Volume 3, Issue 1

Original Research Article

KNOWLEDGE, ATTITUDES, AND PRACTICES OF POSTGRADUATE MEDICAL INTERNS AND RESIDENTS OF CEBU DOCTORS UNIVERSITY HOSPITAL ON ADULT ROUTINE VACCINATION: A CROSS-SECTIONAL STUDY

Algeo Andrew E. Olmilla, Psalm S. Elaco, Edward G. Fiel Jr., Vianca Louise H. Garcia, Trini Laura S. Javellana, Anthony Omar O. Martinez, Ashley M. Mejias, Gian Marrsen C. Noel, Frederick F. Sarmen Jr., Bryan Albert Lim

College of Medicine, Cebu Doctors' University

Article History
Date Submitted: June 18, 2024
Date Accepted: September 17, 2024
Date Published: December 18, 2024

Corresponding Author: Algeo Andrew E. Olmilla, College of Medicine, Cebu Doctors' University, Mandaue City, Cebu, Philippines

Abstract: Adult routine vaccination has been largely overlooked in the Philippines where immunization policies primarily focus on infants and children. It is crucial to recognize that concrete policies targeting adult routine vaccination are equally important. This study aims to assess the level of knowledge, attitudes, and practices of postgraduate medical interns and residents of Cebu Doctors University Hospital regarding routine adult vaccination. An observational cross-sectional study was conducted at Cebu Doctors University Hospital involving 94 participants—48 postgraduate medical interns and 46 medical residents from the departments of Internal Medicine, Pediatrics, Obstetrics and Gynecology, and Surgery. A researcher-developed questionnaire titled Adult Routine Vaccination was used for data collection. Most respondents were aged 25–29 years (69, 73.4%), female (58, 61.7%), unmarried (83, 88.3%), and taught utilizing the Problem-Based Learning (PBL) strategy (74, 78.7%). Good knowledge scores were observed among those aged 30–34 years (12, 54.5%), males (21, 58.3%), and medical residents (25, 54.3%). Negative attitudes were more common among participants aged 30–34 years (13, 59.1%), females (33, 56.9%), those taught utilizing a traditional curriculum (7, 63.6%), and medical residents (25, 54.3%). Poor vaccination practices were found among those aged 30–34 years (14, 63.6%), married (7, 63.6%), taught utilizing a traditional curriculum (7, 63.6%), and medical residents (27, 58.7%). Overall, while respondents taught utilizing the PBL strategy demonstrated good knowledge, they also exhibited negative attitudes and poor vaccination practices. These findings highlight the need for targeted educational and policy interventions to enhance attitudes and practices regarding adult routine vaccination.

Keywords: Adult routine vaccination, KAP on adult vaccination, postgraduate interns and residents KAP on vaccination

I. INTRODUCTION

Adult routine vaccination plays a crucial role in safeguarding public health by preventing a resurgence of vaccine-preventable diseases and achieving herd immunity. Historically, the focus was on childhood immunizations, resulting in underrecognized benefits of adult vaccination (Antonelli-Incalzi et al., 2021).

To address the gap, adult vaccination programs were created to protect against various infectious diseases, reduce overall disease burden, and enhance public health preparedness, particularly during pandemics. The number of adults who died from vaccine-preventable disease is higher than deaths in children (Laupeze et al., 2021). In the Philippines, persistent vaccine-preventable diseases and inconsistent adult vaccination coverage (60-79%) underscore the need for robust vaccination programs (World Health Organization [WHO], n.d.).

Significant knowledge gaps exist among healthcare professionals, impacting patient adherence to vaccination schedules (Abdulla et al., 2020;Panaligan et al., 2023).

Assessing the knowledge, attitudes, and practices of postgraduate interns and residents is crucial in improving adult vaccination efforts (Bulut et al., 2022). In this study, knowledge, attitudes, and practices towards adult routine vaccination pertain to understanding, perceptions, and actions related to adult vaccination. Specifically, knowledge includes their awareness of the importance, efficacy, types, and recommended schedules of adult vaccinations. Attitudes refer to their opinions, beliefs, and feelings, including their acceptance, trust, or skepticism toward vaccinations. Practices involve their actual behaviors, such as adherence to the most updated vaccination guidelines, vaccine administration, and engaging in promoting and supporting adult vaccination programs (Baig et al., 2020).

