

Normal vaginal birth: Enhancing Emergency Medical Technicians' Knowledge and Skills in Bangalore, India

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Abstract

Background: Maternal mortality remains a public health concern in India. Emergency medical services (EMS) provide critical, time-sensitive care, especially in emergencies such as trauma, cardiac arrest, and obstetric cases. In India, the role of Emergency Medical Technicians (EMTs) is crucial in pre-hospital care, yet many EMTs, particularly those trained at the basic level, lack the skills necessary to assist in normal vaginal births. This study aimed to assess the outcome of skills-based training on enhancing EMTs' knowledge and skills in assisting women in normal vaginal birth. **Methods:** A quasi-experimental one-group pre-test post-test design was used, involving 30 EMTs from selected ambulance services in Bangalore to assess outcome of skill-based training on assisting women in normal vaginal births using a knowledge questionnaire and an observation checklist on Assisting Women in Normal Vaginal Birth. The training program included a pre-test, interactive educational sessions, practical demonstrations, and

a post-test to evaluate improvements in knowledge and skill proficiency. **Results:** In the pre-test, 23.3% of EMTs had inadequate knowledge, and 76.6% had inadequate skills. Post-training, 80% achieved adequate knowledge, and 73.3% demonstrated moderate skills, with significant improvements in both knowledge ($t = 9.63$, $p = 0.01$) and skills ($t = 8.24$, $p = 0.01$). Significant associations were found between pre-test knowledge and skills and variables like education and prior obstetric experience of the EMTs. **Discussion:** The findings emphasize the effectiveness of targeted training in improving EMTs' proficiency in managing imminent normal vaginal births. Recommendations include periodic refresher courses and real-life training in labor rooms during EMT certification programs.

Keywords:

Emergency Medical Services, Emergency Medical Technicians, Ambulance, Prehospital Care, Normal Vaginal Birth, Skills training, Imminent labor

Date submitted: 8-October-2024

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BACKGROUND:

Maternal Mortality Rate (MMR) is a significant public health concern in India. According to the Sample Registration System (SRS) Report 2022, India's MMR reduced from 130 per 100,000 live

Citation: Mary Roy S, X S, Tarachand Jadhav S, K P, K N, and Thapa T. Normal vaginal birth: enhancing emergency medical technicians' knowledge and skills in Bangalore, India. *Educ Health* 2024;38:26-30

Online access: www.educationforhealthjournal.org

DOI: 10.62694/efh.2025.217

Published by The Network: Towards Unity for Health

births in 2014–16 to 97 per 100,000 live births in 2018–20. While this is a commendable improvement, it remains above the Sustainable Development Goal (SDG) target of 70 per 100,000 live births by 2030.¹ Among the various causes of

maternal mortality, postpartum hemorrhage (PPH) is the leading direct cause, contributing to approximately 25–30% of maternal deaths in India.² Additionally, transport-related delays account for about 20% of maternal deaths, highlighting the critical role of timely and efficient Emergency Medical Services (EMS) in maternal healthcare.³ Inadequate enroute care, such as the absence of trained paramedics, further jeopardizes the emergency care.

In India, ambulance services are a critical component of healthcare, providing time-sensitive emergency medical services (EMS) from on-scene care to transport and hospital handover. EMS plays a vital role in utilizing the “golden hour” to save lives during emergencies like trauma, cardiac arrest, and obstetric complications. Ambulances are equipped with life-saving devices such as ventilators, cardiac monitors, and medications, staffed by trained Emergency Medical Technicians (EMTs) capable of performing essential medical interventions during transit.⁴

In India, over 54,000 EMTs are employed in government-run 108 ambulances. In addition, there are several private ambulance service providers. The EMTs working in ambulances typically complete either basic or advanced certification programs following higher secondary education (12th Grade). Emergency Medical Technician—Basic is an entry-level training program comprising 544 hours spread over 7 to 8 weeks which includes 173 hours of Theory, 211 hours of practical and 160 hours of internship. This curriculum focuses on foundational emergency care skills with a scope limited to providing basic life support, and administering lifesaving medications under medical supervision via radio or phone. Obstetric care receives minimal emphasis, with only four hours each dedicated to theory and practical training. Conversely, the EMT—Advanced (EMT-A) involves more extensive training, requiring 750 hours of course work and internship. The EMT-A curriculum allocates five hours of theory and 10 hours of practical to managing obstetric and gynecological emergencies.^{4,5} Although the EMTs are provided sufficient training during their course, the curriculum does not include provisions for the EMTs to witness and assist in the care of a woman in labor in a hospital, which would provide them a real-life experience in assisting a woman in imminent labor.

