

# The Impact of a Targeted Educational Intervention on Vaccine Vigilance Among Auxiliary Nurse Midwives: A Pre-Test/Post-Test Study

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## Abstract

**Objective:** To evaluate the effect of a structured awareness training program on the knowledge, attitude, and practices of Auxiliary Nurse Midwife (ANM) students regarding vaccine vigilance and Adverse Events Following Immunization (AEFI) monitoring. **Design:** A quantitative single-group pre-test/post-test interventional study. **Subjects/Patients:** A total of 150 ANM students from two nursing institutions participated in the study. **Methods:** Data were collected using a structured questionnaire assessing knowledge, attitude, and practice related to vaccine vigilance. The tool demonstrated good internal consistency (Cronbach's alpha: 0.785–0.854). A structured AEFI awareness training program was conducted between the pre-test and post-test assessments. Data analysis was performed using SPSS, employing descriptive statistics and paired sample t-tests. **Results:** Post-intervention analysis showed significant improvements in all domains. Mean knowledge scores increased from 5.51 to 10.97, attitude scores from 4.79 to 7.91, and practice scores from 4.31 to 8.82 ( $p < 0.001$ ). **Conclusion:** The structured training program significantly improved ANM students' knowledge, attitude, and practices toward AEFI monitoring, highlighting the importance of educational interventions in strengthening vaccine safety surveillance.

**Keywords:** Education; Inservice Training; Nurse Midwives; Pharmacovigilance; Vaccines effects.

## Introduction

Vaccine vigilance, the heart of the global pharmacovigilance system, is the one that guarantees the safety, quality, and acceptability of immunization programs. Administering vaccines to large populations, systematic monitoring of Adverse Events Following Immunization (AEFIs) is very important for detecting safety issues, maintaining transparency, and sustaining public trust in national immunization efforts <sup>[1,2]</sup>. A powerful AEFI surveillance system enables the rapid identification, evaluation, and control of rare or unexpected reactions, thereby ensuring the overall integrity of public health programs <sup>[3]</sup>. At the national level, countries like India have made it clear that they want to expand vaccine safety monitoring under the National AEFI Surveillance Program to ensure that the benefits of immunization are not outweighed by any associated risks<sup>[4]</sup>.

Auxiliary Nurse Midwives (ANMs) are integrated into the healthcare system as primary healthcare providers who play a key role in the successful operation of vaccination services in the community. They are located at sub-centres and primary health facilities, making them the first point of contact for beneficiaries and thus performing an essential function in identifying, recording, and reporting AEFIs <sup>[5]</sup>. Their active participation not only ensures swift

detection and response but also enhances the trustworthiness and alertness of the immunization safety system. Conversely, studies indicate that, although ANMs are crucial for immunization, their knowledge, confidence, and reporting practices regarding AEFI surveillance often have gaps <sup>[6,7]</sup>.

In light of these limitations, there is increasing demand for targeted educational measures to enhance healthcare professionals' skills in vaccine monitoring. Thus, this research aimed to assess the impact of a systematic awareness training program. The study was designed to evaluate whether such training would improve ANM students' ability to actively participate in AEFI reporting systems by changing their knowledge, attitudes, and practices.

## Methods

### Study Design and Setting

The researchers used a quantitative, single-group pre-test/post-test interventional design. The researchers were able to assess the impact of the awareness training program by comparing participants' pre- and post-intervention scores, thanks to this design.

The research was conducted at two nursing schools, Sri Jagadguru Balagangadharanatha Swamy College of Nursing

(SJBCON) and Global Institute of Nursing Sciences (GINS), from which the participants were selected.

### Participants

The study population included 150 Auxiliary Nurse Midwife (ANM) students from the collaborating institutions. The students' demographic and professional characteristics were documented before the intervention. Most participants were female, and many were 18–22 years old. Only a small percentage of the students were in the 23-25 age group. Regarding professional backgrounds, participants varied in their prior training on Adverse Events Following Immunization (AEFI). Just over half of the group had no prior AEFI training during the study, while the others had some experience. These characteristics enabled a clear depiction of the involved student cohort in the intervention.

