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A cross-sectional study to assess the awareness and practices related to adult immunization among nursing students in a metropolitan city

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Abstract:

INTRODUCTION: Immunization against vaccine-preventable diseases in adults is the need of the hour. The student nurses by virtue of training are the frontline health workers dealing with patient care. They are exposed to maximum risk of contracting the diseases. Vaccine awareness is not a part of their induction training program. It is necessary to plan preventive measure related to vaccination in their interest.

AIM: This study aims to assess awareness and practices of nursing students related to adult immunization.

MATERIALS AND METHODS: It is a cross-sectional study, conducted on nursing students of School of Nursing in Mumbai, over a period of 4 months. Universal sampling technique was used. Sample size was 271. A semi-structured interview schedule was used for data collection. Data were analyzed in Microsoft Excel.

RESULTS: The awareness about the vaccines was as follows: hepatitis B (98.1%), hepatitis A (72.3%), rabies (90.4%), H1N1 (74.9%), dT (52%), meningococcal (33.6%), human papillomavirus (49.8%), vaccines during pregnancy (88.2%), varicella (76.4%), typhoid (54.6%), cholera (52.8%), rubella (79.7%), travel vaccines (63.5%), Japanese encephalitis (69%), haemophilus influenzae b (40.9%), and pneumococcal (43.5%). About 87.8% of students have received TT at 10 years of age and 83% have received TT at 16 years of age. Hepatitis B vaccine was taken by 64.5%, out of which only 35% students received complete three doses. Majority of them could not answer the correct doses, availability, and cost of these vaccines.

CONCLUSIONS: The awareness and practices about adult immunization are found to be inadequate. Nurses should be appraised about theory and practical aspect of immunization as an immediate solution. Furthermore, considering the importance of this topic, the induction training program of nursing students should include awareness on adult immunization and emphasize their own vaccination. The annual health checkup of students should ensure the compliance of vaccines such as hepatitis B.

Keywords:

Adult vaccination, adult immunization, health-care workers, nursing education

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Introduction

Vaccinations have helped mankind conquer over dreadful diseases such as smallpox and polio and have been a powerful tool in fighting a range of

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communicable diseases. It is no surprise that childhood vaccination has remained the topmost priority for World Health Organization (WHO), UNICEF, and Government of India. However, over the years, we have lagged in effectively utilizing the same strategy for adults

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except the tetanus immunization in pregnancy. Adult immunization in India is one of the most ignored parts of health-care services.^[1] In spite of the availability of a wide basket of vaccines for effective control of diseases, adult vaccination has not yet received much attention.

There are 155.8 million clinical episodes of pneumonia globally, which contribute to approximately 1.9 million deaths, 70% of which occur in Africa and South-East Asian Region. Pneumococcal disease is also estimated to account for 3,000 cases of meningitis, 50,000 cases of bacteremia, 500,000 cases of pneumonia, and seven million cases of otitis media each year. Tetanus causes nearly 309,000 deaths worldwide annually. In India alone, the number of HBsAg carriers has been estimated to be over 40 million with 205,286 deaths related to chronic hepatitis.^[2]

The WHO Scientific Advisory Group of Experts (SAGE) to Global Programme for Vaccines and Immunization has indicated the need to expand immunization activities beyond infancy, either as part of routine immunization services, or as part of disease elimination and/or eradication measures.^[2] The recommendations of National Vaccine Advisory Committee, 2011 also states that there is need for increasing community demand for adult vaccination, education of health-care providers on immunization practices, and research related to public and health-care provider's knowledge, attitude, and practices related to adult immunization.^[3]