Ambulance transport services for obstetric indications are extensively used in India. A newspaper report highlights that at least four babies are delivered every day in ambulances in Karnataka.⁴ Data from five Indian states (Andhra Pradesh, Assam, Gujarat, Karnataka and Meghalaya) showed that out of 1,684 women who called the emergency services for pregnancy-related issues, 44 women delivered in the ambulance, assisted by EMTs.⁷ This clearly indicates the need for skilled emergency technicians. The objective of this study was to assess the effectiveness of “Assisting Women in Normal Vaginal Birth” skills-based training on the knowledge and skills of emergency medical technicians.

METHOD:

This study employed a quasi-experimental one-group pre-test post-test design to evaluate the effectiveness of “Assisting Women in Normal Vaginal Birth” hands-on skills training on the knowledge and skills of Emergency Medical Technicians (EMTs). A knowledge questionnaire and an observation checklist on Assisting Women in Normal Vaginal Birth were developed based on a comprehensive review of relevant literature and consultation with subject experts.

The knowledge questionnaire had 30 questions focused on signs of imminent labor, the management of women during imminent labor, and immediate newborn care. The minimum score was zero and the maximum score was 30. The observation checklist was designed to assess the EMTs' skills in assisting women in normal vaginal births, including receiving the woman in labor, communicating with the health facility, adhering to Personal Protective Equipment (PPE) precautions, collecting relevant pregnancy history, conducting assessments, preparing for imminent birth, assisting in the birthing process, managing the third stage of labor, providing immediate care to the newborn (which included initial steps of newborn resuscitation), documenting the procedure, and handing over the woman and newborn to the healthcare facility. The minimum score was zero and the maximum score was 45. EMTs' knowledge and skills were classified as adequate if they scored above 75%, moderate if their score was between 50% and 75%, and inadequate if their score was below 50%.

The tools were assessed for content validity by eight experts in obstetric and gynecological nursing. The reliability of the tools was tested using split-half

method for the structured knowledge questionnaire ($r = 0.8$) and inter-rater reliability for the structured observation checklist ($r = 0.82$). Ethical clearance was obtained from the institution's ethical review board. Data collection took place from August to September 2021.

The study involved 30 EMTs working with selected ambulance services in Bangalore, chosen through a convenient sampling technique. The training was conducted in two batches of 15 EMTs each by a team of researchers, including three qualified nursing faculty members specializing in obstetric and gynecological nursing.

On the first day, a pre-test was administered to assess the EMTs' knowledge and skills in assisting women during normal vaginal births. All 15 EMTs completed a knowledge questionnaire within 30 minutes. The skill of the EMTs in managing a woman in imminent labor was assessed by individual practical demonstration using a mannequin, with one of the researchers observing and evaluating their performance using an observation checklist.

Following the pre-test, a brief review of the anatomy and physiology of the female reproductive system, pregnancy and labor, a didactic session focused on the role of EMTs in assisting women in normal labor was conducted using audio-visual aids like PowerPoint presentations, models, and videos. The researchers then demonstrated the steps involved in assisting women in imminent labor in the demonstration laboratory, after which the EMTs practiced the skills multiple times. Each practice session was supervised by the research team to ensure proper techniques. Post-test was conducted seven days after the training program to reassess the EMTs' knowledge and skills using the same tools.

RESULTS:

The majority of the EMTs were males (56.7%) aged between 23–27 years (53.3%) and were unmarried (76.7%). The basic educational qualification of 33.3% of the EMTs was higher secondary education (Class 12). 66.7% of the EMTs had completed the EMT (Advanced) course and had EMT experience between 6 months–1 year. The majority of the EMTs (80%) had no experience in assisting for normal vaginal birth in a hospital/health center.

In the pre-test, about 73.3% of the EMTs had moderate knowledge and 23.3% of them had inadequate knowledge, while in the post-test, 80 % of the EMTs had adequate knowledge, 20% had

moderate knowledge and none of them had inadequate knowledge on assisting women in normal vaginal birth. With regards to skill, a majority of the EMTs (76.6%) had inadequate skill in the pre-test while none had adequate skill whereas in the post-test, there was an enhanced skill i.e. 73.3% of the EMTs with the moderate skills, 20% of them had adequate skills. However, 6.7% of the EMTs exhibited inadequate skills in assisting women in normal vaginal birth. However, 6.7% of the EMTs exhibited inadequate skills in assisting women in normal vaginal births. Additional training was provided to the EMTs who had inadequate skills, which was outside the scope of this study.

