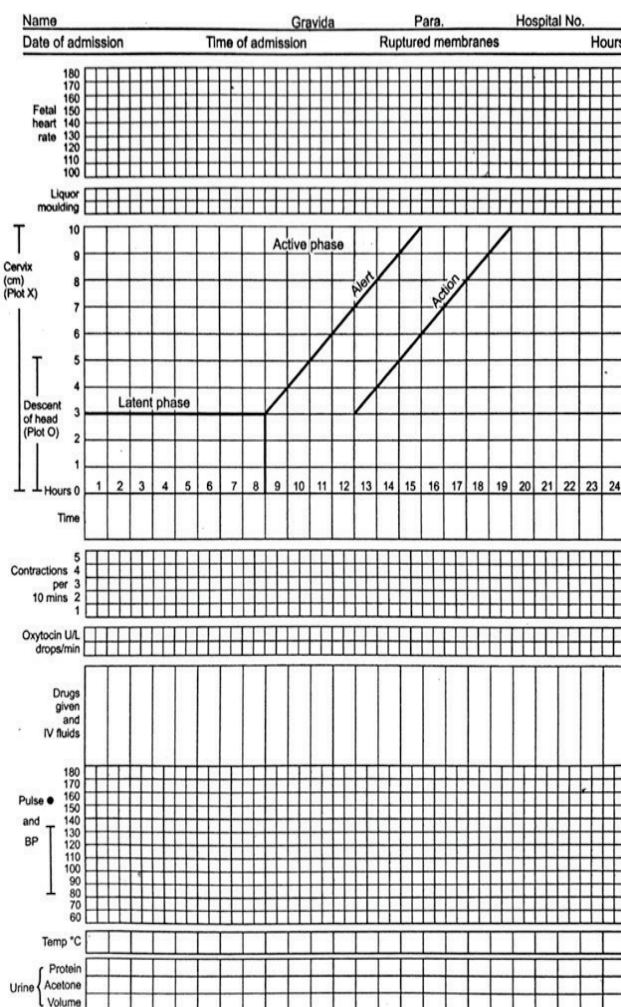


Figure 3: The WHO Composite Partograph

The Composite Partograph had a latent phase of 8 hours, and an active phase starting at 3 cm of cervical dilatation. It also included alert and action lines, the slopes of which were set at 1 cm/hour. The action line ran parallel to the alert line, spaced 4 hours apart. The composite partograph also included columns for recording the descent of the fetal head, maternal condition, fetal condition, and medications administered.

e. The WHO Simplified/ Modified Partograph (2000) – In 2000, the WHO launched the Modified partograph, in which the active phase of labour

started at 4 cm of cervical dilation and the latent phase was removed. This approach simplified the recording process to improve usability in clinical practise.²⁰

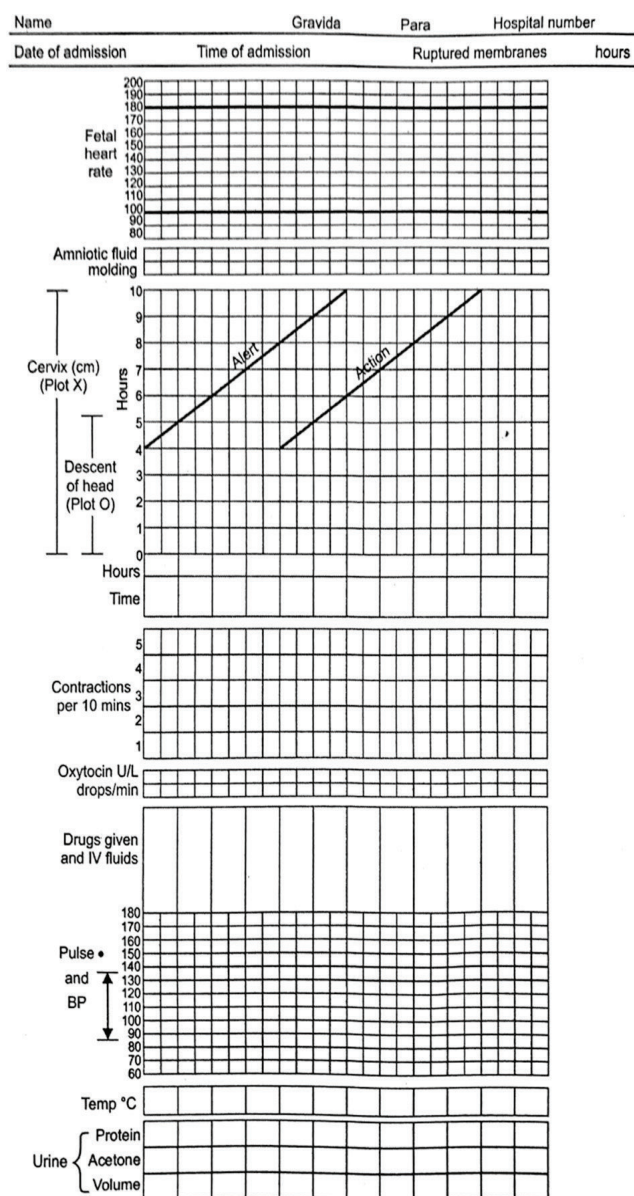


Figure 4. The Modified WHO Partograph

f. Next-generation partogram/Labour care guide (2020)

In 2020, the WHO replaced the composite, modified and simplified partographs with the Next-Generation Partograph or the Labour Care Guide, which was based on findings from the Zhang et al study. The labour care guide is a seven-section document that could be used to monitor the mother and fetus during the active first stage and the second stage of labour. The active phase of labour started at 5 cm of cervical dilation. The partograph also included novel sections on Supportive care (birth companion, pain relief, oral fluids and mobility), Shared Decision Making (a summary section for the provider to write the next steps in management) and the Second Stage

of Labour. The partograph used evidence-based observations rather than a single diagonal action or alert line to monitor concerning maternal and fetal conditions during labour progress. The aim of the partograph was to "Review, Record and Reassess", rather than directly jumping to interventions.²¹

Defining Abnormalities of Labour

The ACOG updated its guidance on labour management in 2024 in their Clinical Practice Guideline.²² The guidelines emphasize allowing more time for labour progress to reduce unnecessary interventions and provided guidance on labour abnormalities as follows:

Active Phase: The active phase is defined by accelerated cervical dilation and starts at 6 cm. Before 6 cm, patient is said to be in latent phase.

Prolonged Latent Phase: The latent phase is termed prolonged if it lasts more than 16 hours, regardless of parity. Notably, latent phase prolongation does not warrant caesarean delivery if maternal and fetal statuses are reassuring. Previously latent phase was said prolonged if it lasted more than 20 hours in nulliparous women and more than 14 hours in multiparous women.

Protracted active phase: It is defined as a cervical dilation which is slower than 1 cm every 2 hours. Protraction is a warning sign.

Arrest of active phase: It is defined at 6 cm or more of cervical dilation with a ruptured membrane and 4 hours adequate uterine activity (>200 Montevideo units) or 6 hours of oxytocin administration if contractions are inadequate.

Prolonged second stage of labour: It is defined as slower than expected descent of foetal head during second stage of labour despite active pushing.

Arrest of second stage of labour: It is defined as complete cessation of fetal descent during second stage of labour despite adequate pushing efforts (3 hours for nulliparous and 2 hours for multiparous women).

Prolonged Third Stage of labour: A duration of 30 minutes or more for third stage.

Failed induction of labour: It is defined as an inability to reach active phase (6 cm of cervical dilation) after at least 12 to 18 hours of oxytocin administration with membranes ruptured.

Section 1 →

Name

Ruptured membrane

Section 2 →

Alert column →

NURTURING CARE	Companion
	Pain relief
	Oral fluid

Figure 5. The Next-Generation Partograph: Labour Care Guide

Comparative Effectiveness: Why Current Evidence Remains Inconclusive?

The characteristics of normal labour progression remain a contentious topic. Because Zhang et al used a diverse and larger population cohort, several guidelines, including those from the American College of Obstetrics and Gynaecology (ACOG), and the WHO consider Zhang's labour curve to be superior to the historic Friedman's curve.²²⁻²⁵ However, Friedman et al, differ, citing selection biases, confounding and faulty statistical methods used in the Zhang et al study.²⁶⁻³⁰

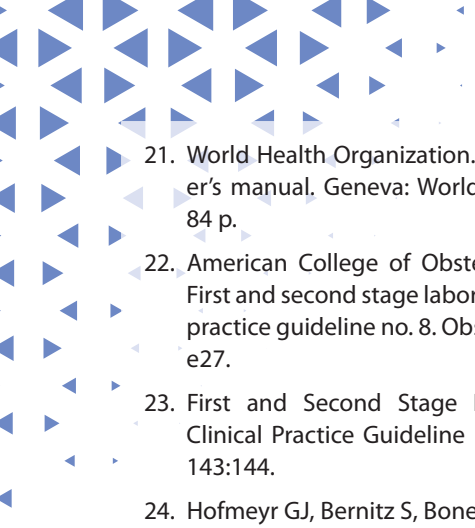
Noteworthy, the trials on normal labour progression are limited. For now, it is unclear whether the Zhang labour curve is superior to the Friedman curve. A Cochrane review even questions the efficacy of using a partograph in obstetric practice.³¹ The Labour Progression Study (LaPS), was a multicentric cluster randomized trial in Norway, that compared the WHO partogram based on the Friedman's labour curve and the contemporary Zhang's labour curve. The authors reported that both the curves resulted in reduced rates of caesarean deliveries and neither was superior to the other. Another cluster-randomized trial demonstrated a small (21.8% vs 22.5%), yet statistically significant, reduction in rates of caesarean deliveries with the implementation of the Zhang's labour curve.³²

Conclusion

The evolution of the labour curve represents a significant advancement in obstetric practice. While the Friedman model provided a valuable foundation for understanding labour progression, contemporary research has demonstrated that labour is far more variable and complex than previously recognized. The Zhang labour curve and related studies have challenged traditional assumptions, and have presented a more flexible and individualized approach to labour management. However, further large-scale randomized controlled trials and meta-analyses are needed to externally validate the clinical utility of the contemporary labour curve.

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Induction of Labor: Indications, Methods, and Optimization Strategies

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Introduction

Induction of labour is undertaken when the benefits of planned birth outweigh the risks of continuing pregnancy, and safe vaginal delivery is feasible. A key clinical choice is between pharmacological methods and mechanical methods, each with distinct efficacy and safety considerations that guide method selection and monitoring. This chapter also addresses failed induction and thresholds for proceeding to caesarean birth. Finally, it reviews current evidence on active versus expectant management, highlighting when planned induction improves outcomes and when watchful waiting remains appropriate within shared, individualized decision-making.

Definition

Induction of labor (IOL) refers to the process of artificially stimulating the uterus in order to start labor.¹

Indications of IOL

1. IOL is recommended for women with uncomplicated pregnancies who have certainly reached 41 weeks (≥ 41 weeks+0/7 days) of gestation (Supported by NICE, ACOG).¹
2. IOL may be considered in women with uncomplicated pregnancies at 39- 41 weeks in light of their values and preferences in settings where it can be performed safely. The ARRIVE trial studies also favours IOL at 39 weeks to reduce the risk of caesarean birth and for better maternal and foetal outcome.²
3. For other indications for IOL in different situations Refer to Table 1

Table 1: Indications for IOL in complicated pregnancies ^{3,4,5}

Condition		Gestational age	Remarks
PROM	after 37 weeks	Induce	A wait time period of 12-24 hours may be considered to await spontaneous labor
PROM	34+0 to 36+6/7 weeks	Induce	Expectant management may be considered after counselling and shared decision making
	<34+0 weeks	Expectant management till 34+0 weeks. Then IOL	Expectant management till 37+0 weeks may be considered after counselling and shared decision making
Hypertensive disorders in pregnancy	Gestational HTN	37–39 weeks	Severity of HTN to be considered
	Preeclampsia without severe features	37 weeks	
	Preeclampsia without severe features	at ≥ 34 weeks	
Hyperglycemic disorders in pregnancy	GDM well controlled on medical nutritional therapy and there should be no other complication	after 39 weeks	
	GDM controlled on oral hypoglycemic agents or insulin	between 38 to 39 weeks	
	Poorly controlled pregestational DM	before 37 weeks	Not controlled on insulin
	EFW > 4000 gm	No IOL. Offer elective CS	Holds true for both GDM & pregestational DM

SGA fetuses (EFW between 3rd and 10th centile and normal Doppler parameters)		39 weeks	Exclude other maternal and fetal indications
FGR fetuses (AC/EFW < 3rd centile or AC/EFW between 3rd- 10th centile with UA PI >95th centile) *		36 to 38 weeks	
Intrahepatic cholestasis of pregnancy (IHCP)	TBA <40 µmol/L (mild)	39–40 weeks	Exclude other maternal and fetal risk factors
	TBA between 40–99 µmol/L (moderate)	37–38 weeks	
	TBA ≥100 µmol/L (severe)	35–36 weeks	
	Co-existing risk factors or previous stillbirth due to IHCP	Tailor the timing of IOL	
IUFD	No complications (sepsis, eclampsia, abruption)	Immediate IOL	Respect the women's preferences and conservative management may be an option
	With complications	Immediate IOL	
Previous stillbirth		Not before 39+0 weeks	Provided the previous stillbirth was unexplained and the present pregnancy is uncomplicated
Uncomplicated DADC twins		38 weeks	Provided the 1st twin is cephalic
Uncomplicated DAMC twins		between 36- 37 weeks	Provided the 1st twin is cephalic
Post IVF pregnancy		Not before 39+0 weeks	After a shared decision-making between patients and healthcare providers

PROM: Prelabor rupture of membranes, **PPROM:** Preterm prelabour rupture of membranes, **GDM:** gestational diabetes mellitus, **EFW:** Estimated fetal weight, **SGA:** Small for gestational age, **TBA:** Total bile acids, **AC:** abdominal circumference, **DCDA:** dichorionic diamniotic, **MADC:** monochorionic diamniotic, **UA PI:** umbilical artery Pulsatility Index, **IUFD:** Intrauterine fetal death, **FGR:** fetal growth restriction.

*For other arterial and venous doppler findings, IOL is tailored. Severe doppler abnormalities require elective C-section.

4. IOL/ Termination of pregnancy is considered for maternal conditions like eclampsia, peripartum cardiomyopathy, acute fatty liver of pregnancy, chorioamnionitis, abruption. Other factors should be taken into consideration while deciding the mode of termination in these situations.

Contraindications for labor induction^{3,5}

1. Non-reassuring fetal or maternal conditions
2. Non-vertex position: external cephalic version (ECV) may be tried in breech. In transverse lie, ECV is followed by IOL.
3. Umbilical cord prolapse.
4. Placenta previa, vasa previa, placenta accreta syndrome
5. Active perineal herpes infection
6. Other conditions
 - (a) Previous longitudinal caesarean or high-risk hysterotomy
 - (b) Previous uterine rupture

- (c) Cervical cancer

Pre-requisites/ Checklist prior to IOL

1. Verify gestational age, presentation (fetal position), placental position.
2. Existing maternal conditions and facilities to manage the complications arising as a result.
3. Availability of neonatal resuscitation and ICU.
4. Assess risks by a proper history, examination and investigations.
5. Availability of blood/ emergency OT facilities.
6. Discuss induction method, the steps involved depending on the chosen method and obtain informed consent.
7. A pre-induction Bishop's scoring is done (See Table 2)

Table 2: Modified Bishop's score 6

Cervix	Score				Bishop Score Modifiers
	0	1	2	3	
Cervical Dilatation (cm)	0	1 - 2	3-4	5+	Add 1 point for: Preeclampsia Each previous vaginal delivery
Cervical Length (cm)	>4	2-4	1-2	<1	
Station of Presenting Part	-3 or above	-2	-1, 0	+1, +2	Subtract 1 point for: Postdate pregnancy Nulliparity PPROM
Consistency	Firm	Medium	Soft		
Position	Posterior	Mid-position	Anterior		

Total score: 13, Favourable Score: 6 – 13, Unfavourable Score: 1 – 5

A score of ≥ 6 suggests a favourable cervix with a higher likelihood of spontaneous labor or a better response to induction interventions. SOGC takes a score of ≥ 7 as favourable. ⁷

Options for IOL^{3,4}

1. Offer cervical ripening in cases of Bishop score < 6 . Both mechanical (balloon catheter) and pharmacological (dinoprostone/PGE2 and misoprostol/PGE1) methods are recommended. Sequential use of cervical ripening methods, such as balloon catheters followed by prostaglandins, can be used with caution. Simultaneous use of multiple methods is not recommended.
2. Both oxytocin and amniotomy are considered in cases where Bishop score is > 6 .

Pharmacological methods of IOL^{3,4,5,6}

1. **Dinoprostone, PGE2 (tablet, gel, or insert):** It provides the benefit of a lower surgical intervention rate compared to oxytocin, and it decreases the need for additional oxytocin when the cervix is unfavourable. After insertion, a strict fetal heart and uterine monitoring for at least 30 minutes is recommended. Despite diverse recommendations for dosage and administration, all guidelines highlight the critical role of vigilant monitoring in preventing uterine hyperstimulation. PGE2 is available for vaginal or intracervical use.

