

Knowledge of Auxiliary Nurse Midwives on Immunization Safety: A Cross-Sectional Study in a Sub-Division of Purba Bardhaman District, West Bengal

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Abstract:

Introduction: Safe immunization is one of the prerequisites for successful routine immunization program. Awareness on various components of immunization safety among frontline health workers determines their practice. **Objectives:** This study was conducted to assess knowledge of Auxiliary Nurse Midwives (ANM) regarding various components of immunization safety and to determine association of their knowledge with some background characteristics (if any). **Method:** This cross-sectional study was conducted at four community development blocks of Sadar North sub-division of Purba Bardhaman district of West Bengal between June - September, 2017. All the 189 ANMs working in 107 sub-centres of these four blocks were interviewed for knowledge on various components of immunization safety with a pre-designed, structured, self-administered questionnaire. **Results:** Only 68 (36%) ANMs had adequate knowledge (score ≥ 33) combining all components on immunization safety. Chi-square test revealed that knowledge of ANM had statistically significant association with education level ($p = 0.00$) and last training status ($p = 0.00$). Education and last training status remained significant in binary logistic regression. **Conclusion:** Despite being trained, knowledge among ANMs regarding various components of immunization safety in the study area was still not satisfactory. Further emphasis on training and supportive supervision by local and district health authority is the need of the hour.

Key Words: Auxiliary Nurse Midwives, Immunization Safety, Knowledge

Introduction:

Immunization is one of the most cost effective public health interventions throughout the globe. Besides reducing morbidity and mortality from vaccine preventable diseases (VPD), it has contributed to improve the quality of life in the population.^[1] However, since vaccines are administered to healthy people, especially children, besides being potent and effective, safety issues must be ensured. Thus immunization safety is a priority concern worldwide since its inception. Immunization safety has been defined by World Health Organization (WHO) as the process of ensuring and monitoring the safety of all aspects of immunization, including vaccine quality, adverse

events, vaccine storage and handling, vaccine administration, disposal of sharps and management of waste.^[2]

In our country, immunization is mostly being implemented through the primary health care delivery system along with other essential services. Auxiliary Nurse Midwives (ANMs) are the main service providers for immunization at community level. ANMs play an important role in increasing coverage as well as quality of immunization. Thus assessment of their knowledge on immunization safety is absolutely essential and this will guide district health authority to emphasize training of health workers on certain areas. There are studies on awareness about immunization among parents or

mothers but very few studies among health care providers on knowledge of immunization safety. Particularly in West Bengal, this aspect has not yet been adequately explored. In this background present study was conducted to assess the prevailing knowledge of the ANMs regarding different components of immunization safety in a sub-division area of Purba Bardhaman district, West Bengal.

Objectives:

To assess knowledge of the ANMs regarding different components of immunization safety (vaccine handling, vaccine administration, immunization waste segregation and disposal and lastly adverse effects following immunization) in a sub-division area of Purba Bardhaman district, West Bengal.

Method:

This cross-sectional study was conducted at Sadar North sub-division of Purba Bardhaman district of West Bengal between June - September 2017. Four i.e., more than 50% of the total seven community development blocks of the sub-division (Burdwan I, Burdwan II, Bhatar and Galsi II) were selected by simple random sampling. All the ANMs working in 107 sub-centres of these four blocks (i.e. 189 ANMs) were included as study subjects by complete enumeration technique. ANMs were interviewed for knowledge on various components of immunization safety with a pretested, pre-designed, structured, self-administered questionnaire. Questionnaire was comprised of two sections - background characteristics of ANMs and components of immunization safety. Immunization safety was again subdivided into four sub-sections comprising its four components - vaccine handling, vaccine administration, immunization waste segregation and disposal and lastly Adverse Effects Following Immunization (AEFI). Each of these four subsections contained six questions. Major areas of question on different subsection were as follows:

Vaccine handling: vaccine carrier, freeze sensitive vaccines, diluents, duration of use of reconstituted vaccine, vaccine vial monitor, shake test

Vaccine administration: open vial policy, key messages of vaccination, minimum gap between live vaccines, contraindication and dose, route, site, age of administration of different vaccines.

Immunization wastes: segregation of AD syringe, wrapper, sharps, disposal of black and red bag wastes
AEFI: major AEFI, recording, reporting, nil reporting, monthly report, AEFI kit

During pretesting of the questionnaire, it was found that knowledge regarding dose, route, site and age of administration of different vaccines was correct among all participants. Hence, in the final analysis, these variables were excluded from scoring. Correct responses were given one mark and incorrect/no responses were given zero mark. Depending upon type of question final score of various sections were different. Maximum score for vaccine handling section was 12, for vaccine administration 15, for immunization waste disposal 6 and for AEFI 8; minimum score for each section were zero. Combining all sections, total maximum attainable score was 41. Analysing the responses, mean score of the ANMs were found to be 31.08 (standard deviation = 3.06); median score was 31 with interquartile range 29-33. With this information ANM with a score of ≥ 33 (75th percentile of the obtained score) was categorized as having adequate knowledge and < 33 was considered as having inadequate knowledge.