There was significant improvement in knowledge ($P=0.01$) and skills ($p=0.01$) of EMTs in post-test (Table 2). There was a significant association between the pre-test level of knowledge on assisting women in normal vaginal birth and socio-demographic variables like Gender ($P=0.01$), Basic Educational Qualification ($P=0.01$) and Experience in Assisting Birth in a Hospital/Health center ($P=0.01$). There was a significant association between the pre-test level of skill on assisting women in normal vaginal birth and socio-demographic variables like basic educational qualification ($P=0.01$), experience in assisting birth in a hospital/health center ($P=0.01$), qualification to practice as an Emergency Medical Technician ($P=0.01$) and working experience as an EMT ($P=0.01$). Thus, it is evident that knowledge and skill of the EMTs in assisting in normal vaginal birth are influenced by their educational status and their experience in assisting women in normal vaginal birth.

DISCUSSION:

A robust EMS system in India with well-trained emergency medical technicians (EMTs) makes life-saving interventions available to the public and can serve an important role in driving forward Sustainable Development Goal (SDG) 3 to reduce maternal and neonatal mortality and morbidity.⁶

Consistent with other studies, the study found that the majority of the EMTs in India were males (56.7%) aged between 23–27 years (53.3%) and were unmarried (76.7%)¹⁰ most of the EMTs (33.3%) had completed their class¹², and while 66.7% had completed EMT Advanced program, only 20% of the EMTs had some experience in assisting women in normal vaginal birth. Before the skills-based training, 23.3% of the EMTs had inadequate knowledge and 76.7% lacked adequate

skills, with none demonstrating proficiency in assisting normal vaginal births. The findings align with a study conducted in Karnataka that identified significant gaps in EMT skills and in preparedness to handle emergencies.⁸

The study demonstrated significant improvement in the knowledge ($P=0.01$) and skills ($P=0.01$) of the EMTs after the skills-based training, highlighting the effectiveness of such programs. This aligns with evidence that on-the-job training enhances retention of knowledge and skills, thereby improving maternal and neonatal outcomes.^{7, 9, 11}

The World Health Organization emphasizes educational accreditation and continuing education as standard practice for prehospital systems. However, unlike High-Income-Countries, continuing education or recertification is not a routine requirement in Low- and Middle-Income Countries like India.

The EMT training curriculum in India is generic, broad and covers various emergency care areas. The researchers' communication with the EMTs revealed that even though a majority of them had experience of less than a year after completing their training, they had forgotten components of obstetric care. This could be due to a lack of real-life training and no refresher courses. Therefore, we recommend that the EMTs should receive refresher training on managing imminent labor at least once every six months to maintain proficiency.

The EMT training curricula includes theoretical components and demonstration of the skills. However, they do not get an opportunity to practice their skills in a real-life setting. We recommend the incorporation of a minimum of two weeks of hands-on clinical training in a labor room during EMT training to build confidence and skill proficiency in managing normal vaginal births. Furthermore,

given the magnitude of obstetric-related services being sought in India, we recommend the establishment of a specialized cadre of EMTs focused on emergency obstetric care to cater to the high demand for obstetric services.

The study was limited to EMTs employed by a private provider in Bangalore city. A future study that includes EMTs working in rural India is recommended.

CONCLUSION:

This study underscores the critical need for skill enhancement among Emergency Medical Technicians (EMTs) in managing obstetric emergencies, particularly imminent labor. The findings reveal that structured skills-based training programs can significantly improve EMTs' knowledge and skills in assisting women during normal vaginal births. Such training equips EMTs to provide timely and effective prehospital care, contributing to improved maternal and neonatal outcomes.

This research highlights the potential benefits of incorporating real-life obstetric exposure and regular refresher training into EMT curricula. The establishment of a specialized cadre of EMTs focusing on emergency obstetric care is recommended to address the growing demand for obstetric services in India, particularly in underserved areas.

Ultimately, a robust and well-trained Emergency Medical Services system is indispensable for achieving Sustainable Development Goal 3 by reducing maternal and neonatal mortality. Future research should focus on larger, multicenter studies to validate these findings and advocate for nationwide implementation of advanced EMT training in obstetric care.

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