(a) Vaginal: either a tablet or a controlled release vaginal insert/pessary can be used. A dose of 2–3 mg of dinoprostone tablet is placed in the posterior fornix of the vagina. If necessary, a repeat dose of 2 mg can be administered after 6–8 hours, with a maximum dose of 6 mg within 24 hours. A removable controlled release vaginal insert/pessary (10 mg) over 24 hours for cervical ripening is another option. It releases prostaglandin at a slower rate (0.3 mg/hour). The pessary should be removed either at the end of the 24-hour dosing period or once the labor is established, whichever occurs first. Membrane rupture does not necessitate pessary removal. It can be easily removed in the case of uterine hyperstimulation or other adverse events. It thus increases maternal satisfaction. The pessary should be stored in a freezer at -10° to -25°C .

(b) Intracervical: 0.5 mg dinoprostone gel is recommended. A second dose may be

administered after 6–12 hours of the first dose in case the 1st dose does not result in adequate cervical changes. The maximum of three doses (1.5 mg) may be administered within 24 hours. The gel is stored in a refrigerator at 2° to 8°C . Vaginal use is preferred over intracervical due to a lower risk of uterine hyperstimulation and failed inductions.

2. **Misoprostol, PGE1:** low cost, easy availability, rapid onset of action and various routes of administration are its advantages. The initial dose is approximately 25 μg , every 2 hours by oral route and every 6 hours by vaginal route. Higher doses (50 μg every 6 hours), may be considered in certain situations but carry increased risks, including uterine tachysystole and abnormal fetal heart rate. It has not been formally approved by the Drug Controller General of India (DCGI) specifically for labor induction, despite its widespread "off-label" use for this purpose in India and worldwide. Fetal well-being (electronic fetal monitoring preferred) is assessed before and for at least 30 minutes following administration. Vaginal PGE1 is associated with a higher risk of uterine hyperstimulation with FHR changes, and meconium-stained liquor. PGE1 is contraindicated in women with previous C-Sections or major uterine surgery. It is best used in IUFD. Oral PGE1 is preferred in cases of PROM.
3. Synthetic oxytocin: preferred in cases of Bishop score > 6 . The dose is monitored in milliunits per minute (mU/min) using an infusion pump. It can

be used alone, in combination with amniotomy, or following cervical ripening. In women with intact membranes, amniotomy should be performed where feasible prior to commencement of an infusion of oxytocin. It is used under strict control in cases of previous cesarean delivery. Atosiban is an oxytocin antagonist and can be used in cases of uterine tachysystole. Oxytocin should be administered at least 6 hours after inserting vaginal PGE₂, 30 minutes after removing a PGE₂ vaginal insert, 2 hours after administering oral misoprostol, and 4 hours after inserting vaginal misoprostol. Both low and high-dose regimen are used for administration.

(a) Low-dose regimens: Infusion is started at 2 mU/min with the increment of 2 mU/min (3 ml/hr) up to a maximum of 32 mU/min or 48 mU/min depending upon institutional protocol.

(b) High dose regimen: the infusion is started at 4 mU/min with an increment of 4 mU/min up to a maximum of 32 mU/min or 48 mU/min depending upon institutional protocol.

It is not recommended for multigravida and women with a previously scarred uterus.

Preparation of oxytocin drip

Each ampoule (1 mL) of oxytocin contains 5 units (U). A dilution of 1U/1 mL is made by mixing it with 4 ml of normal saline. 2U of this diluted oxytocin is then added to 500 mL of Ringer Lactate (RL). The dose of oxytocin in drops/minute and mU/minute (with 2U in 500 mL RL) is shown below:

drops/min	8	16	24	32	40	48	56	64
mU/min	2	4	6	8	10	12	14	16

One ml is equal to 16 drops

If 5U is added to 500ml of RL (can be used for high-dose regimen):

mL/hr	30	48	60	72	90	120
mU/min	5	8	10	12	15	20

The oxytocin infusion can be increased until labor progress is normal or uterine activity reaches 200 to 250 Montevideo units (i.e. good regular uterine contractions, each lasting for 40-45 seconds duration and minimum of 3 contractions in 10 minutes).⁶ The frequency, intensity and duration of uterine contractions should be assessed every 30 minutes and with each incremental increase in oxytocin. Watch for clinical features of maternal hyponatremia, uterine hyperstimulation and uterine rupture.

A maximum dose of 60 mIU/min of oxytocin may be administered for primigravidae while a maximum of 30 mIU/min may be considered for multigravida and women with a previous caesarean section.

In the presence of ruptured membranes, if regular contractions are not established after total of 16-20 mIU/minute, then induction should be stopped.

4. Mifepristone: is not currently recommended for IOL in live pregnancies due to insufficient evidence.

Mechanical methods of IOL^{3,5}

1. Membrane sweeping: it is an old method that causes the release of prostaglandins inducing labour. It increases the chances of infection, accidental rupture of membranes, or may cause bleeding in case of low-lying placenta. Risks associated with membrane sweeping include discomfort, vaginal bleeding and PROM. NICE recommends membrane sweeping after 39 weeks after discussion with woman and a verbal consent. Additional membrane sweeping after discussion and consents may be offered if labour does not start spontaneously following the first sweep.⁸ It is suitable for non-urgent indications for term pregnancy termination. Membrane stripping is inexpensive, easy to perform, and convenient. Contraindications to membrane stripping include rupture of membranes; active infections; positive group B streptococcal carriers; and placental abnormalities (placenta previa, placental abruption, and vasa previa), and vaginal bleeding of unknown etiology.

2. Balloon catheters: used in unfavourable Bishop score and preferred in women desiring Vaginal Birth After Caesarean (VBAC). A Foley's catheter is placed into the cervical canal, and its balloon is inflated with 30-50 cc in the extra-amniotic space. To maintain continuous traction against the cervical opening, the catheter is then secured to the inner thigh. Cervical ripening occurs due to the local release of endogenous prostaglandins. It poses a reduced risk of uterine tachysystole and fewer instances of non-reassuring fetal heart rates when compared to dinoprostone gel. The device is removed if labor begins, membranes rupture, it expels spontaneously, or if the fetus shows signs of distress.

Newer Catheters

The double balloon catheter (DBC), most commonly the Cook Cervical Ripening Balloon (Cook OB/GYN), is a well-established mechanical method for cervical

ripening and labor induction in women with an unfavorable cervix (Bishop score < 6). FDA-approved in 2013, it promotes cervical ripening through direct mechanical dilation or by stimulating prostaglandin release from the amnion, chorion, and decidua. Regarding its technique, the uterine balloon is inserted into the uterine cavity and inflated with 40 mL of saline, followed by inflation of the vaginal balloon to 40 mL; both are then progressively increased by 20 mL increments to a maximum of 80 mL each, with the catheter removed after 6–12 hours. In terms of advantages, the main benefit of this mechanical method is the low rate of uterine hyperstimulation, improving the safety profile and allowing less frequent fetal monitoring. Regarding disadvantages, evidence suggests that the incidence of chorioamnionitis was higher, though findings remain conflicting across studies.⁹

Surgical methods of IOL^{3,5}

Amniotomy: if the Bishop's score is ≥ 6 or higher, it's advised to combine amniotomy with oxytocin, adjusting based on uterine contraction intensity. Control amniotic fluid release manually, noting its characteristics (color, amount). Fetal heart rate must be monitored after ARM. Rapid fluid expulsion can cause uterine decompression, potentially leading to placental abruption. Contraindications include placenta previa, vasa previa, and active genital infections.

Failed induction

While no standard definition exists, various guidelines offer numerous interpretations of failed induction, making it challenging to definitively determine which is correct. FIGO guidelines define it when an active phase of labor cannot be reached. Failed induction is defined after at least 15 hours of oxytocin use with ruptured membranes (spontaneous or by amniotomy).⁴

FOGSI GCPR guidelines 2018⁶ define it as failure to achieve regular uterine contractions (every 3 minutes) after one cycle of completion of cervical ripening consisting of (i) insertion of 3 intracervical PGE2 gel (3g) at 6-h intervals, and 12 h of oxytocin administration after rupture of membranes, if feasible, or (b) one PGE2 pessary (10 mg) within 24 h.

Management of failed IOL

1. Review individual clinical circumstances with an assessment of fetal status, and discuss options for care.
2. Look into the reason for IOL.
3. If appropriate, consider an alternative IOL method, and/or discharge home for 24 hours followed by a second attempt at IOL.

4. A Caesarean section may be offered.

Complications of IOL (See Table 2)

Table 2: Fetal and maternal complications of IOL

Maternal	Fetal
Failed induction and need for C-Section	Meconium stained liquor
Operative vaginal delivery	Fetal distress
Uterine hyperstimulation or tachysystole	Iatrogenic prematurity
Maternal infections	Neonatal jaundice
Postpartum haemorrhage	

Elective IOL vs expectant management

An elective induction, also known as non-medically indicated induction, is when labor is induced without any specific medical reason. Elective inductions might occur for (i) social reasons (availability of a health care provider or of a partner or support person) (ii) other non-medical reasons(wanting to be done with an uncomfortable pregnancy, travel issues or upcoming weather events).

There are two main viewpoints on this topic. One belief is that babies should be "rescued" by ensuring they are born as early as safely possible. The opposite view is to "let labor begin naturally unless there's a medical reason to induce it." IOL changes the time when labor starts, the length of labor, and the way the labor unfolds.¹⁰

On the basis of the ARRIVE trial, Society of Maternal-Fetal Medicine (SMFM) has concluded that at 39 weeks, there's no difference in key neonatal outcomes between elective IOL and expectant management, making both viable options for Low-Risk Nulliparous Women at Term. The applicability of these findings to multiparous women is not yet known. Moreover, women needing IOL due to medical or obstetric conditions should adhere to standard recommendations and guidelines for their condition. Shared decision-making and counselling women is critical. The gestational age should be confirmed, capacity of the facility and available staff, including nurses and anaesthesiologists should be taken in deciding elective IOL. ¹¹ Another study concluded that elective IOL in low-risk multiparous women in the 39th week of gestation was associated with decreased perinatal morbidity and a lower frequency of C-Sections compared with expectant management.¹²

Conclusion

Induction of labor, a common obstetric intervention, is

carefully considered based on clear maternal and fetal indications, while strictly observing contraindications to ensure safety. Various methods, mechanical, surgical and pharmacological, are employed to initiate labor effectively. For low-risk pregnancies at term, the decision between elective induction and expectant management involves balancing benefits and risks, empowering shared decision-making between patient and provider. Ultimately, the goal is to optimize maternal and neonatal outcomes through evidence-based practice and individualized care plans, ensuring the safest possible delivery for each unique situation.

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Intrapartum Foetal Surveillance

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Introduction

Intrapartum foetal surveillance aims to identify foetal hypoxia early enough to prevent metabolic acidosis, neurological injury, and stillbirth, while simultaneously avoiding unnecessary operative intervention. The fundamental challenge is balancing sensitivity (detecting true compromise) against specificity (avoiding overdiagnosis).

Despite widespread use of electronic foetal monitoring (EFM), its false-positive rate remains high, contributing to rising operative delivery rates without proportional improvement in long-term neurological outcomes. Contemporary approaches therefore emphasize:

- Physiological interpretation rather than pattern recognition alone
- Integration of clinical context (risk factors, stage of labour)
- Use of adjunctive tests when indicated

Physiology of Foetal Oxygenation and Hypoxia

Foetal oxygenation depends on multiple factors like Uteroplacental perfusion, placental gas exchange and umbilical circulation. Foetal cardiovascular compensation occurs through inbuilt compensatory mechanisms. When the oxygen delivery decreases, there is peripheral vasoconstriction. So blood flow redistributes and flow increases to the vital organs- the brain, heart and adrenals. Subsequently there are reduced foetal movements. It may manifest as altered heart rate patterns. On the other hand failure of compensation leads to anaerobic metabolism, Lactic acidosis, Myocardial depression and finally terminal bradycardia.

Foetal behavioural states

Foetal behavioural states¹ vary depending on the activities of the baby.

- 1. Foetal quiescence reflecting deep sleep (no eye movements):** Deep sleep can last up to 50 minutes and is associated with a stable baseline, very rare accelerations, and borderline variability
- 2. Active sleep (rapid eye movements):** This is the most frequent behavioural state and is represented by a moderate number of accelerations and normal variability.

- 3. Wakefulness:** Active wakefulness is rarer and represented by a large number of accelerations and normal variability. In this pattern, accelerations may be so frequent as to cause difficulties in baseline estimation (confluence of accelerations).

The alternation of different behavioural states (cycling) is a hallmark of foetal neurological responsiveness and absence of hypoxia/acidosis. Transitions between the different patterns become clearer after 32–34 weeks of gestation, consequent to foetal nervous system maturation.

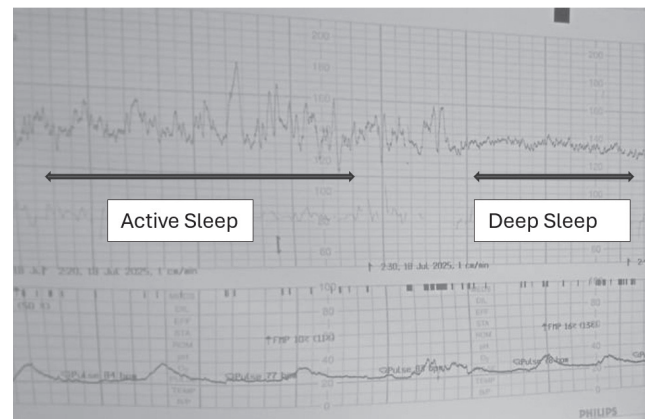


Fig 1: Cycling (alteration of different behavioural states) – Hallmark of foetal neurological responsiveness

4. Modalities of Intrapartum Surveillance

4.1: Intermittent Auscultation (IA)

It has the advantage of promoting mobility and physiological labour, and so has a low intervention rate. It is recommended for **low-risk pregnancies** using Doppler or Pinard. However it cannot pick up subtle variations, slowly evolving hypoxia or cannot assess variability.

Frequency:

- o Every 15–30 min in first stage
- o Every 5 min in second stage
- o To listen for atleast 1min after a contraction

4.2: Cardiotocography (CTG)

CTG remains the cornerstone of intrapartum monitoring. Its main components include:

- o Baseline foetal heart rate (FHR)
- o Variability
- o Accelerations
- o Decelerations
- o Uterine contractions

The conventional FIGO/ NICE classified CTG depending on fixed criteria specified for the above components. It could be

- Normal
- Suspicious
- Pathological

Physiological CTG (Modern Approach)²

Now NICE emphasises the classification to be based on the Physiological changes, which include:

- Type of hypoxia (acute vs chronic)
- Compensatory capacity
- Trend over time

Interpretation of CTG: Physiological Approach

First guideline for physiological approach to interpretation of CTG was published in 2018² and first revision has been published in 2024³. This chapter also includes the changes from first revision of the guideline.

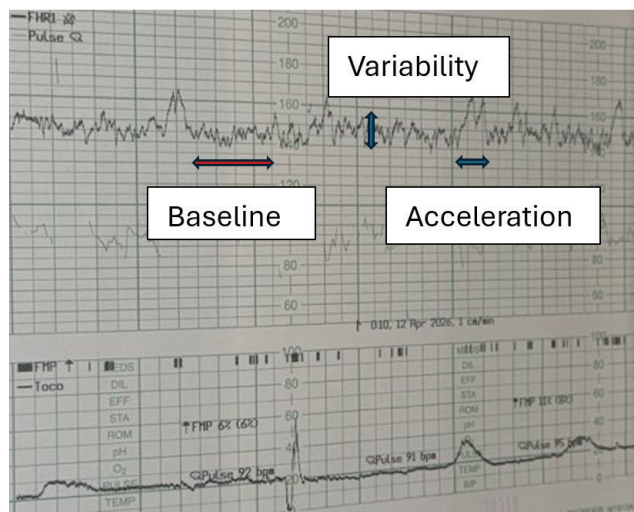


Fig 2: Normal CTG graph

Baseline- 150bpm, Variability 10bpm, Accelerations present, No decelerations

5.1 Baseline heart rate

- The mean foetal heart rate rounded to increments of five beats per minute during a ten-minute segment, excluding accelerations, deceleration and periods of marked FHR variability. The baseline must be for a minimum of 2 minutes in a ten-minute segment. Otherwise, the baseline for that segment is described as indeterminate.⁴
- Normal: 110–160 bpm. Preterm foetuses tend to have values toward the upper end of this range and post-term foetuses towards the lower end.
- Tachycardia (>160), lasting >10 minutes: infection, hypoxia, drugs

- Bradycardia (<110), lasting >10 minutes: hypoxia, cord compression. Values between 90 and 110 bpm may occur in a normal foetus, especially in a postdate pregnancy. It is mandatory to confirm that this is not the maternal heart beat and that the trace shows normal baseline variability.⁶
- In tracings with unstable FHR signals, review of previous segments and evaluation of longer time periods may be necessary to determine the baseline.⁵

5.2 Variability

- This refers to the oscillation in the FHR signal, evaluated as the average bandwidth amplitude of the signal in 1-minute segments⁵; the fluctuations should be irregular in amplitude and frequency⁴. Variability is documented in beats per minute.
- Normal: 5–25 bpm
- Reduced variability (<5 bpm >50 min or for more than 3 minutes during decelerations^{5,7}) suggests hypoxia or CNS depression

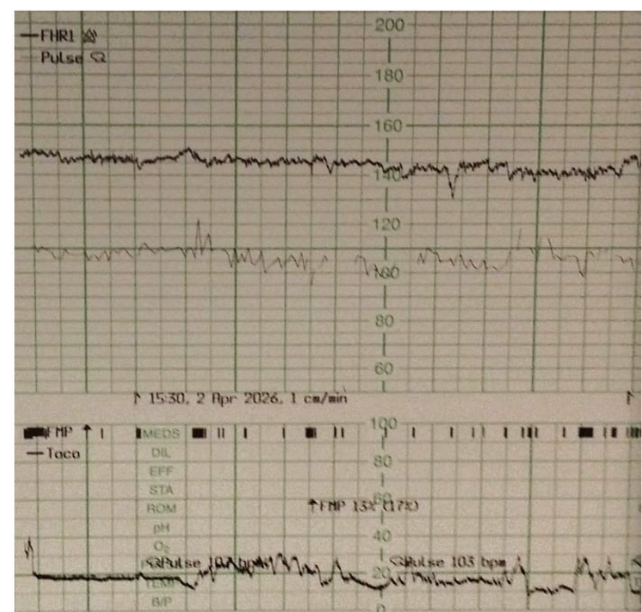


Fig 3: Reduced Variability

- Absent Variability: Amplitude range undetectable with or without foetal decelerations⁴.
- Increased Variability (Saltatory Pattern): a bandwidth value exceeding 25 bpm lasting more than 30 minutes. It may be seen linked with recurrent decelerations, when hypoxia/acidosis evolves very rapidly. It is presumed to be caused by foetal autonomic instability/hyperactivity⁵. Intervention may be required sooner if this pattern is seen during the second stage or during decelerations. A saltatory pattern for more than 30 minutes may indicate hypoxia even without decelerations.