II. METHODOLOGY

This study utilized a cross-sectional research design to determine the knowledge, attitudes, and practices of postgraduate interns (PGIs) and residents under training for internal medicine, surgery, pediatrics, and obstetrics and gynecology in Cebu Doctors University Hospital (CDUH) regarding adult routine vaccination. The respondents for the study were gathered using complete enumeration.

In total, 94 respondents, consisting of 46 medical interns and 48 residents, were included in the study following a complete enumeration (census) of all eligible individuals. A comprehensive, up-to-date list of interns and residents meeting the inclusion criteria served as the sampling frame, ensuring that every individual was accounted for without discrimination based on age, gender, or years of medical experience. The inclusion criteria specified that eligible participants were postgraduate interns and medical residents actively present, physically available, or on schedule at Cebu Doctors University Hospital during the data collection period. Only residents under training for internal medicine, surgery, pediatrics, or obstetrics and gynecology, and willing to participate were included. Exclusion criteria removed participants preoccupied with a case or patient, those unable to be present due to illness or unanticipated circumstances, or those who declined participation. Out of 103 eligible individuals, the final response rate was 91.3%, with 94 respondents included in the final data analysis. No vulnerable groups were involved in this study.

The Adult Routine Vaccination questionnaire, a researcher-made questionnaire to determine knowledge, attitudes and practices regarding adult routine vaccination, underwent pilot testing at Chong Hua Hospital. Written permission to conduct the pilot testing was granted by the medical director of Chong Hua Hospital. The questionnaire was divided into three scales: Knowledge (30 items), Attitude (14 items), and Practice (14 items). It demonstrated acceptable reliability, with Cronbach's alpha values of 0.72 for both the Knowledge and Attitude scales, and 0.73 for the Practice scale. Items with a low alpha coefficient below 0.70 were removed to improve the reliability of the questionnaire.

For the 30-item Knowledge scale, each correct answer received 1 point and a 0 mark for an incorrect answer. The sum of scores indicated Poor (0–14), Moderate (15–22), or Good (23–30) knowledge based on Baig et al. (2020). Those with Poor Knowledge (<50%) had limited understanding of adult vaccination, including the timing, safety, contraindications, and necessity of vaccines, indicating insufficient familiarity with guidelines. Those with Moderate Knowledge (50–75%) reflected a fair grasp of key aspects like the importance of vaccines for diseases such as influenza and hepatitis but there are areas where understanding is incomplete, unclear, or inaccurate. Participants with Good

Knowledge (> 75%) demonstrated a comprehensive understanding of vaccination schedules, safety protocols, and the benefits of vaccines, and strong familiarity with guidelines for different adult populations, including those with chronic conditions.

The 14-item Attitude Scale used a 5-point Likert scale, with reverse coding applied to items 6, 10, and 13. Scores ≥ 22 indicate a negative attitude, reflecting skepticism or a lack of confidence in the safety, efficacy, and necessity of vaccines. This includes belief in vaccine myths or the view that vaccines are unnecessary for healthy individuals, which may affect willingness to recommend or administer vaccines. Conversely, scores less than 22 indicate a positive attitude, manifesting trust in vaccine benefits and safety, confidence in communicating their importance, and proactive support for routine vaccination in adult healthcare.

The 14-item Practice Scale also used a 5-point Likert scale, with reverse coding applied to items 11, 13, and 15. Scores ≥ 24.5 indicate poor adult routine vaccination practices, characterized by rarely recommending, administering, or discussing vaccines, and showing limited engagements in vaccination promotion. In contrast, scores less than 24.4 indicate good adult routine vaccination practices, marked by consistent vaccine recommendations, administration, addressing misconceptions, and active engagement in immunization discussions.