### The Intervention

The intervention used a structured awareness training program to improve students' understanding of vaccine vigilance and AEFI reporting. The training was given after the pre-test and before the post-test. The program was intended to reinforce knowledge, promote positive attitudes, and develop practical skills related to immunization safety.

### Data Collection Instrument

The study used a structured questionnaire developed specifically for this purpose. The instrument was divided into four main parts: (1) consent and demographic information, (2) knowledge, (3) attitude, and (4) practice. Knowledge consisted of 11 items, attitude - 8 items, and practice - 9 items. The internal consistency of the instrument was evaluated using Cronbach's Alpha during both the pre-test and post-test phases. The strong reliability of all three domains was indicated by Cronbach's Alpha values that significantly exceeded the acceptable criterion of 0.70, confirming that the questionnaire reliably measured the intended constructs throughout the research.

### Data Analysis

The gathered information was analysed using SPSS (Statistical Package for the Social Sciences). Descriptive statistics, which are frequencies, percentages, means, and standard deviations, were used to provide a summary of the features of the participants and their scores before and after the tests. To determine whether the treatment produced meaningful changes, paired-samples t-tests were conducted for each area. As a result, this method helped compare average scores before and after the training program to raise awareness and provided statistical evidence of the program's effectiveness.

## Results

### Reliability of the Measurement Instrument

The internal consistency of the three domains of the questionnaire, namely Knowledge, Attitude, and Practice, was measured by the

Cronbach's Alpha coefficients. The reliability analysis was conducted separately for the pre-test and post-test to determine whether the items in each domain consistently measured their intended constructs. The table shows that all domains were rated as having good to excellent reliability, with alpha values above 0.70, which is the minimum accepted threshold. The Knowledge domain, which consisted of 11 items, had a pre-test alpha value of 0.785 and a post-test value of 0.821. The Attitude domain, containing 8 items, displayed even better internal consistency by producing coefficients of 0.810 and 0.854, respectively. The same was true for the Practice domain, which consisted of 9 items, with reliability values of 0.792 for the pre-test and 0.833 for the post-test. In conclusion, the questionnaire items consistently measured their respective constructs across the two testing periods (**Table I**).

### Participant Characteristics

The socio-demographic and professional characteristics of the 150 Auxiliary Nurse Midwives (ANMs) studied are presented in Table II. The sample was mainly composed of females; the majority (95.3%) of the participants were women, while (4.7%) were men. Most participants were 18 to 22 years old, and 6.7% were 23 to 25 years old. The distribution of participants across the two nursing institutions was similar: one-half of the ANMs were from SJBCON and the other half from GINS. Regarding prior training on Adverse Events Following Immunization (AEFI) reporting, the data showed a very close split. A slight majority (53.3%, n=80) reported not receiving any AEFI-related training before the intervention, whereas 46.7% (n=70) had some training. In summary, the Table shows a young, female-dominated group with equal representation across institutions and varying levels of training experience.

### Pre-Test vs. Post-Test Performance: Paired Samples Analysis

The awareness training program was evaluated using a paired-samples t-test, which showed significant changes in participants' knowledge, attitude, and practice scores. According to the results, mean scores in all three areas increased substantially from pretest to post-test, demonstrating the intervention's effectiveness. In the knowledge area, participants' scores increased substantially, rising from a pre-test mean of 5.51 (SD = 1.87) to a post-test mean of 10.97 (SD = 1.01). This improvement was very significant, as shown by the t-value of -25.10 with 149 degrees of freedom ( $p < 0.001$ ). The attitude scores had also improved remarkably, from a pre-test mean of 4.79 (SD = 1.95) to a post-test mean of 7.91 (SD = 0.45), with a mean difference of 3.12 points. This change was statistically significant ( $t(149) = -14.68$ ,  $p < 0.001$ ). Likewise, practice scores increased significantly by 4.51 points, from 4.31 (SD = 2.01) pre-training to 8.82 (SD = 0.52) post-training. The t-value of -20.25 ( $p < 0.001$ ) also confirmed the significance of this increase. The graph showed that in every area, the post-test columns were much taller than the pre-test columns, visually supporting the training program's effectiveness. Knowledge, in particular, showed the largest increase, followed by attitude and practice (**Figure 1**).