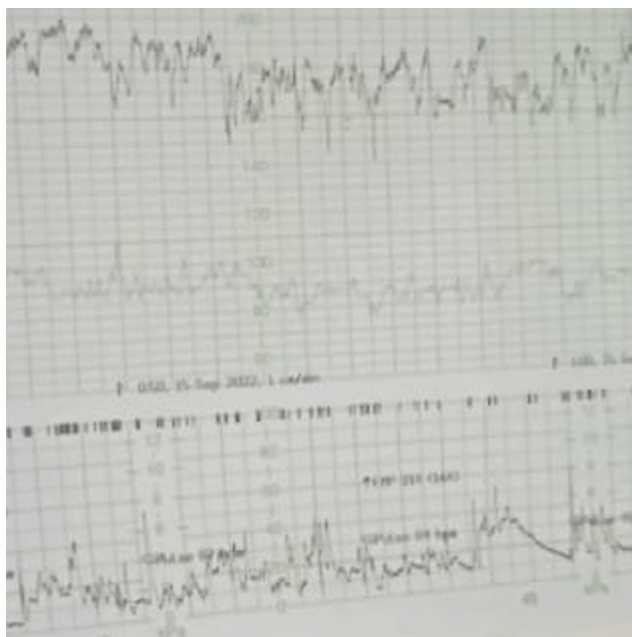


Fig 4: Saltatory pattern

- Sinusoidal pattern: A regular, smooth, undulating signal, resembling a sine wave, with an amplitude of 5–15 bpm, and a frequency of 3–5 cycles per minute. This pattern lasts more than 30 minutes and coincides with absent accelerations. It occurs in association with severe foetal anaemia, as is found in anti-D alloimmunisation, foetal-maternal haemorrhage, twin-to-twin transfusion syndrome, and ruptured vasa praevia. It has also been described in cases of acute foetal hypoxia, infection, cardiac malformations, hydrocephalus, and gastroschisis.⁵

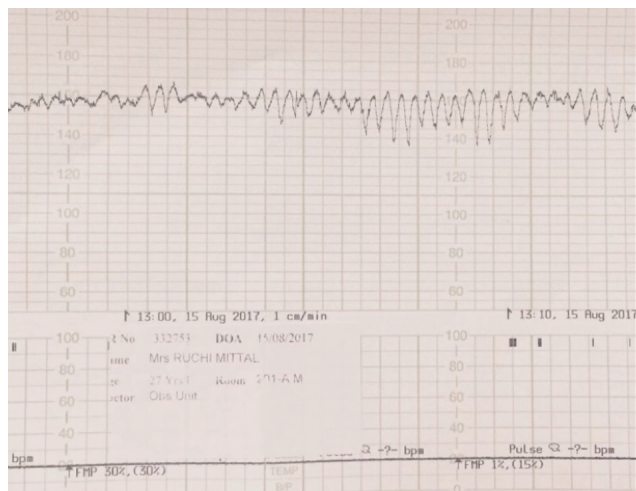


Fig 5: Sinusoidal pattern

- Pseudo-sinusoidal pattern: A pattern resembling the sinusoidal pattern, but with a more jagged “saw-tooth” appearance, rather than the smooth sine-wave form. Its duration seldom exceeds 30 minutes and it is characterized by normal patterns before and after.⁵ This pattern has been described after analgesic

administration to the mother, and during periods of foetal sucking and other mouth movements. It is sometimes difficult to distinguish the pseudo-sinusoidal pattern from the true sinusoidal pattern, leaving the short duration of the former as the most important variable to discriminate between the two.⁵

5.3 Accelerations:

Abrupt (onset to peak in less than 30 seconds) increases in FHR above the baseline, of more than 15 bpm in amplitude, and lasting more than 15 seconds but less than 10 minutes. Before 32 weeks of gestation, amplitude and duration of accelerations may be lower (10 seconds and 10 bpm of amplitude)⁴.

An acceleration must start from and return to a stable baseline. Fig 2

Accelerations coinciding with uterine contractions, especially in the second stage of labour, suggest possible erroneous recording of the maternal heart rate, since the FHR more frequently decelerates with a contraction, while the maternal heart rate typically increases.⁸

5.4 Decelerations:

Decreases in the FHR below the baseline, of more than 15 bpm in amplitude, and lasting more than 15 seconds. Decelerations are considered to be a reflex response to protect the myocardial workload when a foetus is exposed to a hypoxic or a mechanical stress, to help maintain an aerobic metabolism within the myocardium.

- Early Decelerations: Decelerations that are gradual (onset to nadir $\geq 30s$) that return to the baseline. They coincide with contractions⁴, and show normal variability within the deceleration. They are likely to be seen in the late first stage and second stage of labour and are believed to be caused by foetal head compression. They do not indicate foetal hypoxia/acidosis.⁵ Fig 6



Fig 6: Early decelerations or Quicklie

- **Variable Decelerations:** V-shaped decelerations that exhibit a rapid drop (onset to nadir in <30s) followed by a rapid recovery to the baseline. The precipitous fall and rise of the baseline due to cord compression means there is not time to exhibit good variability within the trough of the deceleration. These decelerations vary in size, shape, and relationship to uterine contractions. Variable decelerations constitute the majority of decelerations during labour, and they translate a baroreceptor-mediated response to increased arterial pressure, as occurs with umbilical cord compression.⁵

They are believed to occur secondary to baroreceptor and/or peripheral chemo-receptor stimulation. They are seldom associated with foetal hypoxia/acidosis, unless they evolve to exhibit a U-shaped component ("sixties" criteria) with a reduced or an increased variability within the deceleration (see late decelerations below), and/or their individual duration exceeds 3 minutes.^{5,7}

Variable decelerations meet the "sixties" criteria if two or more of the following are present: drops by 60bpm or more, reaches 60bpm or less, for the duration of 60 seconds or longer.⁷

- **Late Decelerations:** Decelerations with a gradual onset and/or a gradual return to the baseline and/or reduced or increased variability within the deceleration. Gradual onset and return occurs when more than 30 seconds lapses between the beginning/end of a deceleration and its nadir. When contractions are adequately monitored, late decelerations start more than 20 seconds after the onset of a contraction, have a nadir after the acme, and return to the baseline after the end of the contraction⁵. These decelerations are indicative of a chemoreceptor-mediated response to foetal hypoxaemia.⁷ In a trace showing no accelerations and reduced variability, the definition of late decelerations also includes those with an amplitude of 10–15 bpm (shallow decelerations).
- **Prolonged decelerations:** Decelerations lasting more than 3 minutes. These are likely to include a chemoreceptor-mediated component and thus to indicate hypoxemia. Decelerations exceeding 5 minutes, with FHR maintained at less than 80 bpm and reduced variability within the deceleration, are frequently associated with acute foetal hypoxia/acidosis and require urgent intervention⁵ (see "3 – minute rule").

5.5 Contractions:

With the tocodynamometer, only the frequency of contractions can be reliably evaluated⁵. The intensity and duration of contractions may be assessed by manual palpation. If frequency of contractions cannot be assessed reliably by the tocodynamometer, manual

palpation for 10 minutes every 30 minutes is required.

- Tachysystole- more than five contractions in 10 minutes.
- Hyperstimulation refers to an exaggerated response to uterine stimulants, presenting as an increase in frequency of the contractions, strength of uterine contraction, increased uterine tone between contractions and/or prolonged contractions for over 2 minutes. These may lead to foetal heart rate changes. Therefore, any increased uterine activity (frequency, duration or strength) associated with CTG changes should be considered as uterine hyperstimulation.

Physiology of Hypoxia in Labour

During labour the foetus employs various adaptive mechanisms in response to hypoxia, these generally follow a similar pathway as the physiological response to exercise. Intrapartum hypoxia generally follows one of three pathways:

1. Acute Hypoxia^{9,10,11}

- Presents as a prolonged deceleration lasting for more than 5 minutes or for more than 3 minutes if associated with reduced variability within the deceleration⁵. (Fig 7)
- Causes poxia
 1. Accidents
 - Cord prolapse
 - Placental Abruption
 - Uterine Rupture
 2. Iatrogenic
 - Maternal Hypotension (usually secondary to supine hypotension or epidural top-up)
 - Uterine hyperstimulation (by oxytocin / PGs) or spontaneous increased activity
- Foetal pH drops at a rate of 0.01/min during the deceleration

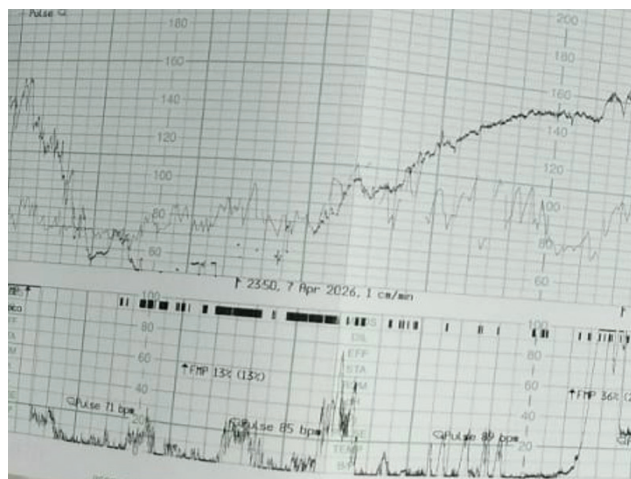


Fig 7: Acute Hypoxia. After placement of Epidural, a sudden deceleration upto 60 bpm, lasting 5 minutes with return to baseline over next 6 minutes

Management follows the 3-Minute Rule:

0– 3 minutes: If a deceleration is noted for more than 3 minutes with no signs of recovery the emergency alarm must be raised to summon the on-call team

3– 6 minutes: Attempt to diagnose the cause of the deceleration. If an accident is diagnosed the aim would be for immediate delivery as soon as safely possible in the fastest route possible (AVD/CS). If an iatrogenic cause is diagnosed immediate measures must be utilized to correct the changes. This includes avoiding supine position, stopping uterine stimulants, starting IV fluids, and administering tocolytics.

6 – 9: Signs of recovery should be noted (return of variability and improvement in heart rate). If no signs of recovery are noted, preparation for immediate delivery MUST be started.

9 – 12: By this point in time the deceleration has either recovered, or preparation for an assisted vaginal delivery / caesarean section is in progress aiming for a delivery of the foetus by 12 – 15 minutes.

- Do not follow the 3-minute rule if the deceleration is preceded by reduced variability and lack of cycling, immediate preparation should be made to expedite delivery by the safest and fastest route possible.¹²
- If normal variability and cycling before and during the first 3 minutes of the deceleration, it is likely that 90% will recover within 6 minutes, and 95% in 9 minutes, if acute accidents have been excluded.

1. Subacute Hypoxia¹³

- Presents on the CTG by the foetus spending most of the time in decelerations. (Fig 8)
- This is almost invariably caused by uterine hyperstimulation.
- Foetal pH drops at a rate of 0.01 / 2-3 minutes
- Management is by:
 1. Stopping / reducing uterotonics
 2. Avoiding supine position
 3. Starting IV fluids
 4. Administering tocolytics if hyperstimulation persists despite previous measures
 5. Expediting delivery if hypoxia persists despite tocolysis (AVD / CS)

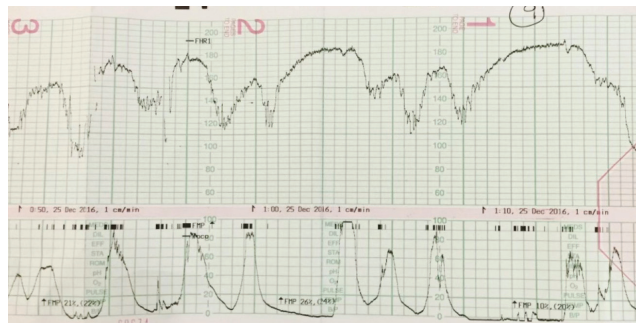


Fig 8: Subacute Hypoxia

- If encountered in the second stage of labour, ask the mother to stop pushing to allow the recovery of the foetal status. If no improvement is seen within 10 minutes, expedite delivery. Once stable recommence pushing. If subacute hypoxia recurs, expedite delivery.

2. Gradually Evolving Hypoxia¹⁴

This is the most common type of hypoxia in labour. During this process, the foetus undergoes the same changes that a normal adult would be expected to show during exercise

This tends to present with the following order:

1. Evidence of hypoxic stress (decelerations)
 2. Loss of accelerations and lack of cycling
 3. Exaggerated response to hypoxic stress (decelerations become wider and deeper) (Fig 9)
 4. Attempted redistribution to perfuse vital organs facilitated by catecholamines (first sign noted is a rise in baseline)
 5. Further redistribution with vasoconstriction affecting the brain (reduced baseline variability)
 6. Terminal heart failure (unstable/ progressive decline in the baseline –“step ladder pattern to death”)
- Stages 1 – 4 represent evidence of stress with maintained foetal compensation.
 - Stages 5 & 6 represent evidence of stress with foetal decompensation.
 - Stages 4 & 5 may be reversible although prolonged episodes of hypoxia can lead to foetal organ damage. reduced variability
 - Management of gradually progressive hypoxia is by improving foetal conditions with the first signs of redistribution to avoid internal organ damage. (stage 4)

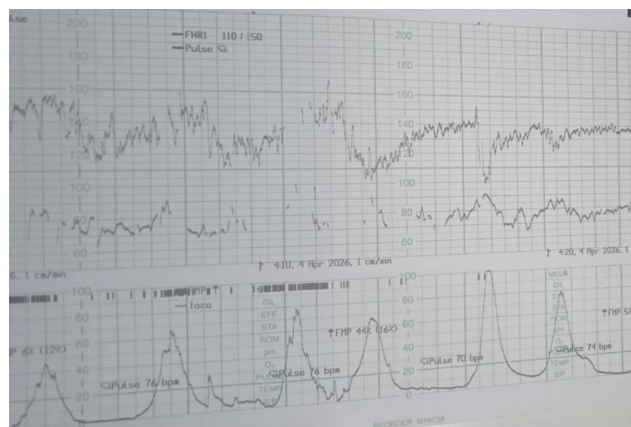


Fig 9: Gradually evolving Hypoxia

4. Chronic Hypoxia¹⁵

- This is an antenatal type of hypoxia with implications for intrapartum care
- Presents as a baseline rate at the upper end of

normal associated with reduced variability and blunted responses (infrequent accelerations and lack of cycling) and is frequently associated with shallow decelerations. (Fig 10)

- This represents a foetus with reduced reserve and increased susceptibility to hypoxic injury during labour.
- Careful consideration should be given when planning interventions potentially increasing the risk of hypoxia, with low threshold for surgical intervention.

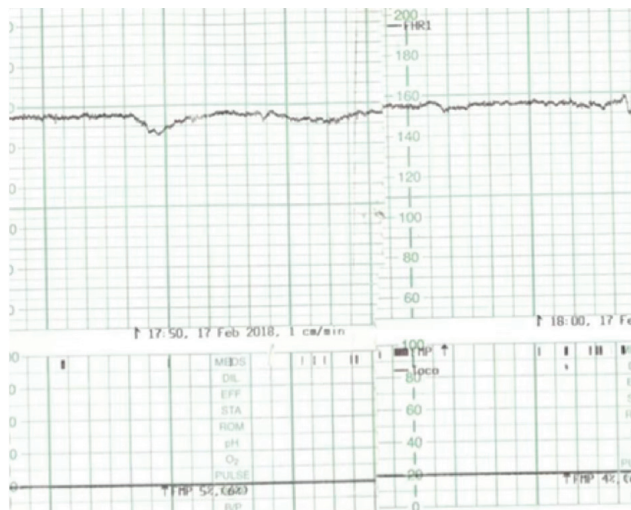


Fig 10: Chronic Hypoxia

Recent Advances

The foetal monitoring checklist which has been recommended in the guideline (2018)¹ to recognise features of chronic hypoxia and preexisting foetal compromise, to ask the question “Is THIS foetus FIT to undertake a progressive hypoxic journey of labour?” has been amended in 2024 to include chorioamnionitis and RUPI-L. (Table 1)

In first revision of International expert consensus statement on physiological interpretation of

cardiotocograph (CTG) in 2024³, few changes made to the 2018 guidance are that to classifying foetal heart rate decelerations based on the morphology, duration and in relation to the uterine contractions has been a historic practice. Though morphology of observed decelerations (eg., early, variable, late, typical, atypical etc) have been reported to have no correlation with poor perinatal outcomes. Therefore, the international expert consensus group panel³ in its first revision in 2024, strongly recommends that the intervening baseline between ongoing decelerations must be scrutinised to determine its stability and the presence of reassuring variability and continuing cycling to determine foetal response to ongoing intrapartum

hypoxic stress.