The immunization schedule for adults by the Expert Group Meeting and the Centres for Disease Control and Prevention Advisory Committee on Immunization Practices (CDC) guidelines 2012^[4] recommends one dose of seasonal influenza for all adults every year, one dose of Td for all adults every 10 years, one dose of pneumococcal vaccine for the people above age 65 years, three doses of human papillomavirus (HPV) and Hepatitis-B vaccine for all adults, one dose of meningococcal and two doses of Hepatitis A for high-risk individuals, two doses of MMR and varicella for all adults having no evidence of immunity. Apart from these, WHO recommends oral cholera vaccine in endemic areas for high-risk groups (children, pregnant female, and elderly). Influenza H1N1 vaccine is recommended by WHO SAGE for health-care workers and high-risk groups. Japanese encephalitis (JE) vaccine is recommended for children in endemic areas but not for adults. Two doses of Rubella vaccines for health-care workers in a setting of outbreak and for adolescent girls are recommended by WHO. Rabies vaccine is given as five doses of postexposure prophylaxis and four doses of preexposure prophylaxis (for high-risk group such as veterinary personnel, doctors, and dog catchers).^[2] Oral Polio Vaccine (OPV), hepatitis A, hepatitis B, typhoid,

varicella, JE, meningococcal, rabies, and yellow fever vaccines are recommended for international travelers.^[5]

The health-care professionals and workers are occupationally exposed to high risk of getting infections. In countries like India, where the burden of communicable diseases is already heavy, the risk is much higher. This is all the more true for nurses and nursing students who work in wards with the patients, day in and day out. They seem to hardly have any protection for themselves. What is alarming is that they are not even aware about utility, availability, and necessity of protecting themselves with immune prophylaxis. By virtue of being nurses, and most of the time, the first contact of patients with the health system, they are in better position to create awareness and increase utilization of vaccines by adults, elderly, and other high-risk groups who are at maximum risk of contracting the diseases. The nursing students become vulnerable to various morbidities by the time they complete their tenure. Furthermore, vaccine awareness is not a part of their induction training program. It is envisaged that creating such awareness and making it an integral part of their curriculum will go a long way in preventing significant morbidity among nursing students. The following study has been undertaken with the aim to assess the awareness and ascertain practices related to adult immunization among nursing students of School of Nursing of a metropolitan city.

Materials and Methods

The objectives of the present study are to study the sociodemographic profile of nursing students, to assess the awareness of nursing students about vaccines used in adult immunization, and to ascertain the immunization status of nursing students with respect to adulthood vaccines.

The research setting is a tertiary level teaching hospital with bed strength of 1800 beds. There is a nursing school affiliated to the institute with intake capacity of 100 students in each batch of GNM nursing diploma course. A cross-sectional descriptive study was undertaken using universal sampling technique. The study duration was 4 months. Nursing students of all three batches were included in the study. There were no exclusion criteria.

There were total 280 students in GNM nursing including 1st, 2nd, and 3rd year batch. By complete enumeration, the expected sample size was 280. Out of 280 students, nine did not participate in the study. Hence, the final sample size was 271, which was used for analysis.

Ethics committee approval was obtained from Institutional Ethics Committee of the same institute.

Furthermore, the administrative and other necessary permissions were obtained before data collection.

The nursing students of all three batches (1st, 2nd, and 3rd year of GNM Nursing) were interviewed during their off-duty time. Written informed consent was taken before the data collection. A validated semi-structured interview schedule was used, in which the details of their vaccination status and their awareness about adult vaccination were recorded. The data were entered and analyzed in Microsoft Excel. Descriptive statistics was used to calculate percentage.

Results

All 271 study participants were females. The mean age of the participants was 20.34 years (\pm standard deviation of 1.38). Majority of participants belonged to rural districts of Maharashtra; hence, modified BG Prasad socioeconomic scale (per capita income) with current price index 2016 was used.^[6] Participants who did not specify the income were 21% (57), 18.4% (50) belonged to upper class, 37.6% (102) belonged to upper middle class, 17.7% (48) belonged to middle class, 4.8% (13) belonged to lower middle class, and 0.3% (1) belonged to lower class.

Table 1 shows the percentage distribution of awareness of participants about adult vaccines, i.e., the percentage of participants who had heard of these vaccines.

About 87.8% (238) of students have received TT at 10 years of age. Eighty-three percent (225) have received TT at age 16 years. Nearly, 65.3% (177) of them received hepatitis B vaccine, out of which a mere 35% (95) students

received complete three doses. One hundred and seventy-five out of 271 have suffered from chickenpox in childhood (64.5%). Twenty-one individuals had history of dog bite in childhood, three of them could not recall about anti-rabies vaccination (ARV). They were directed to ARV OPD for getting the vaccine. About 5.1% students gave history of hepatitis A vaccination. The rate of cholera and typhoid vaccination was 2.9% and 5.9%, respectively. Figure 1 shows the percentage distribution of study participants actually received the vaccines which are recommended for health-care providers.