Data were collected after ethical approval from Institutional Ethics Committee of Burdwan Medical College and Hospital and permission from the district and respective block health authorities. Informed consent was obtained from each and every study subjects. Collected data were entered in MS Excel and were double checked for any erroneous entry. Collated data after checking were imported into SPSS software version 20, IBM, New York, USA. Data were organized and presented applying the principles of descriptive statistics in the form of tables and calculating percentages. Chi-square test was used to find out the statistical association between two categorical variables. A p-value of < 0.05 was

considered as statistically significant. Multivariate analysis was done by binary logistic regression.

Results:

Background characteristics:

A total one hundred and eighty nine ANMs working at all the sub-centres of the selected four blocks of Sadar North sub-division were interviewed; 106 of them were 1st ANMs and rest were 2nd ANMs. Majority (75.6%) of the ANMs were in the age group 31-50 years and half of the ANMs(50.3 %) were graduate and above. 3/4th of the ANMs had received last training on immunization within last 1 year.

Knowledge on components of immunization safety:

Vaccine handling:

This study revealed that almost all of the ANMs (96.8% and 96.3% respectively) had correct knowledge on use of vaccine carrier and time to use after reconstitution (within 4 hours). However, only half of the ANMs correctly knew three freeze sensitive vaccines and name and purpose of shake test. Diluent name of BCG, Measles and JE vaccine were known to only 68.8%, 23.8% and 7.9% respectively. 69.3% ANMs had correct knowledge on stages of VVM.

Vaccine administration:

In this study 86.2% of ANMs had correct knowledge regarding open vial policy. All ANMs had correct knowledge on checking of expiry date and VVM, writing of reconstitution time on vaccine vial, not to massage vaccination site and not to recap the

needle after vaccination. Contraindication to vaccination and minimum gap of 28 days between two live vaccines were known to 95.2% and 89.9% ANMs respectively.

Only 146 (77.2%) ANMs knew all four key messages of vaccination and 1st and 4th key messages were least known among them [Table 1]. Most of the ANMs had correct knowledge of dose, route, site and age of administration of different vaccines but 30 ANMs (15.9%) had incorrect knowledge on dose of BCG.

Immunization waste:

Many ANMs were deficient in knowledge on immunization waste segregation and disposal particularly in segregation of used syringe and disposal of red bag wastes as visible in the following spider diagram. [Figure 1]

Figure 1: Spider chart showing correct knowledge of ANMs regarding various aspects of immunization waste disposal (n =189)

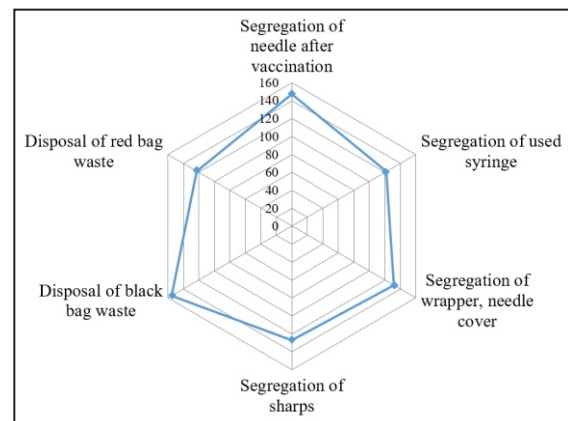


Table 1: Distribution of ANMs according to knowledge on key messages of vaccination (n = 189)

Key messages	Correct Knowledge
	Frequency (%)
Name of vaccine & disease prevented	167 (88.4)
Next date of vaccination	171 (90.5)
Minor side effects & their management	180 (95.2)
Keep immunization card safe & bring during next visit	169 (89.4)
All four messages	146 (77.2)

Table 2: Distribution of ANMs according to knowledge on components of AEFI (n =189).

Items/Components	Correct Knowledge
	Frequency (%)
Recording of AEFI in register	183 (96.8)
Reporting of AEFI	187 (98.9)
Nil reporting	61 (32.3)
Severe AEFI	145 (76.7)
Reporting related to AEFI in MIS	
Abscess	53 (28)
Death	52 (27.5)
Others	54 (28.6)
AEFI kit contents	3 (1.6)

Note: MIS - Management Information system (monthly reporting format)

Overall knowledge and association:

Combining all components, only 68 (36%) ANMs had adequate knowledge (score ≥ 33) on immunization safety [Table 3].