Any deceleration which has an abrupt drop from the baseline (>30 bpm), reaching the nadir within 30 s from the onset of the decelerations, and demonstrating a quick recovery to the baseline may be termed a “**Quicklie**” (Fig 6). These are believed to be due to the compression of umbilical cord, and resultant transient hypoxaemia, and not due to hypoxia and/or acidosis. The intervening baseline and variability should be assessed to determine the oxygenation of the central organs. If such “quicklie” decelerations are associated with an increase in the baseline FHR (i.e., catecholamine surge), then changes in maternal position and/or reducing the rate of oxytocin infusion may help restoring the baseline to normal.

Any deceleration which has a gradual drop from the baseline, and then recovers slowly to the baseline even after the cessation of uterine contractions may be termed “**tardy**” (Fig 9). These “tardy” decelerations are due to an ongoing utero-placental insufficiency and may be associated with acidosis if they are associated with a reduced baseline variability. These “tardy” decelerations are often due to a structural damage to the placenta (e.g., infarction, thrombosis or an abnormal placentation), and therefore, cannot be reversed by changes in the maternal position or administration of fluids to the mother.

Regarding the morphology of FHR decelerations, the international expert consensus group recommends that with evolving understanding and confidence in physiological CTG interpretation, clinicians should move away from identifying the morphology of decelerations but assess the intervening baseline FHR for stability, reassuring variability and cycling to determine foetal wellbeing.

Relative uteroplacental insufficiency of labour (RUPI- L)¹⁶ is a clinical condition that refers to “relative” alterations in the foetal oxygen “demand-supply” equation caused by the onset of regular uterine activity. RUPI- L may be more prevalent in foetuses in cases of subclinical placental insufficiency, post-term pregnancies, gestational diabetes, and other similar conditions. Prior to the onset of regular uterine activity, foetuses with a RUPI- L may present with normal cardiotocography. However, with the onset of uterine contractions, these foetuses start to manifest abnormal foetal heart rate patterns episodes due to transient reduction in oxygenation. If labour is allowed to continue without an appropriate intervention, stronger uterine contractions may result in a rapid deterioration leading to fetal hypoxia and acidosis.

The “ZigZag” pattern to refer to an abrupt and erratic

up and down fluctuation of the baseline FHR variability (>25 bpm) for at least 1 min. The latter occurs when the intensity of hypoxic stress increases with insufficient time available at the baseline to ensure adequate gas exchange. This pattern lasting for more than one minute during labour was associated with a two-fold increase in neonatal acidosis.

Features **suggestive of foetal inflammation (SOFI)** to recognise chorioamnionitis (intraamniotic inflammation and/or infection) are an increase in the baseline FHR by > 10 % without preceding deceleration and/or a baseline FHR > 10 % higher than what is expected for the gestational age should be considered as SOFI. This term encompasses both intraamniotic inflammation due to an ascending infection or

transplacental passage of infection/ inflammatory mediators. Birth should be expedited if features of neuroinflammation is observed on the CTG trace.

Large amplitude accelerations coinciding with uterine contractions (the "Double Mountain Peak sign") or a sudden drop in the observed baseline FHR, sudden disappearing of FHR, a sudden improvement in the baseline FHR variability or disappearance of decelerations may indicate erroneous monitoring of maternal heart rate as FHR. In such cases, oxytocin infusion/ active maternal pushing should be immediately stopped until foetal heart rate is appropriately identified (by the use of maternal pulse oximetry, ultrasound scan or application of foetal scalp electrode

Key CTG Patterns and Clinical Implications

Table 1

Hypoxia	Features	Management
No Hypoxia	- Baseline appropriate for G.A. and stable - Normal FHR variability and presence of cycling - No repetitive decelerations	- Consider whether the CTG needs to continue. - If continuing the CTG perform routine hourly review to determine the onset of hypoxic or inflammatory/ non-hypoxic stress (see below)
Evidence of Hypoxia: Chronic Hypoxia	- Higher baseline than expected for G.A. - Reduced variability and/ or absence of cycling - Absence of accelerations - Shallow decelerations - Consider the clinical indicators: reduced fetal movements, thick meconium, bleeding, evidence of chorioamnionitis, post maturity, IUGR	- Avoid further hypoxic stress: consider tocolysis if a delay is anticipated to accomplish birth (e.g., operating theatre busy) or if there is evidence of progressive reduction in the baseline FHR. - Expedite delivery, if birth is not imminent.
Evidence of Hypoxia: RUPI-L	- A sudden increase in the FHR immediately after the onset of established contractions/ induction of labour - ZigZag pattern and/or widening / deepening of decelerations	Consider the overall clinical context including background risk factors to determine if birth should be expedited.
Gradually Evolving Hypoxia	Compensated - Rise in the baseline (with normal variability and stable baseline) preceded by decelerations and loss of accelerations, with inter-deceleration interval greater than the time spent during decelerations Decompensated - Reduced or increased variability (ZigZag pattern), preceded by repetitive decelerations and an increase in the baseline FHR. - Unstable/ progressive decline in the baseline FHR (step ladder pattern to death)	- Likely to respond to conservative interventions - Regular review every 30-60 min to assess the resolution of the catecholamine response or increased time spent on the baseline FHR. - The wider clinical context such as reduced placental reserve, stage and the rate of progress of labour, presence of meconium or co-existing chorioamnionitis MUST be considered and managed accordingly. - Needs urgent intervention to reverse the hypoxic stress (remove prostaglandin pessary, stop oxytocin infusion, and/ or administer a tocolytic) - Delivery should be expedited, if no signs of improvement (restoration of stable baseline FHR and normal variability) are seen

Subacute Hypoxia	• More time spent during decelerations (>90 s) than at the baseline (<30 s) • May be associated with the "ZigZag" pattern (increased variability) lasting for > 1 min	First Stage • Remove prostaglandins/stop oxytocin infusion • If no improvement is seen, needs urgent tocolysis • If no evidence of improvement within 10-15 min of the above measures, review the overall clinical context, and expedite delivery, if appropriate. Second Stage • Stop oxytocin infusion and stop maternal active pushing during contractions until improvement is noted. • If no improvement is noted, consider tocolysis if delivery is not imminent or expedite delivery by operative vaginal delivery
Acute Hypoxia	• Prolonged Deceleration (>3 min)	Preceded by reduced variability and lack of cycling or reduced variability within the first 3 min • Immediate delivery by the safest and quickest route Preceded by normal variability and cycling and normal variability during the first 3 min of the deceleration • High chance of recovery - see 3 min rule below • Exclude the 3 intrapartum irreversible accidents (i.e. umbilical cord prolapse, placental abruption, uterine rupture - if such an accident is suspected prepare for immediate delivery) • Correct the reversible causes (uterine hyperstimulation/hypertonus, maternal hypotension and sustained umbilical cord compression) • If no improvement by 9 min or any of the accidents diagnosed, immediate delivery by the safest and quickest route
Chorioamnionitis (SOFI)	• >10 % increase in the baseline FHR without any repetitive preceding decelerations • Neuroinflammation = loss of cycling, ZigZag or sinusoidal patterns	• Consider the overall clinical context including parity and the stage of labour and the rate of progress of labour • In the presence of features of neuroinflammation, expedite birth to avoid the detrimental effects of superimposed hypoxia on the background fetal systemic inflammatory response syndrome (FIRS)
Other Abnormal CTG Patterns	• (Double Mountain Peak Sign, Poole Shark Teeth Pattern, Typical Sinusoidal Pattern, uncertain / unstable baseline)	• Escalate to senior team - exclude erroneous recording of maternal heart rate and other non-hypoxic causes such as feto-maternal haemorrhage or chronic fetal anaemia and acidosis as well as fetal cardiac arrhythmias and heart blocks. • Consider the application of a Fetal Scalp Electrode (FSE) to improve signal quality if there is evidence of poor quality recording.

Stepwise Approach

1. Assess baseline risk

The use of the "CAUTION Checklist" should be used as a guide to considering the wider clinical context whilst interpreting CTG traces during the antenatal period.(Table 2)

2. Evaluate CTG systematically

Foetus is assessed at the start of labour to be "FIT" to withstand the anticipated hypoxic stresses during labour.(Table 3)

3. Identify type of hypoxia

Foetus is subsequently reassessed during ongoing labour to recognise any new onset of an intrapartum hypoxic or inflammatory stress

by the use of the intrapartum foetal assessment tool (Table 4). This tool has been revised to help recognise the features of non-hypoxic causes of foetal compromise. It is important to appreciate that there may a combination of different types of intrapartum hypoxia with progressively increasing hypoxic stress. For example, a gradually evolving hypoxia may become a subacute hypoxia with the onset of active maternal pushing. The tool has been modified to include the initial heart rate to facilitate the easy recognition of >10 % increase in the FHR, and to help recognise foetal hypoxic stress superimposed on an ongoing foetal inflammation.

4. Initiate corrective measures

When the foetus is assessed to be at risk, corrective measures like stopping oxytocin infusion, removing prostaglandins, tocolysis, intravenous fluids or stopping maternal pushing in second stage etc in case of decompensated gradually evolving

hypoxia or in subacute or acute hypoxia should be implemented.

5. Escalate if no improvement

Consideration should be given to expedite the delivery if no improvement with above measures and also depending on stage of labour.

Table 2

The Fetal Monitoring Checklist	Is THIS FETUS FIT to undertake the progressive hypoxic journey of labour?		
Antenatal CTG Tool	The CAUTION checklist to detect Antenatal Fetal Compromise.		
Antenatal History:		Sig	2
Cycling absent	YES	NO	Depression of the CNS
Accelerations absent	YES	NO	Depression of the somatic NS
Unstable baseline	YES	NO	Myocardial decompensation
Tardy recovery (late decelerations)	YES	NO	Utero-placental insufficiency
Irritability of the uterus / Inappropriate baseline for gestational age	YES	NO	Potential abruption or chorioamnionitis
Obvious history: vaginal bleeding, PPROM, reduced fetal movement, abdominal pain	YES	NO	Underlying pathology that may contribute to fetal compromise
Non-hypoxic features: Zig-zag pattern or sinusoidal	YES	NO	Feto-maternal haemorrhage, chronic fetal anaemia or CNS irritability
Date and time			
Print name and sign	1		2

Table 3: Intrapartum Fetal Monitoring Tool “How is THIS Fetus”?

Fetal Monitoring Checklist: Is THIS Fetus Fit for Labour? Pereira&Chandrahara 2017			
CTG Features / Risk Factors		Assessment	
1.	Baseline fetal heart rate stable and appropriate for the gestational age.	Yes	No
2.	Normal variability and cycling	Yes	No
3.	Presence of TRUE accelerations (not in labour or latent phase of labour)	Yes	No
4.	No shallow/ tardy decelerations	Yes	No
5.	Consider the wider clinical picture: meconium, pyrexia, fetal growth restriction, reduced fetal movements, gestational DM. pre-eclampsia, induction/augmentation, other	Yes	No
Overall Impression: Normal/ Chronic Hypoxia/ Chorioamnionitis /RUPI/ Other:			
Management Plan:			
Date Time. Name. Signature.			

Table 4: Antenatal CTG Interpretation Tool: the “CAUTION” Checklist.

Intrapartum Fetal Assessment Tool			
Mat Pulse:	Temp:	Initial Baseline FHR	Induced / Augmented labour? Y/N
Risk Factors			
Current Baseline FHR Paper speed	Variability	Accelerations	Decelerations Quicklie/Tardies/Both
Rise in Baseline ($\geq 10\%$)	No	Yes	
Inter-contraction interval < 90 s	No	Yes	
Abnormal Variability (<5 or >25)	No	Yes	
No Cycling / Loss of Cycling	No	Yes	

Features of Hypoxia	No	Yes	
TYPE of Hypoxia	Gradually Evolving/Sub-acute/ Combination/ Acute /None		
Depression of Fetal Central Organs	No	Yes	
New risk factors noted	No	Yes	
Any signs of chorioamnionitis/ infection?	No	Yes	
Any signs of non-hypoxic compromise, ZigZag or Sinusoidal Patterns?	No	Yes	
Second Opinion needed?	No	Yes	
Recommended Management Plan			
Date:			
Time:			
NAME			
SIGNATURE			

Adjunctive Tests

Foetal Blood Sampling (FBS)- It measures scalp pH or lactate and should no longer be used in clinical practice.

STAN (ST Analysis): It detects myocardial hypoxia and is not a part of regular practice.

Limitations of CTG: It has a high false-positive rate with high Interobserver variability. Unless properly observed over time and properly analysed it may lead to over-medicalization of labour.

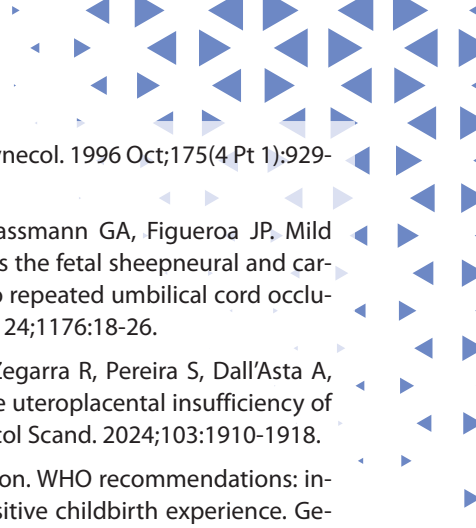
Medicolegal Considerations : CTG is central to litigation in obstetrics. Documentation is critical. Scanned copies should be kept in the records. Timely escalation is essential and use of standardized interpretation systems recommended.

Conclusion

The modern paradigm prioritizes understanding foetal adaptive responses, Avoiding unnecessary intervention and timely recognition of true hypoxia. A structured, physiology-based approach remains the cornerstone of safe obstetric practice.

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Labour Analgesia: Expanding Access, Advancing Innovation, and Enhancing Birth Experience

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Introduction

Labour represents an intense sensory and emotional experience shaped by a complex interplay of physiological, psychological, and sociocultural determinants. While inherently physiological, contemporary obstetric practice recognizes that labour pain warrants proactive, respectful, and evidence-based management to optimize maternal experience and outcomes.

Despite advances in obstetric care, utilisation of labour analgesia in India remains limited, with epidural services predominantly restricted to tertiary care settings. Addressing this gap requires scalable, cost-effective, and context-sensitive strategies aligned with the principles of equitable and respectful maternity care.

Physiology of Labour Pain

Labour pain varies across stages and involves both visceral and somatic components.

During the first stage, pain arises from uterine contractions and cervical dilatation and is transmitted via T10–L1 nerve fibers, producing diffuse visceral pain. In the second stage, pain results from distension of the vagina, pelvic floor, and perineum, transmitted via S2–S4 nerves, leading to sharp, localized somatic pain.

Pain perception is further influenced by factors such as fetal malposition, infection (e.g., chorioamnionitis), placental abruption, and psychological elements including fear, anxiety, and prior experiences. This multidimensional nature of labour pain underscores the need for a multimodal and individualized approach to analgesia.

Importance of Labour Analgesia

Unrelieved labour pain is associated with heightened catecholamine release, reduced uteroplacental perfusion, maternal exhaustion, and adverse psychological sequelae, and may contribute to dysfunctional labour patterns affecting both maternal and fetal outcomes.

Pain leads to multiple physiological changes. There is Hyperventilation leading to respiratory alkalosis and increased oxygen consumption. There is increased

peripheral vascular resistance and elevated cardiac output and blood pressure which reduces placental perfusion and incoordinate uterine activity. There can be psychological effects like posttraumatic stress disorder.

One of the major goals of intrapartum care is management of labor pain. There are two general approaches: pharmacologic and non-pharmacologic. **Pharmacologic approaches** are mainly directed at eliminating or decreasing the physical sensation of labor pain.

While the **non-pharmacologic approaches** are largely directed at increasing comfort and capacity to cope with pain thus preventing suffering. Additionally, non-pharmacologic interventions for labor pain may reduce the risk of cesarean birth, including for patients also using pharmacologic treatments.

Pharmacological Methods

- Systemic opioids provide moderate pain relief and are widely used due to ease of administration. However, they are associated with maternal sedation, nausea, and potential neonatal respiratory depression due to placental transfer.
- Remifentanyl PCA(patient-controlled analgesia): Ultra-short acting, rapid onset, but requires close monitoring due to risk of respiratory depression.
- Fentanyl PCA: Alternative with favorable safety profile.
- Intermittent opioids (e.g., nalbuphine): Useful where neuraxial techniques are unavailable.
- Nitrous Oxide Nitrous oxide offers mild analgesia with rapid onset and offset. It is less effective than epidural analgesia and may cause nausea and dizziness.