Majority of the study participants could not answer the correct doses, availability, and cost of these vaccines. Table 2 shows the percentage distribution of study participants who could answer the correct dose, availability, and cost of various vaccines.

Discussion

The present study was conducted at a tertiary level medical college hospital which is one of the apex institutes in India. Nursing school is affiliated to this institute. The hospital treats around 1.8 million outpatients and 85,000 inpatients annually and provides both basic and advanced treatment facilities in all fields of medicine, surgery, and super specialties. The institute receives patients of various ailments from Mumbai and elsewhere in India. Being a tertiary care center, there exists tremendous load of complicated and drug-resistant cases referred from peripheral health centers.

The student nurses are posted in wards, intensive care units (ICUs), and outpatient department during their curriculum. They are involved directly in the patient care. By virtue of their profession, they are exposed to a very high risk of developing infections including resistant ones. They are especially at high risk of occupational hazards such as hepatitis B, meningococcal meningitis, pneumococcal infections, tetanus, and H1N1 which are vaccine preventable. The vaccines are available, and some of them are available free of cost. The direct

Table 1: Awareness of vaccines used in adults

Distribution of awareness about the vaccines	
Name of vaccine	Number of participants heard about the vaccine (n=271), n (%)
Hepatitis B vaccine	266 (98.1)
H1N1 vaccine	203 (74.9)
Rubella vaccine	216 (79.7)
dT vaccine	141 (52.0)
Anti-rabies vaccine	245 (90.4)
Meningococcal vaccine	91 (33.6)
HPV vaccine	135 (49.8)
Hepatitis A vaccine	196 (72.3)
Pneumococcal vaccine	118 (43.5)
Varicella vaccine	207 (76.4)
Typhoid vaccine	148 (54.6)
Cholera vaccine	143 (52.8)
Vaccines for travellers	172 (63.5)
JE vaccine	187 (69.0)
Hib vaccine	111 (40.9)
Vaccines during pregnancy	239 (88.2)

dT=Diphtheria tetanus toxoid, HPV=Human papillomavirus, JE=Japanese encephalitis, Hib=Haemophilus influenzae b

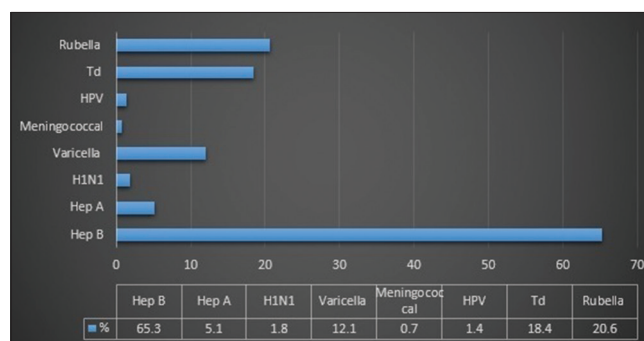


Figure 1: Vaccination status of respondents

Table 2: Awareness of correct doses, availability, and cost of vaccines (n=271)

	Hepatitis B	Hepatitis A	dT	Rabies	H1N1	Varicella	Meningococcal	HPV	Rubella
Awareness of correct doses, n (%)	110 (40.5)	6 (2.2)	28 (10.3)	79 (29.1)	23 (8.4)	7 (2.5)	8 (2.9)	1 (0.3)	14 (5.1)
Awareness about availability, n (%)	229 (84.5)	91 (33.5)	84 (31)	169 (62.3)	85 (31.3)	97 (35.7)	40 (14.7)	42 (15.4)	97 (35.7)
Awareness about cost, n (%)	225 (83)	82 (30.2)	81 (29.8)	151 (55.7)	78 (28.8)	88 (32.4)	44 (16.2)	45 (16.6)	86 (31.7)

HPV: Human papillomavirus, dT: Diphtheria Tetanus Toxoid

or indirect cost of occupational infections is way more than the efforts to prevent them. Hence, increasing awareness and practices of adult vaccination among nursing students is the need of the hour.