**Table I: Cronbach's Alpha Reliability Coefficients for Questionnaire Domains**

Domain	Number Items (k)	of	Cronbach's (Pre-Test)	Alpha	Cronbach's (Post-Test)	Alpha
Knowledge	11		0.785		0.821	
Attitude	8		0.810		0.854	
Practice	9		0.792		0.833	

**Table II. Frequency and Percentage Distribution of Participant Characteristics (N=150)**

Characteristic	Category	Frequency (n)	Percentage (%)
Age Group (Years)	18-22	140	93.3%
	23-25	10	6.7%

Gender	Female	143	95.3%
	Male	7	4.7%
Nursing Institute	SJBCON	75	50.0%
	GINS	75	50.0%
Received Specific Training on AEFI?	Yes	70	46.7%
	No	80	53.3%

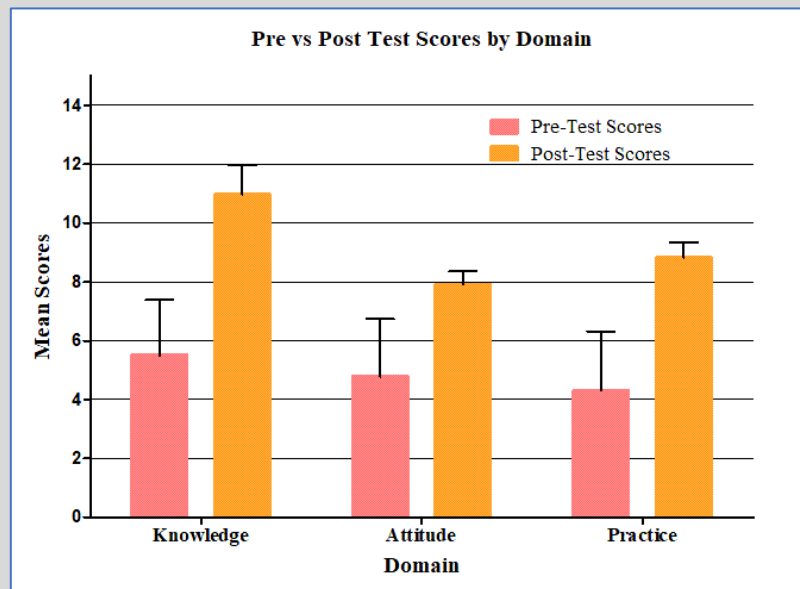


Fig. 1. Mean Pre-Test and Post-Test Scores by Domain

## Discussion

The findings of the present study indicated that the structured awareness training program had a positive overall impact on the knowledge, attitudes, and practices of ANM students regarding vaccine vigilance and AEFI reporting. The noticeable rise in post-test scores across all three areas clearly indicated that the participants gained a lot from the intervention. With an average increase of more than five points, knowledge scores were the highest, while attitude and practice scores also experienced significant developments. The study results above the knowledge and skills of health care workers in immunization safety, through the use of focused educational interventions. Training-related gains similar to those reported in our study have been noted in earlier studies in which focused instructional programs improved healthcare workers' understanding and reporting of vaccine-related adverse events [8,9]. Our study findings are consistent with these results, supporting the claim that structured, context-based learning greatly improves preparedness for surveillance activities.

Moreover, the reliability evaluation provided additional support for the data's robustness, as indicated by Cronbach's Alpha coefficients, which were above 0.70 across all domains in both the pre-test and post-test phases. This aligns with the instrument development literature, which advocates internal consistency as a major facilitator of measurement precision [10]. The reliability being consistent throughout both phases supported the view that the changes in the participants' knowledge and attitudes were real and not attributable to measurement error. The study sample was primarily young and female, with varying levels of prior AEFI training. The significant increase among participants with little or no prior training highlights the intervention's contribution to foundational skill-building.