Epidural Analgesia: The Gold Standard

Epidural analgesia involves placement of a catheter in the epidural space with administration of local anesthetics (e.g., bupivacaine, ropivacaine) often combined with opioids.

The main advantages are superior pain relief, minimal maternal sedation, extendable for operative delivery

and minimal exposure of the fetus to opioid drug therapy.

Its major drawbacks are that it requires skilled personnel and limited availability in resource-constrained settings

Non-Pharmacological Methods: Expanding Access

Non-pharmacological techniques are primarily directed at enhancing coping mechanisms and reducing the subjective experience of suffering rather than abolishing pain entirely. Inadequate antenatal preparation regarding labour pain has been associated with increased anxiety, highlighting the importance of patient education and counselling.

- Breathing and relaxation techniques help reduce anxiety and modulate pain perception by promoting rhythmic breathing and mental focus
- Continuous labour support, including the presence of a birth companion or doula, provides emotional reassurance and has been shown to reduce perceived pain and intervention rates.
- Massage and touch therapy work through stimulation of mechanoreceptors and the gate control theory of pain, offer comfort during contractions.
- Hydrotherapy, especially immersion in warm water, promotes muscle relaxation and reduces pain intensity during early labour.
- Transcutaneous electrical nerve stimulation (TENS) involves electrical stimulation over the lower back to inhibit pain transmission pathways.

The main advantages of these modalities are that they are safe, inexpensive, and easy to implement. They also promote maternal involvement and satisfaction and are suitable for low-resource settings

However they are less effective in severe labour pain and often require motivation and support.

While these methods may not provide complete analgesia in advanced labour, they play a crucial role as adjuncts and in improving overall birth experience.

Comparative Perspective

While epidural analgesia remains the most effective modality for labour pain relief, non-pharmacological approaches provide modest but meaningful benefit and are widely accessible. Contemporary obstetric care increasingly advocates for a complementary, individualized strategy integrating both modalities based on patient preference, clinical context, and

resource availability.

Feature	Epidural Analgesia	Non-Pharmacological Methods
Pain Relief	Excellent	Mild to moderate
Availability	Limited in India	Widely feasible
Cost	Higher	Minimal
Skill Requirement	Specialized	Minimal
Maternal Satisfaction	High	Variable
Role	Gold standard	Adjunct/alternative

Innovations in Labour Analgesia: Bridging the Gap

Recent advances in labour analgesia have focused on enhancing efficacy, safety, maternal autonomy, and accessibility, reflecting a shift towards personalized and patient-centered intrapartum care.

- 1. Low-Dose (Walking) Epidural techniques** use dilute local anesthetic-opioid combinations to preserve motor function (reducing motor block) and allow mobility during labour
- 2. Patient-Controlled Epidural Analgesia (PCEA)** enables women to self-administer analgesia within prescribed limits, thus improving satisfaction and reduction in overall drug consumption and thereby reducing side effects
- 3. Programmed Intermittent Epidural Bolus (PIEB)** systems deliver automated boluses, resulting in better drug spread and superior analgesia compared to continuous infusion with lower doses
- 4. Remifentanyl PCA** has emerged as an alternative in settings where epidural is contraindicated or unavailable, although it requires close monitoring
- 5. Sterile Water Injections** low-cost innovations such as sterile water injections provide effective pain relief for labour-associated back pain and are especially relevant in resource-constrained settings.
- 6. Ultrasound-Guided Epidural Placement** Ultrasound is increasingly used to identify the epidural space in difficult cases (e.g., high BMI), reducing needle passes and increasing success rates.
- 7. Dural Puncture Epidural (DPE):** A newer technique involving intentional, small-gauge needle perforation of the dura before catheter insertion, potentially enhancing, faster-onset analgesia compared to conventional epidural.

Advancements in Pharmacotherapy: Use of low-dose local anesthetics combined with adjuvants (e.g., fentanyl, clonidine) provides effective analgesia with

minimal motor blockade.

The main benefits of these modern techniques are improved mobility, reduced drug consumption, high maternal satisfaction and no increase in caesarean section rates (as per recent evidence)

Role of the Obstetrician

The obstetrician plays a pivotal role in antenatal counselling, addressing misconceptions, facilitating informed decision-making, and coordinating multidisciplinary care to ensure safe and effective labour analgesia.

Expanding Access in India: The Way Forward

Barriers to labour analgesia in India include lack of awareness, cultural beliefs, limited trained personnel, and infrastructure gaps. Strategies to improve access include: Antenatal counselling, training programs, institutional protocols and integration into national maternal health initiatives

Conclusion

Labour analgesia is a fundamental component of respectful maternity care. A balanced, physiology-informed, and patient-centered approach integrating pharmacological and non-pharmacological modalities can substantially enhance both the experience and outcomes of childbirth. Future efforts should prioritize integration of labour analgesia into routine maternal health services, particularly at secondary care levels, to ensure equitable access.

Key Messages

- Labour analgesia should be individualized and accessible
- Epidural analgesia remains the most effective method
- Non-pharmacological methods are essential adjuncts
- Innovation is key to improving access

Summary Box

- Labour pain is a dynamic process involving both visceral (T10–L1) and somatic (S2–S4) pathways, influenced by psychological and cultural factors.
- Effective labour analgesia improves maternal satisfaction, labour outcomes, and overall birth experience, and is an essential component of respectful maternity care.

- Epidural analgesia remains the gold standard, providing superior and consistent pain relief, with increasing evidence suggesting a reduction in severe maternal morbidity.
- Non-pharmacological methods—including breathing techniques, labour support, massage, hydrotherapy, TENS, and sterile water injections—are safe, cost-effective, and crucial for expanding access, especially in low-resource settings.
- Modern practice emphasizes a multimodal approach, combining pharmacological and non-pharmacological strategies tailored to individual needs.
- Recent innovations such as low-dose epidural, patient-controlled epidural analgesia (PCEA), programmed intermittent epidural bolus (PIEB), remifentanyl PCA, and ultrasound-guided techniques are improving both efficacy and accessibility.
- In India, barriers include limited awareness, resource constraints, and shortage of trained personnel, highlighting the need for systemic interventions.
- Expanding access requires antenatal counselling, institutional protocols, and training initiatives

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Standardization of Labour Room Protocols and Checklists

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Introduction

Intrapartum care is a critical determinant of maternal and neonatal survival, with a substantial proportion of preventable deaths and severe morbidities occurring in and around the time of labour and birth.¹ Variability in clinical practice between facilities, providers, and shifts can lead to omissions of essential care and delays in the recognition and management of complications.² Standardization of labour room processes through evidence-based protocols, structured checklists, the WHO Labour Care Guide (LCG), and systematic quality improvement (QI) initiatives is an effective strategy to enhance the safety, reliability, and consistency of obstetric care.³

Global efforts have emphasized the need for simple, context-appropriate tools that translate guidelines into point-of-care actions. The World Health Organization (WHO) Safe Childbirth Checklist provides a concise set of critical practices at key time points during labour and the immediate postpartum period, focusing on major causes of maternal and perinatal mortality.⁴ The WHO Labour Care Guide has been developed as an evolution of the traditional partograph and aims to operationalize WHO intrapartum care recommendations for a positive childbirth experience.⁵⁻⁷ In India, the Labour Room Quality Improvement Initiative (LaQshya) offers a national framework to transform labour rooms and maternity operation theatres into high-quality, respectful, and safe environments.⁸⁻⁹ This article discusses the rationale for standardized labour room protocols, illustrates the role of checklists and the LCG, and describes how QI initiatives, audit, and feedback systems can be integrated in everyday practice.

Rationale for Standardization of Labour Room Care

The leading causes of maternal deaths in low- and middle-income settings include postpartum haemorrhage, hypertensive disorders, sepsis, and complications of obstructed labour, while neonatal deaths are frequently related to intrapartum asphyxia, prematurity, and infections.¹ Many of these adverse outcomes arise not only from resource constraints but also from gaps in timely recognition, decision-making, communication, and execution of routine tasks. Standardization aims to reduce unwarranted variation

by ensuring that all women and newborns receive a defined minimum standard of care, regardless of provider or shift.¹⁰

In a busy labour room, teams are often composed of staff with differing levels of training and experience, rotating frequently and working under considerable pressure.⁹ In the absence of clear protocols and standard documentation formats, decision-making can be inconsistent, critical steps may be missed, and opportunities for early intervention lost.¹¹ Written protocols, checklists, and structured monitoring tools such as the LCG create a shared understanding of expected practices and thresholds for escalation, support task-sharing, and reduce reliance on individual memory, especially during emergencies.^{5,11} They also make the care process more visible and measurable, which is essential for meaningful audit and QI.^{8,9,12}

Core Labour Room Protocols

Each labour room should have a core set of protocols covering the continuum from admission to early postnatal care. These protocols should be evidence-based, aligned with national and international guidance, and tailored to the facility's case-mix and resources.^{8,9,13}

1. Admission and Triage

A structured admission and triage protocol ensures rapid identification of women with obstetric emergencies or high-risk conditions who require urgent assessment and management. Key elements include:

- Rapid assessment of airway, breathing, circulation, and consciousness.⁸
- Recording of vital signs, obstetric history, and presenting complaints.
- Identification of high-risk conditions (e.g., previous caesarean section, multiple pregnancy, pre-eclampsia, antepartum haemorrhage, reduced fetal movements).
- Baseline fetal assessment and documentation.
- Criteria for admission to labour room versus observation or referral to a higher centre.

Colour-coded triage categories (e.g., red, amber, green) can help prioritize care where patient load is high.⁸ Admission orders, including intravenous access, essential investigations, and prophylactic measures, should be standardized.⁹

2. Intrapartum Monitoring and the Labour Care Guide Standardization of intrapartum monitoring hinges on consistent use of structured tools and clear thresholds for action.¹⁴ Protocols should specify:

- Frequency of maternal vital signs, uterine contractions, and fetal heart rate monitoring.^{9,14}
- Criteria for initiating and continuing a monitoring chart.¹⁴
- Thresholds for escalation when progress deviates from expected norms or fetal status is non-reassuring.¹⁴
- Decision-to-intervention timelines for operative vaginal delivery or caesarean section in cases of labour dystocia or fetal compromise.^{9,15}

The WHO Labour Care Guide has been proposed as a "next-generation" tool to replace or complement the traditional partograph, in line with updated WHO intrapartum care recommendations.⁵⁻⁷ It is initiated once the woman enters active labour, at cervical dilatation of 5 cm or more, and is designed for use at all levels of health facilities.⁵ The LCG prompts regular, structured assessment across domains such as the woman's wellbeing, fetal condition, labour progress, supportive care, and use of interventions, thereby combining clinical monitoring with a strong focus on respectful, woman-centred care.^{5,6} Early evaluations suggest that the LCG is usable and acceptable to providers and may support more individualized decision-making in labour.^{6,7,6} FIGO and several professional bodies have endorsed the LCG as an important tool to support implementation of WHO intrapartum care recommendations.¹⁶

3. Third Stage of Labour and Immediate Postpartum Care

Active management of the third stage of labour (AMTSL) should be standardized as a high-impact intervention to reduce postpartum haemorrhage.¹⁵ Protocols should define:

- Choice, dose, and timing of prophylactic uterotonics.¹⁵
- Steps for controlled cord traction where indicated.¹⁵
- Post-delivery monitoring of uterine tone, vaginal bleeding, and maternal vital signs, particularly during the first two hours.¹⁷

Immediate postpartum care should also include pain assessment, early detection of anaemia and infection, counselling on breastfeeding, and postpartum contraception as per facility policy.¹⁷

4. Management of Obstetric Emergencies

Standardized emergency protocols, often presented as algorithms or bundles, are essential for structured and coordinated responses.^{9,15} Key areas include:

- Postpartum haemorrhage: sequential steps (uterine massage, additional uterotonics, tranexamic acid, uterine tamponade, surgical measures, and blood transfusion) with time-bound triggers for escalation and clearly allocated roles during a "PPH call".^{15,18}
- Hypertensive emergencies and eclampsia: magnesium sulfate regimen, antihypertensive therapy, seizure control, fluid management, and indications for expedited delivery.¹⁵
- Sepsis: early recognition criteria, blood cultures where feasible, prompt broad-spectrum antibiotics, fluid resuscitation, and monitoring.^{15,19}
- Shoulder dystocia, cord prolapse, uterine rupture: drills and flowcharts outlining sequence of manoeuvres, communication pathways, and post-event review.²⁰

These protocols should be visible (posters, pocket cards) and reinforced through regular drills.^{8,20}

5. Newborn Care

Newborn care protocols should cover:

- Immediate assessment at birth, including breathing, tone, and heart rate.^{3,21}
- Thermoregulation (drying, skin-to-skin contact, delayed bathing).²¹
- Delayed cord clamping where appropriate.²¹
- Early initiation of breastfeeding and support for positioning and attachment.^{17,21}
- Newborn resuscitation algorithm, with clear criteria for stimulation, positive pressure ventilation, and advanced measures.^{21,22}
- Routine prophylaxis and criteria for special care or neonatal unit admission.²¹

Checklists and the Labour Care Guide in Labour and Delivery

Checklists are brief, structured tools designed to ensure that key steps are not missed, particularly during busy or stressful periods.^{3,11} They are meant to complement, not replace, clinical judgement and detailed case records.

WHO Safe Childbirth Checklist

The WHO Safe Childbirth Checklist is organized around four pause points: on admission, just before or soon after birth, within one hour after birth, and before discharge. At each pause point, a short list of essential practices addresses major causes of maternal and neonatal mortality and intrapartum stillbirths.^{1,3} Examples include confirmation of gestational age and risk factors, readiness for emergency management, prophylactic uterotonic use, infection prevention measures, newborn resuscitation preparedness, and postpartum monitoring.^{3,4}

The checklist is intended for adaptation to local context and integration into routine documentation.^{3,4} Facilities may print it onto case sheets, attach it to bed-head tickets, or display laminated versions at the point of care.¹¹ Successful implementation requires orientation of all cadres, supportive supervision, and a non-punitive environment that encourages completion rather than superficial ticking.

Labour Care Guide as a Standardized Monitoring Tool

The WHO Labour Care Guide is not a checklist in the narrow sense, but functions as a structured labour monitoring chart that standardizes documentation and decision-making during active labour.⁵⁻⁷ It includes sections on identification data, labour characteristics at admission, supportive care, care of the woman, care of the baby, labour progress, medications, and shared decision-making.^{5,6} By prompting a repeated "assess–record–check–plan" sequence, the LCG supports frequent, meticulous observations and encourages providers to think critically rather than rely solely on fixed cervical dilatation thresholds.^{5-7,6} This makes it a natural complement to protocols and checklists and an important component of any labour room standardization effort.

National Programme-Linked Checklists

Under LaQshya, national quality assurance tools include structured checklists for labour rooms and maternity operation theatres, aligned with National Quality Assurance Standards.^{8,9} These cover domains such as clinical care, infection prevention and biomedical waste management, patient rights and respectful maternity care, support services, and quality management systems.^{8,9} They are used for baseline assessments, internal monitoring, and external certification of facilities. These checklists help standardize training and assessment across providers.²²

Principles for Local Checklist Design

For checklists to be practical and acceptable, each facility should refine and develop tools suited to its workflows. Useful principles include:^{2,11}

- Focusing each checklist on a specific procedure or phase of care (e.g., normal vaginal delivery, induction of labour, emergency caesarean section, PPH management).
- Restricting content to truly critical steps, avoiding duplication of routine documentation.³
- Assigning clear responsibility (for example, staff nurse completes, duty doctor reviews).¹¹

- Embedding checklists into existing case records or electronic systems wherever possible.⁹
- Reviewing and revising checklists periodically based on user feedback and audit findings.⁸

Quality Improvement Initiatives in the Labour Room

Standardized protocols, checklists, and the LCG are most effective when embedded within a broader QI framework.^{3,8} LaQshya provides such a structure for Indian labour rooms and maternity operation theatres.^{8,9}

Overview of LaQshya

Facilities are encouraged to conduct baseline assessments using standardized tools, form multidisciplinary QI teams, and develop action plans addressing identified gaps in areas such as clinical protocols, infrastructure, human resources, patient experience, and data systems.^{8,9}

Quality Improvement Cycles

LaQshya promotes multiple QI cycles, often structured around the Plan–Do–Check–Act (PDCA) approach.⁸ Typical steps include:

- Plan: Identify a specific problem (e.g., incomplete partograph/LCG documentation, delays in administration of prophylactic uterotonics), define a measurable target, and design context-appropriate interventions.^{8,10}
- Do: Implement the planned interventions over a defined period (for example, two months), which may include staff training, checklist or LCG-related coaching, workflow redesign, or improved equipment placement.⁸
- Check: Collect and analyse data on process and outcome indicators to assess whether the target has been met.^{8,12}
- Act: Consolidate successful changes into routine practice or, if targets are not achieved, adjust the strategy and initiate another cycle.^{8,12}

Each cycle should focus on a small set of indicators, making data collection feasible.⁸ Examples of QI topics include improving early initiation of breastfeeding, ensuring functional readiness of emergency trolleys, reducing decision-to-incision times in emergencies, or improving documentation completeness in the LCG.^{8,17}

Facility-Level Strategies

Effective QI requires a committed, multidisciplinary team that meets regularly to review data, discuss bottlenecks, and coordinate interventions.^{8,12}

Displaying simple run charts of key indicators in staff areas can help maintain transparency and provide visual feedback on progress.¹² Integrating simulation-based drills (for PPH, eclampsia, neonatal resuscitation) into QI activities reinforces protocols and checklists while strengthening teamwork and communication.²⁰⁻²²