The CDC recommends hepatitis B, MMR, varicella, meningococcal, dT, influenza vaccines to health-care providers and hepatitis A, Polio and typhoid in case of handling of fecal material.^[7]

Hepatitis B virus (HBV) infection can lead to chronic liver disease and hepatocellular carcinoma. The risk of its transmission to a susceptible health-care worker through a single needle stick or cut exposure to HBV infected blood ranges from 6% to 30%.^[8] Although primary immunization achieves protective antibody levels, routine preexposure vaccination should be considered for high-risk groups including health-care workers.

Studies by Debbarma *et al.*^[9] and Raja'a *et al.*^[10] done on health-care providers including doctors and nurses have pointed toward suboptimal knowledge and practices of nurses about hepatitis B vaccine. In our study, around 98% participants were aware about hepatitis B vaccine but only 40% could tell its correct dose. In contrast to this, a study by Debbarma *et al.*, in Delhi, on health-care workers shows 18% of nurses having adequate awareness about hepatitis B vaccination.^[9] A study by Raja'a *et al.* on nursing students in Yemen showed practices of hepatitis B vaccination was only 12.1%.^[10] In our study, the practices of hepatitis B, i.e., coverage with all 3 doses was only 35%. A study done in Karnataka, India shows that the knowledge of nursing staff regarding hepatitis B vaccine is 100%, but practices of complete immunization is 63.3%.^[11] These findings are consistent with our study. A study done in Iran on nursing and midwifery students showed the practices of complete immunization against HBV was 72.3%.^[12] A study from Lahore, Pakistan shows hepatitis B vaccine coverage in nurses was 40.6%, and the main reasons for nonvaccination were high cost of vaccine and the belief of health-care workers that they are not at risk.^[13] A review article mentions that the WHO's estimate of hepatitis B vaccine coverage among health-care workers varies from as low as 18% in Africa to 77% in Australia.^[14]

The pandemic influenza A (H1N1) 2009 virus can cause rapidly progressive pneumonia. The world is now in

postpandemic period. In India, it causes local outbreaks. As per WHO advise, Indian Council of Medical Research and subject experts, Government of India recommends vaccination of high-risk groups with seasonal influenza vaccine. This includes health-care providers, medical and paramedical staff working in ICU, casualty, isolation wards, laboratories testing the virus, rapid response team members in outbreak setting, and even the driver of vehicle transferring the suspect. Furthermore, it is recommended to pregnant women (inactivated vaccine) and immunocompromised people. Influenza vaccine gives around 70%–80% protection, needs to be given at least two to 3 weeks before expected rise in cases and needs to be given annually.^[15]

In our study, the awareness of H1N1 vaccine is 74.9%, but only 1.8% of student nurses actually accepted the vaccine despite free supply of vaccine by the institution. In a study conducted on medical students in Latur, Maharashtra, practices of H1N1 vaccination were 12% in spite of 82.2% knowledge about availability of vaccine.^[16] In a study conducted in Greece on medical students, only 8% had been vaccinated.^[17] In a study done in China, vaccination rate among general population was found to be 10.8%.^[18] These studies show inadequate vaccination against H1N1 and are consistent with our study. In contrast to these studies, a study from AFMC Pune showed 82.6% health-care workers (97.7% nurses) were vaccinated against H1N1.^[19]

Young women are recommended vaccination against rubella.^[7] Rubella is a contagious viral disease. Although the disease is mild and self-limiting, it can lead to major consequences in the form of congenital rubella syndrome if acquired in 1st trimester of pregnancy. Vaccination is the only way to prevent all these complications. Serosurveillance of women needs to be continued, and an immunization policy needs to be developed for adolescent girls and/or women of childbearing age before conception to control CRS.^[20] The nursing students in the study are all in their young age, and it is advisable for them to get vaccinated against rubella.