The Cebu Doctors' University (CDU) Institutional Ethics Review Committee (IERC) granted approval to implement the study. A transmittal letter was then addressed to the Director of Medical Education at Cebu Doctors University Hospital, the Dean of Cebu Doctors' University College of Medicine (CDU-CM), and the Associate Dean for Medical Education and Research of CDU-CM for approval of study implementation.

Data collection was done over two weeks, using physical questionnaires and an online Google Forms backup. Respondents provided informed consent, and physical questionnaires ensured inclusivity. To maintain privacy and confidentiality, no identifying information was collected, and data were securely stored.

The online survey also ensured anonymity of respondents by not recording email or IP addresses. The research adhered to ethical standards validated by the CDU IERC. The study utilized descriptive statistical tests to analyze the collected data according to its objectives. Frequencies and proportions determined the sociodemographic profile and assessed the knowledge, attitude, and practices of CDUH postgraduate interns and residents regarding adult routine vaccination. Results were presented in frequency distribution and contingency tables. Data processing and analysis were performed using IBM Statistical Package for the Social Sciences version 23.

III. RESULTS AND DISCUSSION

Table 1. Sociodemographic Profile of Postgraduate Interns and Residents of Cebu Doctors University Hospital (N = 94)

Sociodemographic Profile		*f*	%
Age	25–29 years old	69	73.4
	30–34 years old	22	23.4
	35–39 years old	2	2.1
	40–44 years old	0	0.0
	45 years old and above	1	1.1
Sex	Male	36	38.3
	Female	58	61.7
Marital Status	Married	11	11.7
	Unmarried	83	88.3
Medical Education	Traditional	11	11.7
	Problem-Based Learning	74	78.7
	Hybrid	9	9.6

Table 1 shows that the majority of respondents fell under the age bracket of 25–29 years (*69, 73.4%*), with 22 (*23.4%*) in the 30–34 age bracket, 2 (*2.1%*) in the 35–39 age bracket, and only 1 (*1.1%*) in the 45 years and above age bracket. Females (58, *61.7%*) consisted of greater numbers compared with males (36, *38.3%*), reflecting their growing presence in the medical field. A large portion of them were unmarried (83, *88.3%*) while only 11 (*11.7%*) were married.

In terms of medical education, most of the respondents graduated from a medical school that utilized the Problem-Based Learning strategy (*74, 78.7%*), followed by Traditional Learning strategy (*11, 11.7%*), and Hybrid Learning strategy (*9, 9.6%*). This suggests that an interactive teaching-learning strategy influenced their medical education, particularly in areas like adult vaccination.

Table 2. Training Level and Residency Specialty of Postgraduate Interns and Residents of Cebu Doctors University Hospital (N = 94)

Sociodemographic Profile		*f*	%
Training Level	Postgraduate Intern	48	51.1
	Resident	46	48.9
Residency Specialty	Internal Medicine	20	43.5
	Surgery	8	17.4
	Pediatrics	6	13.0
	Obstetrics and Gynecology	12	26.1

Table 2 shows that majority of the respondents were postgraduate interns (*48, 51.1%*), while the remaining 46 (*48.9%)* were residents. Among the residents, the majority were specializing in Internal Medicine (*20, 43.5%*), followed by Obstetrics and Gynecology (*12, 26.1%*), Surgery (*8, 17.4%*), and Pediatrics (*6, 13.0%*).

Table 3. Level of Knowledge about, Attitudes towards, and Practices regarding Adult Routine Vaccination among CDUH Postgraduate Interns (n = 48)

Knowledge about Adult Routine Vaccination	***f***	**%**
Good	25	52.1
Moderate	23	47.9
Poor	0	0
Attitudes towards Adult Routine Vaccination		
Positive	24	50.0
Negative	24	50.0
Practices regarding Adult Routine Vaccination		
Good	28	58.3
Poor	20	41.7

Table 3 shows that more than half of the CDUH postgraduate interns had a good level of knowledge about adult routine vaccination (25, 52.1%), while 23 (47.9%) of them had moderate knowledge. Meanwhile, none of them had poor knowledge about adult routine vaccination. This implies that the majority of postgraduate interns have a strong grasp of information about adult vaccinations whereas the rest have reasonable knowledge.