The major differences between pre-test and post-test observed in this study are also consistent with trends in studies

conducted in similar settings. For instance, an intervention among nursing students in South India showed substantial gains in knowledge and reporting skills after an AEFI-specific training session [11], while another study among primary healthcare workers reported that their confidence and accuracy in AEFI identification increased after an educational workshop [12]. These similarities provide a strong basis for generalizing the present study's results, showing that methodological awareness programs have the same effect on improving vaccine monitoring skills across different healthcare training environments.

### Implications for Practice and Policy

The findings of this research have far-reaching repercussions for the formulation of the health sector's frontline practices and policies. The remarkable developments noted in the knowledge, attitudes, and practices of ANM students provide a strong basis for introducing compulsory, structured training on AEFI reporting as part of the curriculum for all nursing and paramedical courses. ANMs are frontline providers responsible for delivering immunizations and are thus indispensable for the early detection and documentation of AEFIs. Their training directly leads to a more alert and trustworthy vaccine safety monitoring system. The same conclusion has been drawn by earlier researchers, who pointed out the need for unified training modules to enhance the quality and timeliness of AEFI reporting [2,13].

At the policy level, making AEFI training a day-to-day practice for healthcare professionals would automatically upgrade the country's national vaccine safety monitoring efforts under the National AEFI Surveillance Program. The improvements in practice scores revealed by this study clearly indicate that such training has a dual effect: it increases knowledge and improves behaviour, which are the foundations of effective surveillance. Moreover, because healthcare professionals play a crucial role in sustaining public trust in vaccination campaigns, gradually improving AEFI reporting

skills will promote transparency and prompt action in the event of AEs, thereby strengthening trust in vaccination programs.

### **Strengths, Limitations, and Future Directions**

The research relied on several strengths, such as a structured, need-based training program for ANM students and strong internal consistency of measuring instruments, among others. The sample size was increased by including 150 participants from two institutions, and the paired pre-test/post-test design allowed a clear evaluation of changes attributable to the intervention. Nevertheless, these strengths highlighted a few limitations that must be recognized. The lack of a control group limits the ability to attribute the observed changes solely to the training, since external factors or natural maturation may have affected the subjects. Thus, future studies should use randomized controlled trials or comparison groups, which would provide stronger causal evidence. Furthermore, there is no follow-up study to track the sustainability of the initial knowledge, attitudes, and practices. It is a common practice to conduct follow-up studies of extended periods in future research to determine long-term retention and real-world applicability. The evaluation of practice behaviours using self-report questionnaires opens the door to social desirability bias despite the promise of confidentiality; hence, it is recommended that future studies include a mix of direct observations or audits of AEFI reporting records to improve accuracy. Moreover, the results of the study could be applicable only to certain populations in healthcare because the whole sample was made up of ANM students from two different universities. The effect of personal traits of the participants like age, clinical exposure, and prior vaccine training on the outcomes of the intervention was not assessed, hence, it is necessary to conduct subgroup analyses in future studies to find out the most advantageous groups and be able to provide more targeted educational strategies. Besides expanding the intervention to other healthcare workers, there is considerable potential in using advanced technologies or blended learning methods.

### **Conclusion**

The research provides solid evidence that the awareness training program not only improved ANM students' knowledge, attitudes, and practices regarding vaccine vigilance but also changed them to a considerable extent. All post-gain intervention areas were significant, and the use of a reliable assessment tool confirmed the effectiveness of the educational approach. These findings underscore the importance of organized training to upskill AEFI reporting competencies and enhance vaccine safety across the healthcare network.

### **Declarations**

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### **Conflict of Interest**

The authors declare no conflicts of interest related to this study.

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All authors contributed to the study conception, design, data collection, analysis, and manuscript preparation, and approved the final version.

### **Ethical Clearance**

Ethical approval for the study was obtained from the Institutional Ethics Committee of BGS Medical Institute of Medical Sciences. Written informed consent was obtained from all participants prior to data collection.

### **Trial Details**

This study was a single-group pre-test/post-test interventional study conducted among Auxiliary Nurse Midwife students. The trial was not registered, as it involved an educational intervention with no clinical risk to participants.

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