Table 3: Association between knowledge status and background characteristics of ANM (n = 189)

Variables	Knowledge		p value	Adjusted Odds Ratio	Confidence Interval
	Adequate (≥ 33) No (%)	Inadequate (< 33) No (%)			
Age (completed years)			0.09		
≤ 30	1 (100)	0 (0)		1	
31 – 40	21 (30)	49 (70)		0.0	
41 – 50	33 (45.2)	40 (54.8)		0.8	0.3 – 2.2
≥ 51	13 (28.9)	32 (71.1)		0.4	0.1 – 1.0
Education			0.001		
Madhyamik	18 (34)	35 (66)		1	
Higher secondary	4 (9.8)	37 (90.2)		2.4	1.1– 5.4
Graduate & above	46 (48.4)	49 (51.6)		9.1	2.6 – 31.8
Last training			0.00		
2014	3 (100)	0 (0)		1	
2015	22 (71)	9 (29)		0.0	
2016 (i.e within last 1 year)	43 (27.7)	112 (72.3)		0.1	0.03-0.3

AEFI:

Most of the ANMs were aware about the need of recording and reporting AEFI but only 61 (32.3%) of them knew about mandatory nil reporting. Approximately 1/4th ANMs knew what to report in sub-centre monthly report format. Only 3 ANMs had correct knowledge on AEFI kit contents. [Table 2]

Bivariate analysis using chi-square test revealed that knowledge of ANM had statistically significant association with education level ($p = 0.001$) and last training status ($p = 0.00$) but not with age ($p = 0.09$). Binary logistic regression between knowledge and age, education level and last training status revealed that education and training status were significantly associated. Model performed well as indicated by Omnibus chi-square test ($p = 0.00$) and Hosmer-Lemeshow test ($p = 0.72$). Here independent variables could explain 34% of variance in the dependent variable (Nagelkerke R^2).

Discussion:

Successful immunization can prevent many vaccine preventable diseases among children but its success depend on knowledge and skill of health workers who are vaccinating. The ages of the respondents ranged between 24 to 58 years with a mean age of 43.8 ± 7.2 . This showed that majority of the health workers in the study area were within productive age group.

In this study, half of the ANMs were graduate and above and 28% and 21.7% were educated up to madhyamik and higher secondary level respectively. Haldar et al^[3] in a study at Uttar Dinajpur of West Bengal found that 65.7% of ANMs were educated till higher secondary, 20% till graduation and 14.3% till secondary level. Ghosh and Chakrabarty^[4] found 53.6% ANMs had education till class X, 21.9% till higher secondary and 24.4% were graduate and above. This difference might be due to multiple reasons – opportunity of education/job, increasing female literacy level in the country^[5]; recruitment policy etc. Recruitment criteria for ANMs have also been changed over the years.

Present study revealed that all ANMs were trained which is better than findings of Ameen et al in Nigeria^[6] who had found only 64% health workers were trained on immunization. Moreover, 3/4th ANMs were last trained within 1 year. Therefore it was not surprising that a high proportion of ANMs had good knowledge on aspect of vaccine carrier, expiry date, reconstitution time writing on vaccine vial, open vial policy, no massaging of vaccination site and no recapping of needle after vaccination, contraindication to vaccination, appropriate dose, route, site and age of administration etc. This might be related with the fact that vaccine management topics such as vaccine carrier and handling and vaccine administration were often discussed in CME and training workshops on immunization service delivery.

Present study reported that only 69.3% ANMs had correct knowledge on stages of VVM which was similar to Chandigarh study^[7]. This study also showed that only half of the ANMs correctly knew three freeze sensitive vaccines and aware about shake test as a means to detect freeze sensitivity which was corroborating with 67.8% found by Ameen et al in Nigeria^[6]. Diluent name of BCG, Measles and JE vaccine were known to only 68.8%, 23.8% and 7.9% ANMs respectively in this study. There are four key messages of vaccination which are mandatory to be advised to caregiver. Present study revealed that 77.2% ANMs were aware about four key messages which was slightly better than Patel et al^[8] finding in Gujrat. This indicates proper intermittent reorientation training on VVM, shake test and key messages is required to ensure safe immunization.

This study revealed that knowledge among ANMs regarding AEFI was poor which is corroborating with the findings of a WHO and NIHFWS collaborative report in 2009 (53%)^[9]. This is one of the neglected areas of routine immunization and thus specific, focused training on AEFI is the need of the hour.

Present study had reported that knowledge level of ANMs had statistically significant association with

education ($p = 0.001$). Amrit Bairwa et al^[10] also found similar findings. It may be hypothesized that higher the education level, greater may be the knowledge of ANMs regarding immunization safety.

Current study revealed that training on routine immunization had statistically significant association with knowledge of the ANMs ($p=0.00$) contrary to Madhusudan Swarnakar et al^[11] findings of non-significant negative correlation with previous training. This might be postulated that regular training can have influence on knowledge level of the health workers.

Strength of this study lies in the fact that it was conducted in a subdivision area comprising all ANMs of the selected blocks and targeting all components of immunization safety. In spite of that, if ANMs of all seven blocks of the subdivision were interviewed that might give more comprehensive result.

Conclusion:

ANMs being the main service provider at the sub-centre level, their knowledge are very much pertinent for immunization safety. Despite being trained on immunization their knowledge regarding various components of immunization safety in the study area was still sub-optimal. Also, knowledge of ANM was statistically significantly associated with education level and last training status.

Recommendations:

There is need for periodic on the job training, retraining and supportive supervision by local and district health authority to improve knowledge among routine immunization service providers especially on AEFI, key messages, waste disposal.

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Declaration:

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Conflict of Interest: Nil

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