Capacity building is central to sustaining QI.⁹ Periodic refresher training, bedside coaching, and objective structured clinical examinations (OSCEs) can be used to assess and improve provider skills.²² Linking QI initiatives to recognition or incentives, where possible, may further motivate teams.⁸

Audit and Feedback Systems

Audit and feedback are essential to ensure that standardization efforts are translated into consistent practice and improved outcomes.¹²

Types of Audits

Labour room audits may focus on:

- Clinical audits: assessing adherence to protocols for specific conditions or procedures (e.g., PPH management, eclampsia care, induction of labour, indications for caesarean section, neonatal resuscitation).^{14,15}
- Process audits: evaluating timeliness and completeness of critical processes (e.g., time from admission to first assessment, initiation and continuation of partograph/LCG, decision-to-delivery intervals, referral documentation).¹²
- Outcome audits: monitoring key indicators such as rates of PPH, severe maternal morbidity, fresh stillbirths, early neonatal deaths, and near-miss events.^{1,23}

Maternal and perinatal death reviews, as well as near-miss reviews, provide in-depth insights into system issues and are an important complement to routine audits.²³

Conducting Audits

Audits begin with defining explicit standards, ideally based on national and international guidelines and institutional protocols.^{1,15} Data are collected prospectively or retrospectively, analysed to determine the degree of adherence, and gaps are identified.¹² Interventions to address these gaps may include revising protocols, reinforcing training, reorganizing workflows, or strengthening supply chains.¹²

The audit loop must be closed through re-audit after interventions have been implemented.¹² This iterative process aligns naturally with QI cycles and helps cultivate a culture of continuous improvement.⁸

Simple tools such as standardized audit forms and basic spreadsheets can suffice in most facilities.¹²

Feedback Mechanisms

Timely, specific, and constructive feedback is crucial for translating audit findings into practice change.¹² Regular morbidity and mortality meetings, labour room review meetings, and QI huddles provide forums to discuss data and case narratives.²³ The focus should be on system improvement rather than individual blame, encouraging open discussion of errors and near-misses.^{2,23}

Feedback should be explicitly linked to QI initiatives and training.^{8,12} For instance, if audits identify gaps in adherence to PPH protocols or LCG completion, a targeted QI cycle on PPH management or documentation quality with drills and refresher training can be initiated.^{18,20} Documenting and sharing improvements in indicators helps sustain engagement.¹²

Way Forward and Conclusion

Standardization of labour room protocols and systematic use of checklists and the LCG, embedded within structured QI initiatives and supported by robust audit and feedback systems, can substantially improve the safety and quality of childbirth care.^{1,3,5,8} Tools such as the WHO Safe Childbirth Checklist, the WHO Labour Care Guide, and national programmes like LaQshya provide frameworks that translate evidence into practical actions at the bedside, while local adaptation ensures feasibility and relevance to diverse Indian settings.^{3,9}

Sustainable change depends on fostering a culture of safety, teamwork, and continuous learning.^{2,10} Obstetricians, paediatricians, nurses, and residents, working together can adapt and refine protocols, checklists, and the LCG, use data to guide decisions, and normalise open, non-punitive discussion of adverse events and near-misses.^{12,23} As more labour rooms adopt such standardized, QI-oriented approaches, the goal of safe, respectful, and high-quality care for every woman and newborn becomes increasingly attainable.^{1,8}

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Role of Ultrasound in Labour

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Introduction

Assessment of labour progression is central to obstetric practice. Traditionally, obstetricians relied on abdominal examination and digital vaginal examination (DVE), which is very subjective and associated with significant interobserver variability. Erroneous assessment of fetal head position and station can lead to inappropriate clinical decisions, including unnecessary operative interventions.

Intrapartum ultrasonography (IPUS) has emerged as a reliable and objective alternative for evaluating labour dynamics. This article aims to provide an updated overview of the role of ultrasonography in labour, focusing on techniques, clinical applications, and recent advances.

However, there is currently no consensus regarding when during labour ultrasound should be performed, which parameters should be obtained, and how sonographic findings should be integrated into clinical practice to improve patient management.¹

Principles and Techniques of Intrapartum Ultrasound

Ultrasound Approaches

1. Transabdominal Ultrasound (TAUS): Primarily used for determining fetal head position, especially in early labour. It helps identify head and spine position
2. Transperineal ultrasound: Currently the most widely used modality for intrapartum assessment. It enables visualization of the fetal head in relation to the maternal pelvis and provides objective measurements of descent.
3. Transvaginal ultrasound: Limited role in labour due to patient discomfort and restricted field of view.

Key Sonographic Parameters

1. Fetal Head Position

Ultrasound provides superior accuracy compared to DVE in identifying fetal head position, which is crucial for predicting labour progress and planning delivery.

2. Fetal Head Station and Descent

Important parameters for assessment include:

- **Angle of progression (AoP)** - the angle between a line running longitudinally in the midline of the symphysis pubis and a line from the lowermost

point of the symphysis pubis tangential to the most leading point of the fetal head.²

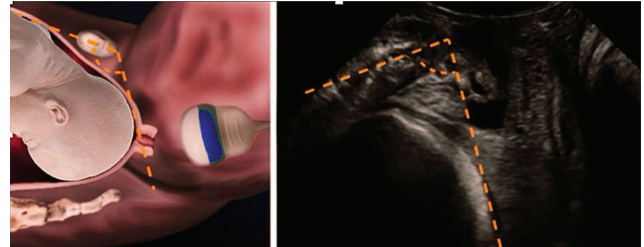


Figure 1: Transperineal ultrasound assessment of angle of progression (AoP)

- **Head-perineum distance (HPD)** - distance between the fetal head and maternal perineum when the transducer is applied in a horizontal direction transperineally with an upward inclination towards the symphysis pubis.³

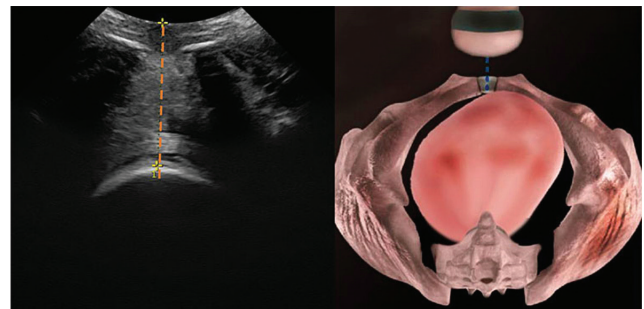


Figure 2: Transperineal ultrasound assessment of head-to-perineum distance (HPD)

- **Head direction-** This is an indirect marker of head station. It is the angle between the longest recognizable axis of the fetal head and the long axis of the pubic symphysis, measured in a midsagittal transperineal view.⁴
- **Midline rotation angle (MLA)** - It is measured as the angle between the longitudinal fetal head diameter represented by the fetal brain midline structures and the midsagittal anteroposterior diameter of the maternal pelvis.⁵

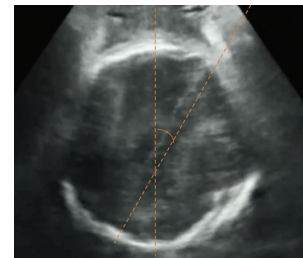


Figure 3: Transperineal ultrasound assessment of midline angle of rotation (MLA)

- **Progression distance (PD)** is measured as the distance between the infrapubic line (a perpendicular line to the lowermost point of the sagittal midline of the symphysis pubis) to the deepest point of the fetal head.⁶ Head-symphysis distance (HSD) - the distance between the lower edge of the pubic symphysis and the nearest point of the fetal skull.⁷
- Measuring the distance between the deepest point of the fetal head and the infrapubic line was also suggested to assess the fetal head station as the infrapubic line is 3 cm above the plane of the ischial spines.⁸
- **Suprapubic descent angle (SDA)** - is the angle between a longitudinal midline through the symphysis pubis and a line from the upper part of the symphysis pubis extending tangentially to the fetal skull.

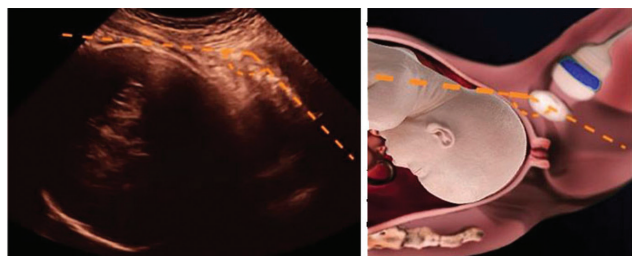


Figure 4: Transabdominal ultrasound assessment of suprapubic angle of descent (SDA)

These parameters offer objective quantification of fetal head descent.

3. Fetal Head Attitude

Assessment of flexion or deflexion using occiput-spine relationship.

4. Asynclitism

Ultrasound allows detection of lateral tilt of the fetal head, an important cause of labour dystocia.

5. Dynamic Assessment

Real-time evaluation during uterine contractions and maternal pushing enhances prediction of delivery outcomes.

Indications of ultrasound in labour

Routine use of intrapartum ultrasound for determination of fetal head position, station and descent in low risk women is not yet recommended. More studies are required to prove a clinical benefit of intrapartum ultrasound for the fetus or the mother with respect to severe perinatal or maternal morbidity.

However, since it provides a more objective and reproducible measure of fetal head position and station and is also more acceptable to women, it may be used in the following conditions as per ISUOG guidelines¹:

- Slow progress or arrest of labor in the first stage
- Slow progress or arrest of labor in the second stage
- Assessing fetal head position and station before considering or performing instrumental vaginal delivery
- Objective evaluation of fetal head malpresentation

Ultrasound before induction of labor

Induction of labor (IOL) is currently one of the commonest obstetric interventions with a reported incidence of 20%.^{9,10} The Bishop score has been used for assessment prior to IOL to determine the method of induction and the likelihood of its success. Studies have shown that Bishop score has poor predictive value, high inter- and intraobserver variability.^{11,12} Hence, ultrasound for cervical assessment has been emphasized as a more objective and accurate tool than digital examination.¹³ The suggested predictors of IOL success are:

1. Cervical measurement

Assessing CL by transvaginal ultrasound has been shown to perform better than the Bishop score in the prediction of induction-to-delivery interval and IOL outcome.^{14,15} Studies have shown that with every 1mm increase in CL above 20mm, the odds of Cesarean section (CS), due to failed IOL, increased by approximately 10%. In a study conducted by Rane *et al*,¹⁶ ultrasound measurement of CL and posterior cervical angle were independent predictors for induction-to-delivery interval and the outcome of IOL. A posterior cervical angle of more than 120° was associated with a positive response to IOL within 24 hours. CL assessment before IOL can be used to identify women who are candidates for prostaglandin administration.¹⁷ A CL of ≥ 30 mm or ≥ 26 mm corresponded to a Bishop score of less than 6 and 4, respectively, defining the need for prostaglandin for cervical ripening.

2. Identification of fetal head position and station

Precise assessment of fetal occiput position in labor is required for labour management and especially in instrumental deliveries. An error in evaluation of head position may result in inappropriate vacuum or forceps placement, increasing the risk for fetal injury and the failure rate of the procedure. Ultrasound for assessment of fetal position is being researched. Some studies found pre-induction ultrasonographic assessment of fetal occiput and spine position to not correlate with the mode of birth while others demonstrated fetal head position (Figure 1) to be a significant predictor.^{18,19}

There are other measurements that can be used

objectively to determine the fetal head level in the pelvis.

Measuring the AoP by transperineal ultrasound (TPU) has been found to be a significant independent predictor of outcome and IOL success in nulliparous women.⁽²⁰⁾ However, other studies found that AoP did not correlate with the outcome of IOL.²¹

The fetal head-to-perineum distance (HPD) was found to successfully predict vaginal delivery after induction of labor, with a predictive value comparable to that of CL assessed by ultrasound and Bishop score.²²

3. Pelvic floor dimensions and function

Studies have been conducted on levator hiatus dimensions and IOL outcome.

Before the onset of labour, the anteroposterior diameter of the levator hiatus at rest and at maximum Valsalva has been correlated with the mode of delivery and the duration of the second stage. Studies have shown that some women have dysfunctional levator ani muscle contraction, and a consequent reduction in levator hiatus diameter, on pushing, known as levator ani coactivation. Coactivation was shown to be associated with adverse labor outcomes. This information could be used to coach women how to push down properly and help alleviate dysfunctional muscle contraction and improve pushing efforts.

4. Prediction models

A number of predictive models and calculators, comprising sonographic and clinical parameters, have been devised and validated for the success of IOL. The clinical predictors most commonly included were maternal age, parity, body mass index, gestational age, Bishop score and estimated fetal weight, while the ultrasound predictors included were CL and posterior cervical angle, AoP, HPD and fetal occiput position. These prediction models and calculators may help in guiding the obstetrician in decision-making.

5. Prelabor ultrasound pelvimetry

Ultrasound is being used for prelabour pelvimetry. It offers an acceptable, readily available, objective tool. Maternal subpubic arch angle (SPAA) measurement on ultrasound was found to be a predictor of operative delivery and correlates with the persistence of the different occiput positions during the process of labor.²³ SPAA has also been found to correlate with the duration of the second stage.

For measuring the SPAA, TPU was done with a horizontal application of the transducer at the level of the clitoris and tilted upwards until both pubic

rami are visible converging into the SPAA which is then measured.²⁴ SPAA can also be measured using three-dimensional (3D)-TPU by acquiring a volume of the pelvic outlet.

The obstetric conjugate can also be measured by transabdominal ultrasound. The transducer is placed at the level of the symphysis vertically to visualize the symphysis pubis and interpubic fibrocartilaginous disc. The distance between the inner edge of the interpubic disc and the sacral promontory, identified as the most prominent segment of the sacral vertebral column, is then measured as the obstetric conjugate.²⁵

Ultrasound assessment of progress of labor

Monitoring of labor progress has traditionally been done clinically. However, digital assessment of fetal head position and descent has been shown to be unreliable with high degrees of interobserver variability. The use of ultrasound in monitoring labor progress offers an available, easily applicable, reproducible objective method of assessment.

The use of ultrasound to monitor fetal head descent was proposed as early as 1977 but the methodology was not clinically implementable. Sherer *et al.* described a simpler transabdominal approach for diagnosis of fetal head engagement but was not widely practiced due to shadowing from the bony maternal pelvis.²⁶ To avoid this predicament, studies that followed focused on TPU (translabial) scanning techniques. TPU parameters for head engagement and descent were more reproducible and widely applicable. AoP, progression distance, head-to-symphysis distance and HPD have all proven to be accurate, reproducible methods for assessing fetal head station and descent.

For the clinical application of these parameters and how to use them for the objective assessment of the progress of labor and in aiding management of prolonged labor, HPD and AoP cut-offs of 40 mm and 110° were suggested to be predictive of vaginal birth in 87% and 93%, respectively.²⁷

Assessment of fetal head descent by transabdominal examination has been highlighted again. The reason being that the TPU approach, as well as vaginal digital examination, assess the distal part of the fetal head while the transabdominal approach assesses the proximal part. A distinction of which part of the fetal head is being assessed should be considered in cases of fetal skull molding, before assessing fetal head engagement and descent to monitor labor progress or when considering assisted vaginal birth. Furthermore,

the transabdominal approach tends to be more familiar to obstetricians and more acceptable to laboring women. The suprapubic descent angle (SDA) is now being proposed as a transabdominal ultrasound assessment of fetal head descent and its reliability and reproducibility have been assessed.

The Midline rotation angle (MLA) pertain to the assessment of the progress of the second stage of labor. Hence, it helps in assessing the head position and the direction of the fetal head.

MLA can be obtained by applying the transducer horizontally on the perineum to display an axial view of the pelvis. Direction of the fetal head in relation to the symphysis pubis and infrapubic line can be visualized by TPU when the fetal head points downwards at higher stations and upwards at lower head stations and more advanced labor stages. These two parameters are best applied in the active phase of the second stage, when the fetal head is close enough to the perineum to allow for visualization of the brain midline structures and when the change in fetal head direction related to maternal bearing down can be monitored.

A narrower angle of progression at the beginning of the second stage in cases of occiput posterior position is associated with a higher risk of persistent occiput posterior position and of Cesarean delivery. However, serial ultrasound assessments rather than a single one should be used to monitor labor progress.

Ultrasound and assisted vaginal birth

Several intrapartum ultrasound parameters provide helpful tools when an operative vaginal delivery is considered. Assessing fetal head engagement and descent are fundamentals before instrument application. Correctly identifying the exact fetal head position is essential for the choice of instrument and its application.

Ultrasound assessment of fetal head position was found to be superior to clinical assessment of fetal head position prior to instrumental delivery. In a randomized controlled trial setting, the incidence of incorrect diagnosis was significantly lower in the ultrasound group than in the standard-care group (1.6% vs 20.2%) without delaying delivery.²⁸

Reassuring intrapartum ultrasound parameters before operative vaginal delivery include:

- A well-flexed occiput anterior head position
- Midline angle <45°
- Head perineum distance <35 mm, in occiput anterior position (or <25 mm regardless of the occiput position)

- Angle of progression >145° (>153° on pushing)

Summary

Intrapartum ultrasonography (IPUS) has emerged as a valuable adjunct to conventional clinical assessment of labour. Unlike digital vaginal examination, which is subjective and prone to interobserver variability, ultrasound provides objective, reproducible, and real-time evaluation of key parameters such as fetal head position, station, descent, and rotation. Transperineal ultrasound, in particular, has gained prominence due to its ability to quantify labour progress using measurable indices such as angle of progression, head–perineum distance, and midline rotation angle.