In the present study, the awareness of rubella vaccine was 79.7%. However, only 20.6% gave the previous history of Rubella or MMR vaccination. A community-based study done in New Delhi, India on adolescent girls

revealed 17.83% were found to be seronegative for Rubella IgG where none of the individuals gave history of vaccination.^[21] Another study done in Saudi on medical and dental students showed 2.9% seronegative for Rubella antibodies.^[22] Indian Academy of Paediatrics recommends HPV vaccine before starting their sexual life, if they can afford it.^[7]

The participants in this study were frontline health-care workers, in their early twenties and exposed to urban lifestyle. The urban lifestyle and hostel life exposes them to the risks involved in eating outside food which translates to the risk of typhoid and hepatitis A. Hepatitis A, typhoid, and cholera are transmitted by fecal-oral route through contaminated food and water. Being in Mumbai, eating out and coming in contact with unhygienic food and unsafe water are part of life. Our study shows the vaccination rate against hepatitis A, typhoid, and cholera is 5.1%, 5.9%, and 2.9%, respectively, despite 72.3%, 54.6%, and 52.8% respective awareness. A study from Bangladesh on medical students revealed the awareness about hepatitis A vaccine was 6.4% and practices were nil.^[23]

Chicken pox is caused by varicella zoster virus and is highly communicable. The disease is mild self-limiting when occurs in childhood and one attack gives long-term immunity. This can be severe in adults. In the present study, 64.5% participants suffered from chicken pox in childhood and 12.1% gave history of immunization. The migratory population from nonendemic areas is more susceptible to varicella infection. Hence, all those having no evidence of immunity, i.e., unvaccinated and not exposed to infection in childhood should be vaccinated against varicella virus. CDC recommends varicella vaccination for all health-care providers considering their exposure status.

JE is a mosquito-borne zoonotic disease caused by Group B arbovirus. JE is endemic in different districts of 18 states in India. Vaccination for children against JE is included in routine immunization under universal immunization program in 113 districts in 15 states. Our study shows that 69% of participants are aware about JE vaccine. The awareness about the vaccine needs to be improved, as the city being a metropolitan city can have migrants or travelers from endemic areas.^[24]

Travel vaccines are recommended as per guidelines if they are traveling across borders or visiting fairs/festivals or hugely crowded religious places. Mumbai, being a financial capital of India, has frequent travelers from different part of the world by air or by sea route. Hence, knowledge about vaccination required for international travelers, especially yellow fever vaccination certificate for African countries, OPV vaccination certificate for

endemic countries like Pakistan, and meningococcal vaccination for Hajjis is expected in health-care providers. In our study, around 63.5% participants are aware about vaccines given to travelers.

Our study also provides knowledge status of nursing students about availability and cost of vaccines. This knowledge is also found to be inadequate.

There exists a gap between knowledge and practices of adult vaccination among the nursing students. This could be probably due to lack of detailed knowledge about vaccine-preventable diseases, lack of emphasize on this topic in curriculum, absence of dedicated adult vaccination center, or mere apathy on the part of participants who underestimate the risk of transmission. Doubt about vaccine efficacy and safety and lack of popularity of adult vaccination among general population could be other reasons. Low-cost consciousness, nonexposure to private sector, limited availability of vaccines in public sector, and lack of separate immunization OPD could be some other reasons for poor uptake. Sensitization about vaccine-preventable diseases and establishment of adult vaccination center may help in increasing acceptance of vaccination among nursing students.

Conclusions

The awareness and practices about adult immunization are found to be inadequate. Vaccination can prevent the disease and its transmission and can reduce its severity. It is therefore necessary to emphasize vaccination along with education on personal hygiene, hand hygiene, sanitation, respiratory etiquettes, use of personal protective measures, and universal precautions against communicable diseases.

Nurses should be appraised about theory and practical aspect of immunization as an immediate solution. Furthermore, considering the importance of this topic, the induction training program of students should include awareness on adult immunization and emphasize their own vaccination. The annual health checkup of students should ensure the compliance of vaccines such as hepatitis B.

The hospital can help strengthen the infrastructure for adult immunization by starting dedicated adult immunization OPD where the services can be provided to health-care workers and general population. This will also help to create awareness of adult immunization in general population. This will increase the community demand. The increased demand and subsequent increase in supply will help to reduce the cost of vaccines.

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Conflicts of interest

There are no conflicts of interest.

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