Half of the CDUH postgraduate interns had a positive attitude towards adult routine vaccination (24, 50.0%), and the other half had a negative attitude (24, 50.0%). This implies that despite the majority of respondents having good knowledge and good practices, this was not shown to uniformly translate to the majority reporting positive attitudes.

This discrepancy points to the need for interventions that not only enhance knowledge and practices but also address the underlying factors affecting attitudes. By doing so, it may be possible to foster more uniformly positive attitudes towards adult routine vaccinations among CDUH postgraduate interns.

More than half of the CDUH postgraduate interns had good practices regarding adult routine vaccination (28, 58.3%), while 20 (41.7%) of them had poor practices. This suggests that more than half of the interns are adhering to recommended vaccination practices, which is in line with data on knowledge of the same participants. These findings highlight the importance of maintaining and further enhancing the educational initiatives and training programs that contribute to good knowledge and practices observed among the majority of PGIs.

By continuing to support these areas, it is possible to ensure that a higher percentage of interns adhere to best practices in adult routine vaccinations. The study defined knowledge as information on the importance, efficacy, types, and schedules of adult vaccinations. Most postgraduate interns and residents exhibited good knowledge and none showed poor knowledge. The high knowledge levels among postgraduate interns are likely due to active learning experiences and mentorship from senior staff.

Table 4. Level of Knowledge about, Attitudes towards, and Practices regarding Adult Routine Vaccination among CDUH Residents

Specialty	Knowledge (*f*, %)			Attitudes (*f*, %)			Practices (*f*, %)		
	Good	Moderate	Total	Positive	Negative	Total	Good	Poor	Total
Internal Medicine	7, 35.0%	13, 65.0%	20, 100.0%	6, 30.0%	14, 70.0%	20, 100.0%	7, 35.0%	13, 65.0%	20, 100.0%
Surgery	6, 75.0%	2, 25.0%	8, 100.0%	5, 62.5%	3, 37.5%	8, 100.0%	5, 62.5%	3, 37.5%	8, 100.0%
Pediatrics	3, 50.0%	3, 50.0%	6, 100.0%	6, 100.0%	0, 0.0%	6, 100.0%	3, 50.0%	3, 50.0%	6, 100.0%
Obstetrics and Gynecology	9, 75.0%	3, 25.0%	12, 100.0%	4, 33.3%	8, 66.7%	12, 100.0%	4, 33.3%	8, 66.7%	12, 100.0%
Total	**25, 54.3%**	**21, 45.7%**	**46, 100.0%**	**21, 45.7%**	**25, 54.3%**	**46, 100.0.%**	**19, 41.3%**	**27, 58.7%**	**46, 100.0%**

As shown in Table 4, the CDUH residents had a good level of knowledge about adult routine vaccinations (25, 54.3%), while 21 (45.7%) of them had moderate knowledge. Meanwhile, none of them had poor knowledge about adult routine vaccinations. This distribution suggests that the majority of CDUH residents possess a solid understanding of adult routine vaccinations, which is encouraging for ensuring competent patient care and public health management. For Obstetrics and Gynecology residents, their training programs and educational initiatives significantly enhance their knowledge. Similarly, Surgery residents benefit from their comprehensive training programs, which emphasize critical aspects of patient care, including adult immunization (Lim et al., 2023).

Internal Medicine residents showed moderate knowledge about adult routine vaccinations, including Influenza, pneumococcal, Tdap, Hepatitis B, Shingles, HPV, and COVID-19. Out of 17 routine vaccines, their training program emphasized only seven (Whitaker et al., 2015). Knowledge gaps existed in vaccine efficacy, side effects, and fears.

A slightly higher percentage of residents specializing in Obstetrics and Gynecology (9, 75.0%) and Surgery (6, 75.0%) had good knowledge about adult routine vaccinations. Majority of the residents in Internal Medicine (13, 65.0%) showed moderate knowledge about adult routine vaccination. This supported the claims of Cason & Williams (2021) where Internal Medicine residents were only exposed to specific vaccines, thus showing limited knowledge about other adult routine vaccinations. The result supported the study of Panaligan et al. (2023) that showed that knowledge about adult immunization may be more tailor-fitted depending on the specialty of the residents. This implies that residents may become more familiar with their chosen specialty, thus knowledge gaps may be existent in between specialties.