Current evidence supports the role of ultrasound in selected clinical scenarios, including prolonged or arrested labour, assessment prior to instrumental vaginal delivery, and evaluation of fetal malposition. Additionally, pre-induction ultrasound assessment of cervical characteristics and fetal head parameters shows promise in predicting induction outcomes and guiding management.

Despite its advantages, routine use of IPUS in all labouring women is not yet recommended due to limited evidence demonstrating improvement in major maternal and neonatal outcomes. Furthermore, there is no universal consensus regarding optimal timing, parameters, and integration into clinical protocols. Ongoing research and standardization are needed to fully establish its role in routine obstetric practice.

Take-Home Messages

- IPUS complements, not replaces, clinical examination in labour assessment.
- Transperineal ultrasound is the most useful modality for assessing fetal head descent and rotation.
- Key parameters include:
 - Angle of progression (AoP)
 - Head–perineum distance (HPD)
 - Midline rotation angle (MLA)
- Ultrasound is particularly valuable in:
 - Prolonged or arrested labour
 - Second-stage assessment
 - Before instrumental vaginal delivery
 - Suspected malposition or malpresentation
- Serial assessments are more informative than single measurements in monitoring labour progress.
- Routine use in low-risk labour is not yet recommended due to insufficient outcome-based evidence.

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Who 2025 Guidelines on Active Management of the Third Stage of Labour (AMTSL): An Updated Evidence-Based Approach

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Introduction

The third stage of labour, defined as the period from the birth of the baby to the expulsion of the placenta and membranes, is the shortest yet one of the most crucial phases in obstetric care. Despite its brevity, it carries a significant risk of complications primarily due to postpartum haemorrhage (PPH), which remains the leading cause of maternal mortality worldwide, especially in low- and middle-income countries.¹

The World Health Organisation (WHO) has periodically updated its recommendations to improve maternal outcomes. Reflecting evolving evidence, the 2025 WHO guidelines on Active Management of the Third Stage of Labour (AMTSL) focus on simplifying interventions while maximising effectiveness. In these guidelines, particular emphasis is placed on the prioritisation of key interventions, especially uterotonic administration, while other interventions are modified or de-emphasised based on current evidence.

Expectant vs Active Management of the Third Stage of Labour

Expectant (physiological) and active management represent two distinct approaches to the third stage of labour, differing primarily in the degree of intervention used to facilitate placental delivery and prevent postpartum haemorrhage (PPH). Expectant management relies on the natural physiology of childbirth, allowing the placenta to separate and deliver spontaneously without routine use of uterotonics, controlled cord traction, or uterine massage. It emphasises maternal effort, gravity, and spontaneous signs of placental separation, and is generally associated with a longer third stage and a higher risk of PPH, particularly in settings where timely intervention may be limited. In contrast, active management involves the prophylactic administration of a uterotonic (traditionally, oxytocin), delayed cord clamping, and, when performed by a skilled provider, controlled cord traction to expedite placental delivery and reduce blood loss.² Evidence consistently shows

that active management significantly lowers the incidence of severe PPH and the need for additional therapeutic interventions, making it the preferred strategy in most facility-based births. Contemporary WHO guidelines have progressively refined active management to prioritise uterotonics as the single most critical component, while allowing flexibility in the use of controlled cord traction and discouraging routine uterine massage in favour of intermittent assessment of uterine tone. Together, these approaches reflect a balance between physiological birth practices and evidence-based interventions aimed at optimising maternal outcomes.

Active management of the third stage of Labour (AMTSL)

Active Management of the Third Stage of Labour (AMTSL) is a set of evidence-based prophylactic interventions performed immediately after the birth of the baby to prevent postpartum haemorrhage. It primarily includes:

1. Administration of a uterotonic drug
2. Controlled Cord Traction
3. Delayed Cord Clamping

In summary, when implemented correctly, AMTSL significantly reduces the risk of postpartum haemorrhage, shortens the duration of the third stage of labour, and improves both maternal and neonatal outcomes. This highlights the importance of integrating AMTSL into clinical practice for optimal results.

The primary objective of AMTSL is the prevention of postpartum haemorrhage, particularly due to uterine atony. Secondary objectives include:

- Reduction in severe PPH (≥ 1000 mL blood loss)
- Decreased maternal morbidity and mortality
- Reduced need for blood transfusion
- Prevention of postpartum anaemia²

AMTSL has consistently demonstrated superiority over expectant management in reducing blood loss and associated complications.

Table 1: Evolution of WHO Guidelines

WHO recommendations on AMTSL have evolved over time based on emerging clinical evidence.

Component	WHO 2007/2012 Guidelines	WHO 2018 Update	WHO 2025 Guidelines
Uterotonics	Essential component of AMTSL	Essential	Most critical component; strongly emphasized
Timing of cord clamping	Early clamping common	Delayed clamping recommended	Delayed clamping (≥ 1 min) strongly recommended
Controlled cord traction (CCT)	Routine part of AMTSL	Optional in low-resource settings	Recommended only when performed by a skilled provider
Uterine massage	Routine postpartum massage recommended	Not routinely recommended	Replaced by intermittent uterine tone assessment
Overall approach	Package of 3 interventions (uterotonic + CCT + massage)	Flexible, context-specific approach	Simplified, evidence-prioritized approach focusing on uterotonics

This evolution reflects a shift from a rigid package approach to a selective, evidence-based prioritisation strategy.^{1,3}

Core Components of WHO 2025 AMTSL Guidelines

1. Prophylactic Uterotonic Administration

The 2025 WHO recommendations reaffirm uterotonics as the single most critical intervention within Active Management of the Third Stage of Labour (AMTSL) for preventing postpartum haemorrhage (PPH). Oxytocin remains the first-line drug due to its proven efficacy, safety profile, and global familiarity among birth attendants.

WHO 2025 recommends giving an injection of Oxytocin 10 IU IM/IV immediately after birth, preferably within 1 minute of delivery.¹

Alternatives

- Heat-stable carbetocin (long-acting oxytocin)
- Misoprostol (oral) when oxytocin is unavailable
- However, the updated guideline places stronger emphasis on ensuring the quality and stability of uterotonics, acknowledging that oxytocin's effectiveness is compromised when exposed to heat or poor storage conditions, which is an issue particularly relevant in low-resource settings. Consequently, WHO 2025 elevates the role of heat-stable carbetocin as a preferred alternative where cold-chain maintenance is unreliable.⁵ This marks a shift from earlier guidelines, which listed misoprostol and ergometrine as alternatives without prioritising stability concerns.

2. Delayed Umbilical Cord Clamping

The WHO 2025 update strongly endorses delayed umbilical cord clamping (DCC) as a standard practice for all vigorous newborns, recommending a delay of 30–60 seconds or longer before clamping.⁴

This represents a significant evolution from earlier guidelines, where early clamping was common, and DCC was variably practised. The updated recommendation is grounded in robust evidence demonstrating that DCC substantially improves neonatal iron stores, haemoglobin levels, and long-term neurodevelopmental potential. These benefits are particularly important in low- and middle-income countries, where iron deficiency anaemia remains a major public health challenge.

Importantly, WHO 2025 clarifies that DCC does not increase maternal risk, including postpartum haemorrhage, nor does it interfere with the administration of uterotonics. This reassurance addresses long-standing concerns among clinicians who previously prioritised rapid placental delivery. The guideline emphasises that DCC should be integrated seamlessly into routine birth care, including in settings where immediate newborn care practices such as drying, stimulation, and skin-to-skin contact are performed before cord clamping.

The updated guidance also highlights the physiological rationale for DCC, noting that placental transfusion supports smoother cardiovascular transition at birth and reduces the need for blood transfusion in preterm infants. By elevating DCC to a strongly recommended practice, WHO aims to standardise neonatal care globally and ensure that all newborns benefit from this simple, low-cost, high-impact intervention.

3. Controlled Cord Traction (CCT)

The WHO 2025 recommendations reposition controlled cord traction (CCT) from a routine component of AMTSL to an optional, context-dependent intervention. Earlier WHO guidelines included CCT as a standard practice for all births, based on evidence that it modestly reduced the duration of the third stage of labour and slightly

lowered the risk of retained placenta. However, updated evidence indicates that CCT has a limited impact on preventing PPH, especially when high-quality uterotonics are administered. As a result, the 2025 guideline no longer mandates CCT for all deliveries.

- Instead, WHO now recommends CCT only when performed by a skilled birth attendant who is trained in its correct technique. This shift acknowledges that improper application of CCT can increase the risk of uterine inversion or cord avulsion, particularly in settings with limited training or supervision. The guideline emphasises that the absence of CCT does not compromise maternal outcomes when uterotonics are administered effectively.⁶
- The updated stance also reflects a broader move toward simplifying AMTSL by prioritising interventions with the strongest evidence base. By making CCT optional, WHO aims to reduce unnecessary procedural complexity, especially in high-volume or low-resource settings where skilled personnel may be limited. The recommendation encourages health systems to focus training efforts on uterotonic administration and postpartum monitoring, which have a greater impact on PPH prevention.

Table 2: Changes in CCT Recommendation

Aspect	Previous WHO	WHO 2025
Role	Routine component	Conditional
Requirement	All deliveries	Only with skilled attendant
Benefit	Reduced duration	Same
Impact on PPH	Moderate	Limited

4. Uterine Tone Assessment vs Uterine Massage

A significant shift in WHO 2025 is the removal of routine uterine massage.

Table 3: Uterine Massage vs Tone Assessment

Aspect	Previous Guidelines	WHO 2025
Uterine massage	Routine	Not recommended routinely
Monitoring	Less emphasized	Uterine tone assessment emphasised
Patient comfort	Not considered	Improved comfort

Uterine massage is now reserved only when uterine atony is suspected.³

Benefits of the WHO 2025 Guidelines

1. Maternal Benefits

- Reduced incidence of PPH
- Decreased maternal mortality
- Lower need for transfusion
- Shorter duration of the third stage

2. Neonatal Benefits

- Improved haemoglobin levels
- Reduced iron deficiency anaemia
- Better neonatal outcomes

3. Health System Benefits

- Cost-effective
- Adaptable to low-resource settings
- Reduced burden on emergency services

Challenges in Implementation

Implementation of evidence-based strategies for managing the third stage of labour continues to face several systemic challenges, particularly in low- and middle-income settings. Resource constraints remain a major barrier, with many facilities experiencing inconsistent access to oxytocin and struggling to maintain an adequate cold chain, which compromises drug potency and effectiveness. Training-related issues further hinder optimal practice; providers may misuse uterotonics or apply incorrect controlled cord traction techniques, increasing the risk of complications. Variability in clinical practice also persists, driven by limited awareness of updated WHO recommendations and institutional inertia that favours long-standing routines over newer, evidence-aligned protocols. Compounding these challenges are monitoring and documentation gaps, including poor record-keeping and the absence of regular audits, which restrict opportunities for quality improvement and accountability. In response, WHO emphasises the need to strengthen competency-based training, reinforce adherence to current guidelines, and ensure reliable availability of essential uterotonic drugs to support consistent, high-quality implementation.¹

In special situations such as home deliveries, the use of misoprostol is recommended along with a simplified approach to active management of the third stage of labour. During caesarean sections, uterotonics remain essential, supported by modified techniques for placental delivery to ensure optimal uterine contraction and reduce blood loss. In high-risk cases, enhanced monitoring is crucial, and additional uterotonics may be required based on the clinical scenario to maintain uterine tone and prevent postpartum haemorrhage.

The 2025 WHO guidelines focus on a future with simplified, high-impact interventions, increased use of

heat-stable uterotonics, and stronger integration into broader maternal health programs. Innovations are also emerging, such as community-based distribution of uterotonics and digital monitoring tools to promote safer, more accessible postpartum haemorrhage prevention.

Conclusion

The 2025 WHO guidelines for Active Management of the Third Stage of Labour mark a major advancement in obstetric care by emphasising ethical, patient-centred approaches such as respectful care, informed consent, and shared decision-making. Women are encouraged to be well-informed about both the benefits and risks of active management as well as available alternatives, enabling their active participation in care decisions. The guidelines prioritise uterotonic administration, reinforce delayed cord clamping, and reduce reliance on less effective interventions like routine uterine massage, thereby offering a streamlined, evidence-based framework. This updated strategy not only improves maternal and neonatal outcomes but also adapts successfully across varied healthcare settings, holding the promise to significantly decrease the global burden of postpartum haemorrhage and maternal mortality.

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Know your drugs

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Carbetocin

Postpartum haemorrhage (PPH) continues to be a major contributor to maternal morbidity and mortality worldwide. Carbetocin is a **synthetic oxytocin analogue** with prolonged uterotonic activity. Carbetocin has a similarly rapid onset (1–2 min) and a longer half-life (33 min), nearly 4–10 times longer and can also be stored at room temperature.¹ Conventional carbetocin, requires cold-chain storage (2–8°C) to maintain potency. Heat-stable carbetocin (HSC) is a long-acting analogue of oxytocin which remains stable at ambient temperatures (up to 30°C) for at least three years, even at 75% humidity.^{2,3}

Its high lipophilicity results in a large volume of tissue distribution, extending its duration of action to 4–7 times that of oxytocin. Following intramuscular administration, carbetocin enters circulation rapidly with a time to peak concentration of half an hour with a good bioavailability of 80% and has a non renal elimination. A single 100ug dose can act for upto 16 hours thus reducing the need of continuous oxytocic infusion.

Mechanism of Action: Carbetocin binds to oxytocin receptors in uterine smooth muscle which leads to the following sequence of changes:

- Increased intracellular calcium
- Enhanced uterine contractions
- Sustained uterine tone after delivery

The prolonged half-life explains its single-dose effectiveness.

Administration: Carbetocin 100 µg administered IV over 30–60 seconds. The same dose can be given by IM injection and may be more effective.

Indications

HSC should only be used for PPH prevention after delivery of the baby (not for induction or augmentation of labor, and not for treatment of PPH). The WHO also emphasized on provider education to prevent misuse.

Contraindications:

Carbetocin is contraindicated in women with known hypersensitivity to carbetocin, oxytocin. it should not be used for labor induction or augmentation.

Table 1: Key Points regarding Carbetocin

Pharmacokinetics	Dosage	Adverse effects	Contraindications	Limitations
Intravenous (IV) or intramuscular (IM)	Recommended dose: 100 µg IV or IM	Nausea	² Cardiovascular disease	Higher cost than oxytocin
Rapid onset (within 2 minutes)	Administered immediately after delivery of the baby or placenta	Vomiting	² Severe hepatic or renal dysfunction	Limited availability in some regions
Half-life=33–40 minute	Repeat dosing is generally not required	Headache	² Epilepsy	
Duration of action: Around 1 hour		Flushing	² Hypersensitivity to oxytocin analogues	
Renal excretion		Hypersensitivity		
		Tachycardia		
		Hypotension		

Conclusion

Heat Stable Carbetocin represents a significant advancement in the prevention of postpartum haemorrhage. Current WHO guidelines⁵ support its use as an effective alternative to oxytocin in the prevention of postpartum haemorrhage, particularly in settings where maintaining drug quality is challenging.

Atosiban

Nearly one in ten babies are born preterm each

year, resulting in around 1 million neonatal deaths worldwide.⁶ The main reasons for preterm births are spontaneous preterm labor (40–45%) and preterm pre-labor rupture of membranes (25–30%).⁷ In case of idiopathic preterm labor, use of short-term tocolysis is widely recommended.^{8,9} The primary objective of tocolytic therapy is not to prevent preterm birth entirely, but to achieve short term prolongation of pregnancy which allow for:

- Administration of antenatal corticosteroids
- In-utero transfer to a higher center

Atosiban: Overview

Atosiban is a nonapeptide competitive vasopressin/oxytocin receptor antagonist administered intravenously as a tocolytic to halt preterm labor. It is one of only two drugs developed and registered for a pregnancy-specific condition since the 1950.¹⁰

Dosing and Pharmacokinetics: It is given as an initial IV bolus of 6.75 mg, followed by a high-dose infusion of 300 µg/min for 3 hours, then 100 µg/min for up to 45 hours. It has a low side-effect profile and, importantly, is not contraindicated in cardiac disease or diabetes—distinguishing it from beta-mimetics. Only a small proportion is excreted unchanged in the urine, indicating primarily non-renal elimination; dose adjustment is not required for renal impairment, though caution is advised in hepatic impairment.

Mechanism of Action

Atosiban acts by competitively blocking both Oxytocin and Vasopressin receptors in the myometrium. This blockade leads to

- Reduced intracellular calcium release
- Inhibition of uterine contractions

As a result, uterine activity is suppressed, promoting **uterine relaxation and delaying labor progress.**

Indications⁷

Atosiban is indicated to delay imminent pre-term birth in pregnant adult women with:

- Regular uterine contractions of at least 30 seconds duration at a rate of ≥ 4 per 30 minutes.
- A cervical dilation of 1 to 3 cm (0-3 for nulliparas) and effacement of $\geq 50\%$.
- A gestational age from 24 until 33 completed weeks.
- A normal fetal heart rate.