A larger proportion of CDUH residents had a negative attitude (25, 54.3%), while 21 (45.7%) of them had a positive attitude. This indicates a majority exhibiting negativity towards adult routine vaccinations among the residents. More residents specializing in Pediatrics had a positive attitude towards adult routine vaccinations (6, 100.0%) while a majority of residents specializing in Surgery had a positive attitude (5, 62.5%). Meanwhile, the majority of the residents specializing in Internal Medicine (14, 70.0%) and Obstetrics and Gynecology (8, 66.7%) had a negative attitude.

These findings suggest that while some specialties, such as Pediatrics and Surgery, have residents who are more supportive of adult routine vaccinations, there is a significant portion of residents in other specialties, like Internal Medicine and Obstetrics and Gynecology, who hold negative attitudes. This disparity indicates a need for targeted educational initiatives to address and improve attitudes towards adult routine vaccinations, particularly within specialties that demonstrate higher levels of negativity.

A higher percentage of CDUH residents had poor practices regarding adult routine vaccinations, with 27 residents (58.7%) exhibiting poor practices compared to 19 residents (41.3%) who demonstrated good practices as seen in Table 4. Residents specializing in Surgery at CDUH showed better practices regarding adult routine vaccinations, with 5 residents (62.5%) demonstrating good practices.

This suggests that more than half of the residents are not adhering to recommended vaccination practices. This could imply that certain specializations, like Surgery, may have more stringent adherence to vaccination protocols or place a higher emphasis on the importance of vaccinations in their training and practice. It highlights a need for targeted interventions to improve vaccination practices among CDUH residents, particularly those outside of Surgery, to ensure higher adherence to adult routine vaccination guidelines.

Table 5. Knowledge about, Attitudes towards, and Practices regarding Adult Routine Vaccination across the Sociodemographic Profile of CDUH Postgraduate Interns and Residents (N = 94)

Sociodemographic Profile		Knowledge (*f*, %)		Attitudes (*f*, %)		Practices (*f*, %)	
		Good	Moderate	Positive	Negative	Good	Poor
Age	25–29 years old	37, 53.6%	32, 46.4%	35, 50.7%	34, 49.3%	37, 53.6%	32, 46.4%
	30–34 years old	12, 54.5%	10, 45.5%	9, 40.9%	13, 59.1%	8, 36.4%	14, 63.6%
	35–39 years old	1, 50.0%	1, 50.0%	0, 0.0%	2, 100.0%	1, 50.0%	1, 50.0%
	40–44 years old	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%
	45 years old and above	0, 0.0%	1, 100.0%	1, 100.0%	0, 0.0%	1, 100.0%	0, 0.0%
Sex	Male	21, 58.3%	15, 41.7%	20, 55.6%	16, 44.4%	21, 58.3%	15, 41.7%
	Female	29, 50.0%	29, 50.0%	25, 43.1%	33, 56.9%	26, 44.8%	32, 55.2%
Marital Status	Married	4, 36.4%	7, 63.6%	8, 72.7%	3, 27.3%	4, 36.4%	7, 63.6%
	Unmarried	46, 55.4%	37, 44.6%	37, 44.6%	46, 55.4%	43, 51.8%	40, 48.2%
Medical Education	Traditional	7 63.6%	4, 36.4%	4, 36.4%	7, 63.6%	4, 36.4%	7, 63.6%
	Problem-Based Learning	40, 54.1%	34, 45.9%	36, 48.6%	38, 51.4%	38, 51.4%	36, 48.6%
	Hybrid	3, 33.3%	6, 66.7%	5, 55.6%	4, 44.4%	5, 55.6%	4, 44.4%
Training Level	Postgraduate Intern	25, 52.1%	23, 47.9%	24, 50.0%	24, 50.0%	28, 58.3%	20, 41.7%
	Resident	25, 54.3%	21, 45.7%	21, 45.7%	25, 54.3%	19, 41.3%	27, 58.7%

In terms of knowledge, Table 5 shows that a larger proportion of CDUH PGIs and residents aged 25–29 (37, 53.6%) and 30–34 (12, 54.5%) years old had good knowledge about adult routine vaccinations. This suggests that educational and awareness initiatives are particularly effective within these age brackets. Half of individuals aged 35–39 (50.0%) demonstrated good knowledge, while those aged 45 and above exhibited moderate knowledge. More males (58.3%) had good knowledge compared to females, among whom half (50.0%) possessed good knowledge. Married PGIs and residents mostly showed moderate knowledge (63.6%), while unmarried individuals tended to have good knowledge (55.4%). Younger respondents (25–34 years) had better knowledge, aligning with Pelullo et al. (2020) who found younger healthcare workers access updated vaccination information more easily. Those with purely traditional or problem-based learning curricula also showed higher knowledge levels, consistent with findings by Whitaker et al. (2018) and Wiley et al. (2017). These studies highlighted that both fact-based traditional and interactive, case-based modules increased immunization knowledge. Jing et al. (2022) emphasized that knowledge alone is not enough for positive attitudes; trust in the healthcare system, perceived risks and benefits, and socio-demographic characteristics also play roles. To improve vaccine uptake, strategies must address attitudinal barriers, build trust, communicate risks and benefits, and tailor interventions to specific medical specialties.

Most of those who utilized the problem-based learning method (40, 54.1%) and the traditional approach (7, 63.6%) at their medical schools demonstrated good knowledge. Meanwhile, the majority of those who had a hybrid setup were moderately knowledgeable (6, 66.7%), indicating that the hybrid approach might require adjustments to improve its effectiveness in conveying information about adult routine vaccinations. Slightly higher percentages of PGIs (25, 52.1%) and residents (25, 54.3%) had good knowledge about adult routine vaccinations. This suggests that additional experience and continued education during residency may further enhance knowledge levels in this area. Despite differences in gender and marital status, these findings contrast with Özışık et al. (2017), who found no relationship between these factors and knowledge about adult vaccinations. This suggests that vaccine information is universally applicable, and disseminated through individual channels such as patient interactions or responses to local outbreaks.

CDUH PGIs and residents aged 25–29 (35, 50.7%) and 45 years old and above (1, 100.0%) had a positive attitude towards adult routine vaccination. This suggests that both younger and older cohorts within this medical community recognize the importance of these vaccinations. More male respondents had a positive attitude (20, 55.6%), while more females had a negative attitude (33, 56.9%). Most of the married PGIs and residents had a positive attitude (8, 72.7%), while more unmarried respondents had a negative attitude (46, 55.4%). Attitudes towards adult vaccinations were generally positive among younger respondents (25–29), correlating with their high knowledge levels. This aligns with Hajure et al. (2021), which found healthcare workers under 30 had a positive attitude toward COVID-19 vaccination due to recent education, health campaigns, and digital health information. Pediatric residents also showed a positive attitude, supported by Pelullo et al. (2020), attributing this to access to scientific journals and professional associations. However, despite good knowledge levels, many postgraduate interns and residents exhibited a negative attitude towards adult vaccinations. This discrepancy suggests that personal choices significantly impact attitudes, as highlighted by MacDougall et al. (2015), Mohamed et al. (2021), and Iguacel et al. (2021). Factors such as skepticism about vaccine efficacy,

fear of side effects, and perceived barriers influence these attitudes. Obstetrics and Gynecology residents also showed a negative attitude despite good knowledge from hospital lectures, as noted by Jenitha et al. (2020).

More than half of the participants exposed to problem-based learning (38, 51.4%) and traditional (7, 63.6%) learning approaches at their medical schools had a negative attitude towards adult routine vaccination. Meanwhile, the majority of those who had a hybrid setup had a positive attitude (5, 55.6%). This suggests that the hybrid educational approach may be more effective in fostering a positive attitude towards adult routine vaccination. A slightly higher percentage of residents (25, 54.3%) had a negative attitude towards adult routine vaccination, while half of the PGIs (25, 52.1%) also had a negative attitude. This may point to a broader issue within the residency and postgraduate internship programs that might require comprehensive attitude-shaping interventions to enhance overall positivity towards adult routine vaccinations among these groups.