Comparison with Other Tocolytics

- Demonstrates similar effectiveness to nifedipine in delaying delivery.
- Associated with Fewer cardiovascular side effects than β -agonist
- Particularly useful in patients with underlying cardiac conditions

Advantages of Atosiban

- Act via a Targeted receptor-specific mechanism
- Minimal cardiovascular side effects
- Better tolerability
- Suitable in cardiac patients

Table 2: Key Points regarding Atosiban

Pharmacokinetics	Dosage	Adverse effects	Contraindications	Limitations
Drug Class: Oxytocin receptor antagonist Route of administration : Intravenous Primary use: suppression of preterm uterine contractions.	The Standard Atosiban regimen consists of three sequential steps: 1. Initial bolus: 6.75 mg IV over 1 minute 2. High-dose infusion: 300 µg/min for 3 hours 3. Maintenance infusion: 100 µg/min for up to 45 hours ² Maximum duration: 48 hours	Maternal side effects: • Hypersensitivity an injection site reaction. • Nausea, tachycardia, headache Fetal effects: • No major direct adverse effects reported	No absolute contraindications Not to be used in Gestational age below 24 or over 33 completed weeks Premature rupture of the membranes >30 weeks of gestation Any contraindication to prolong the pregnancy	Expensive IV administration only No proven long-term neonatal benefit Limited availability in some countries

Guideline Recommendations (Latest)

WHO (2021/updated recommendations)¹¹

- Tocolysis should be used **selectively** primarily to facilitate interventions such as corticosteroid administrations.
- No single agent has demonstrated clear superiority, selection should depend upon **availability, safety, and clinical context**.

RCOG / NICE (UK Practice)¹²

- **First-line options:**
 - o Nifedipine
 - o Atosiban
- Avoid β -agonists due to adverse effects.
- Tocolysis recommended only when delay of birth is beneficial.

Key Clinical Principle

- Tocolysis (including atosiban) is used for **short-term prolongation (≤ 48 hours)**
- Not recommended for maintenance therapy

Conclusion

Atosiban is an effective and well-tolerated option for the management of preterm labor. Its primary role is to provide short term suppression of uterine contractions, allowing time for interventions that improve neonatal outcomes, such as corticosteroids therapy. Current clinical guidelines support its use as a **first-line or alternative tocolytic agent**, based on individual patient's factor and resource availability.

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Journal Scan

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M. L.Hernández-Martínez, A.Molina-Rodríguez, M. Maes-Carballo, A.Bueno-Cavanillas, N.Cano-Ibáñez, and C.Amezcu-Prieto, "Clinical Practice Guidelines on Normal Labour and Childbirth: A Systematic Review," BJOG: An International Journal of Obstetrics & Gynaecology 133, no. 7 (2026): 1333–1339.

Introduction

As we are advancing towards more guidelines driven and objective way of labor management, low risk pregnancy has been medicalized more leading to increase in caesarean section rate around 21% according to a 2018 study. It has not led to reductions in maternal and foetal mortality or improvements in maternal and child health outcomes.

The above-mentioned caesarean section rates are well above the recommended range of 10%–15% to improve maternal or perinatal outcomes, although the lowest rates of maternal and neonatal mortality may occur at a caesarean section rate of around 19% as supported by other studies.

As the Lancet Maternal Series states, "every woman, every newborn everywhere has the right to good quality care". A recent systematic review by BJOG highlights the growing threat posed by poor- quality care and inequitable access. Across the globe, some women receive excellent care, but many experience extremes: too little, too late or too much, too soon. Both of them representing a maternal health care approach that is not grounded in evidence.

The global Obstetrics and Gynaecology organizations, including the World Health Organization (WHO), among others support physiological management to improve maternal and neonatal outcomes and have developed Clinical Practice Guidelines (CPGs).

A systematic review by BJOG published in 2026 throws light on evidence-based approach towards following normal physiological pattern without unnecessary medical or, surgical intervention. This systematic review aimed to analyse the quality and reporting of international CPGs on normal childbirth, and to describe the recommendations related to their care. This article summarizes the BJOG, 2026 systematic review highlighting the analyses of CPGs, its interpretation, implications & limitations.

Methodology

- **Study design:** Systematic review prospectively registered in PROSPERO (CRD42021269488) and conducted according to PRISMA 2020 guidelines.
- **Ethical approval:** Not required, as the review included only published clinical practice guidelines (CPGs).
- **Search period:** Initial search (2010–2021) with an updated search in December 2024.
- **Data sources:** Trip Database, Epistemonikos, PubMed (MEDLINE), Cochrane Library, Scopus, Web of Science, and official websites of professional organizations (e.g., WHO, NICE, SEGO, ICM, FIGO).
- **Eligibility criteria:** National and international CPGs on normal childbirth care published between 2010 and 2024. Studies such as RCTs, observational studies, reviews, expert opinions, reports, and guidelines published before 2010 were excluded.
- **Study selection:** Two independent reviewers screened and selected guidelines; disagreements were resolved by a third reviewer.
- **Data extraction:** Standardized form used to collect guideline characteristics and recommendations related to normal childbirth.
- **Quality assessment:** Methodological quality evaluated using the AGREE II (Appraisal of Guidelines for Research and Evaluation II) instrument (23 items across 6 domains). Guidelines classified as:
 - o >80%: Recommended
 - o 50–80%: Recommended with modifications
 - o <50%: Not recommended
- **Reporting assessment:** Reporting quality evaluated using the RIGHT (The Reporting Items for Practice Guidelines in Health Care) checklist (22 items across 7 domains). Guidelines classified as:
 - o >80%: Well-reported
 - o 50–80%: Moderately reported
 - o <50%: Infrequently reported
- **Statistical analysis:** Descriptive statistics (mean, SD, percentages) performed using Stata 16; inter-reviewer agreement assessed with the Intraclass Correlation Coefficient (ICC), with ICC > 0.90 indicating excellent reliability; $p < 0.05$ considered statistically significant.

- **Bias reduction:** Comprehensive search strategy, predefined inclusion/exclusion criteria, independent review, standardized appraisal tools, third-reviewer consensus, and predefined statistical analysis.

Results

▶ **Study Selection:** 6,908 citations identified out of which 25 Clinical Practice Guidelines (CPGs) included after screening.

Characteristics of Included CPGs

- 28% published within the last 5 years; 32% were >10 years old.
- Majority from Europe (40%) and America (36%).
- 72% originated from high-income countries.
- 48% were published in English.

Methodological Quality (AGREE II)

- Best-performing domains:
 - Scope & Purpose
 - Stakeholder Involvement
 - Clarity of Presentation
- Lowest-performing domain:
 - Applicability
- Only 3 CPGs (12%) were rated recommended (>80%).
- Identified as Excellent inter-reviewer agreement (ICC = 0.99).

Reporting Quality (RIGHT)

- Only 2 CPGs (WHO 2018 and NICE 2023) were well reported (>80%).
- 9 CPGs were moderately reported (50–80%).
- 14 CPGs had poor reporting (<50%).
- Identified as Excellent reviewer agreement (ICC = 0.99).

Recommendations Across CPGs

- Highest consensus for second-stage (expulsive phase) management.
- Acceptable agreement for first-stage (dilatation phase) care.
- Greater variability in maternal admission and newborn care recommendations.

Discussion

Overall, the reviewed CPGs for normal childbirth showed moderate to low methodological and reporting quality and the WHO recommendations on

intrapartum care for a positive childbirth experience scored highest across major domains (scope, stakeholder involvement, clarity, and evidence use).

These high-quality, evidence-based guidelines consistently recommended:

- Continuous support during labour.
- Avoidance of routine interventions (enema, perineal shaving, routine episiotomy, routine amniotomy).
- Maternal mobility and oral fluid intake.
- Appropriate pain management.
- Intermittent fetal monitoring in low-risk labour.
- Limited vaginal examinations.
- Spontaneous pushing.
- Immediate skin-to-skin contact.
- Delayed umbilical cord clamping.
- Oxytocin for management of the third stage of labour.

Some important differences did exist between some guidelines. For instance, the Japanese guideline did not recommend delayed cord clamping or active management of the third stage. Also, an American guideline recommended routine amniotomy in nulliparous women.

Several topics were inconsistently covered across all the CPGs, including:

- High-risk pregnancy management.
- Birthing tubs/water birth.
- Neonatal airway suctioning.
- Vitamin K administration.
- Timing of newborn hygiene/bathing.

Strengths of the review:

- Global coverage of guidelines.
- Inclusion of CPGs available in multiple languages without much difficulty in accessing the translation.
- Use of both AGREE II and RIGHT instruments.

Limitations:

- Potential subjectivity in assessment.
- Non-standardized quality cut-offs.
- Exclusion of some guidelines due to translation barriers.
- Inclusion of older guidelines (up to 14 years old).

Overall conclusion: Although core intrapartum care recommendations are largely consistent across high-

quality CPGs, there is a clear need to improve guideline quality, reporting standards, and comprehensiveness to ensure more reliable and universally applicable childbirth care recommendations.

Interpretation

This study argues that clinical practice guidelines (CPGs) for normal childbirth need major improvement, both in how they're written and how useful they are in real-world settings.

Ultimate interpretation of this review article can be summarized as below-

- 1. Many guidelines are outdated or poorly reported:** A large number of existing guidelines haven't been updated in years. Ideally, guidelines should be revised every 3–5 years, but many exceed this timeline. Important sections like how guidelines can actually be applied in practice or what research gaps exist are often weak or missing.
- 2. Newer doesn't always mean better:** Sometimes, older guidelines scored higher in quality than newer ones. For example, the WHO 2018 guideline performed better than some more recent national guidelines. This shows that quality depends more on how guidelines are developed, not just when.
- 3. What high-quality guidelines recommend:** The best-performing guidelines agree on several key practices for uncomplicated childbirth:
 - Allow a support person of the woman's choice
 - Avoid unnecessary interventions like enemas, shaving and routine episiotomy.
 - Encourage movement and flexible birthing positions, fluid intake and natural pushing when ready
 - Use intermittent fetal monitoring, not continuous by default.
 - Limit vaginal exams (at least 4 hours apart).

- Promote skin-to-skin contact immediately after birth and
- Allowing delayed cord clamping (after 1 minute) and use of oxytocin to help manage the delivery of placenta.

4. Benefits of following these guidelines if applied consistently:

- Higher rates of vaginal births
 - Lower rates of unnecessary C-sections
 - Better maternal satisfaction
 - More confidence among healthcare providers (less “defensive medicine” driven by fear of medicolegal issues)
- 5. Patient preferences matter:** Many women prefer less invasive care, personalized treatment and respect for their values and expectations. In this regard, social media also shapes expectations about childbirth experiences, which healthcare providers should consider (when medically safe).
- 6. The biggest challenge is implementation:** Even high-quality guidelines do not automatically change practice. They can take up to 20 years to be widely adopted. Main barriers identified were lack of awareness, resistance to change and system-level limitations.

Conclusion

Current clinical practice guidelines (CPGs) for normal childbirth are largely outdated and often lack strong quality and clear reporting. Important areas—such as women's comfort, use of birthing tubs, and immediate newborn care—are not well addressed. Because of these gaps, the existing recommendations are not reliable enough to draw firm conclusions. There is an urgent need to improve these guidelines so they are accurate, consistent, and up to date, ultimately supporting better care for both mothers and newborns.

EVENTS HELD UNDER AEGIS OF NARCHI

1. Public Forum on HPV Vaccination

Date: **9 April 2026**

Venue: **Tughlaqabad Extension Dispensary**

A public awareness forum on Human Papillomavirus (HPV) vaccination was organized to educate the community regarding its role in preventing HPV-related diseases, including cervical cancer. The session was attended by approximately 50–60 members of the local community. It facilitated improved awareness about HPV transmission, benefits of vaccination, and the importance of preventive healthcare.



2. Lecture on Gender-Neutral HPV Vaccination

Date: **22 April 2026 (World Immunization Week)**

Venue: **HIMSR**

A lecture on gender-neutral HPV vaccination was delivered as part of World Immunization Week celebrations. The session emphasized the importance of vaccinating both males and females to reduce the overall burden of HPV-related diseases. Approximately 120–150 undergraduate students attended the session. The lecture reinforced updated immunization strategies and encouraged future healthcare professionals to adopt inclusive vaccination practices.

3. Public Forum on Maternal Vaccination and HPV Vaccination

Date: **28 April 2026**

Venue: **Gynae OPD**

Organized by: NARCHI, Delhi in collaboration with Department of Obstetrics and Gynaecology, HIMSR. A public forum on maternal vaccination and Human Papillomavirus (HPV) vaccination was organized to mark World Immunization Week 2026. The session focused on the importance of maternal immunization in preventing adverse maternal and neonatal outcomes, as well as the role of HPV vaccination in reducing the burden of cervical cancer and other HPV-related diseases. It was attended by OPD staff patient presenting their attendants marking an attendance of approximately 50-80 people.



4. Public forum on vaccination in HAHC hospital, delhi was organised by department of OBG in association with NARCHI Delhi, ISCCP and ISAI on 29 April 2026



5. CME on vaccination was organised by dept of Obs and Gynae HIMSR in association with ISCCP NARCHI Delhi and ISAI ON 29/04/2026 from 2-4pm. Interactive session on maternal immunisation and HPV vaccination were taken. It was attended by 188 delegates.



6. Public Forum on HPV Vaccination

Date: 9 May 2026

Venue: Tughlaqabad Extension Dispensary

A public awareness forum on Human Papillomavirus (HPV) vaccination was organized to educate the community regarding its role in preventing HPV-related diseases, including cervical cancer. The session was attended by approximately 40–50 members of the local community. It facilitated improved awareness about HPV transmission, benefits of vaccination, and the importance of preventive healthcare.



7. Public forum was conducted today by Department of obstetrics and gynaecology under the aegis of NARCHI DELHI to celebrate World preeclampsia week and increase the awareness on effect of hypertension in pregnancy in Gynae OPD on 22/5/2026



8. NARCHI, Delhi and Institute of Critical care Medicine, SGRH successfully organized the 4th Obstetrical Emergencies and Critical Care Conference 2026 on 6th June 2026 at Sir Ganga Ram Hospital. It was attended by more than 100 delegates and faculty from the field of Obstetrics & Gynaecology and Critical care. The conference focused on managing Obstetrical emergencies with a very useful hands-on workshop. It was a very successful and well-organized conference for updating knowledge in this field.



9. Public Forum on HPV Vaccination and hypertension

Date: 9 June 2026

Venue: Tughlaqabad Extension Dispensary

A public awareness forum on Human Papillomavirus (HPV) vaccination and hypertension in pregnancy was organized to educate the community. The session was attended by approximately 40–50 members of the local community. It facilitated improved awareness about HPV transmission, benefits of vaccination, and the importance of preventive healthcare.



10. International yoga day celebrated under NARCHI, in department of OBG, HIMSR, NEW DELHI ON 21/06/2026. Attended by 30-40 doctors and paramedical staff promoting awareness of health and fitness.





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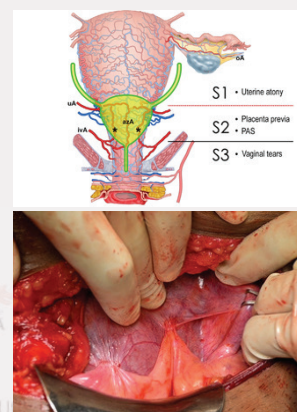
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Session 1: Foundations of Safe Obstetric Surgery	Session 2: Surgical Anatomy & Cesarean
Preoperative Assessment & Optimization Surgical Safety Checklist & Informed Consent Anaesthesia And ERAS Protocols in Obstetrics	Applied Surgical Anatomy: Abdominal + Vascular Cesarean Section: History & Trials
Session 3: Step By Step Cesareansection	Session 4: Safe Extraction
Evidence Based Cesarean Section: Layer Wise Approach to Dense Adhesion	Preterm Cesarean Instrumentation During Cesarean Malpresentation (Breech, Transverse Lie & Free Floating) Deeply Impacted Head
Session 5: Bleeding On Table	Session 6: Dealing With PAS
Hemostatic Sutures Stepwise Devascularization Internal Iliac Artery Ligation	Revising Anatomy & Surgical Staging Placenta Accreta: Approaches redefined
Session7: Hysterectomy	Session 8: Dealing With Visceral Injuries & Hematoma
Cesarean Hysterectomy Cesarean Myomectomy	Bladder Repair Bowel Repair Broad Ligament Hematoma
Session 9: Collapse	Session 10: Special Situations
Peripartum Collapse Perimortem Cesarean Section Death On OT Table: Medicolegal Implications	Cervical Cerclage Ectopic : Tubal, Cornual & Scar Ectopic Isthmocele
Session 11: Postoperative Care	Session 12: Operative Vaginal Delivery
Postoperative Care In Special Situation (Obesity, Diabetes, Hypertension, Thromboprophylaxis) Fluid Management	Forceps Delivery Vacuum Delivery Balloon Tamponade
Session 13: Difficult Situations in Vaginal Deliveries	Session 14
Breech Delivery: Shoulder Dystocia	Blood Loss Estimation Episiotomy Vulvovaginal Hematoma
Session 15: Oasis & Sepsis	Session 16: Miscellaneous
Obstetric Anal Sphincter Injury Laparotomy/ Laparoscopy in Puerperal Sepsis	
<u>Hands On Workshop:</u> Stepwise Devascularization, Hemostatic Sutures, Internal Iliac Artery Ligation, Instrumental Delivery Patwardhan Technique, Instrumentation during Cesarean, Extraction in Malpresentations, Breech Delivery, Shoulder Dystocia <u>Animal Tissue:</u> Cesarean Section, CPT Repair, Bladder Repair	