The results showed that a large proportion of CDUH PGIs and residents aged 25–29 (37, 53.6%) and 45 years old and above (1, 100.0%) have good practices regarding adult routine vaccination. Half of those aged 35–39 years old (1, 50.0%) have poor practices regarding adult routine vaccination. Meanwhile, those aged 30–34 years old (14, 63.6%) have poor practices regarding adult routine vaccination. This suggests that while younger and older PGIs and residents tend to adhere better to vaccination practices, there is a significant drop in adherence among those in the middle age range.

Practices refer to actions and adherence to adult vaccination recommendations. Most postgraduate interns exhibited good practices consistent with the findings of Baig et al. (2020), which linked good knowledge with adherence to recommended practices. This underscores the importance of enhancing knowledge to improve adherence to vaccination practices.

Younger respondents also showed good practices, similar to findings by Vanathy et al. (2022) and Pellulo et al. (2020), who noted high adherence among younger healthcare workers due to recent education and proactive promotion of vaccinations. Those who underwent medical education using a problem-based learning (PBL) or a hybrid strategy also demonstrated good practices, a finding supported by the studies of Wiley et al. (2017) and Hawk et al. (2017).

However, many residents showed poor practices despite good knowledge. This gap, highlighted by (Mohamed et al. 2021), suggests that local guidelines and communication issues within hospitals impact adherence to recommended guidelines. Systemic barriers like vaccine accessibility and organizational support further contribute to poor practices, as noted by Winarto et al. (2022).

To address this problem, healthcare institutions should implement targeted training and educational initiatives for residents, empowering them to advocate for adult vaccinations to improve public health outcomes.

The majority of male respondents showed good practices regarding adult routine vaccination (21, 58.3%), while the majority of females showed poor practices (32, 55.2%). The majority of unmarried PGIs and residents showed good practices (43, 51.8%) while the majority of the married respondents showed poor practices (7, 63.6%). Respondents whose medical education utilized the problem-based learning strategy (38, 51.4%) or a hybrid strategy (5, 55.6%) demonstrated good practices while the majority of those who had a traditional medical education showed poor practices. This indicates that innovative and integrated learning approaches may be more effective in promoting good vaccination

practices among medical professionals. A slightly higher percentage of PGIs (28, 58.3%) showed good adult routine vaccination practices, while more residents (27, 58.7%) showed poor practices.

The findings highlight the need for targeted interventions in several key areas to improve adherence to adult routine vaccination practices. Respondents, particularly those aged 30–34 years, show a significant drop in adherence despite moderate knowledge levels. This suggests that interventions should focus on addressing barriers that prevent this demographic from translating their knowledge into action. Additionally, residents, who generally possess good knowledge, often exhibit poor adult routine vaccination practices. This gap between knowledge and practice may be due to local guidelines, hospital communication issues, or systemic barriers. Therefore, targeted interventions should aim to overcome these practical barriers and improve adherence among residents.

Married respondents also tend to show poor adult routine vaccination practices despite moderate or good knowledge. Interventions should focus on addressing specific barriers they face, such as skepticism about vaccines or perceived risks, to encourage better adherence. Furthermore, those educated under traditional methods exhibit poorer vaccination practices compared to those who underwent medical education utilizing a problem-based learning or a hybrid strategy. Revising or supplementing traditional medical education with more interactive and practical components could help improve vaccination practices in this group. Addressing these key areas could lead to improved adherence to adult routine vaccination practices and improve public health outcomes.

The cross-sectional analysis indicates a disconnect between knowledge, attitudes, and practices across age groups, specialties, and educational backgrounds. Specialty-specific disparities in knowledge, attitudes, and practices regarding adult routine vaccinations indicates that knowledge alone is insufficient to ensure positive attitudes or consistent practices, emphasizing the need for tailored interventions such as attitudinal training and practical workshops within specialty-specific programs to address misconceptions and improve adherence to guidelines.

The study also highlights the role of educational strategies, with respondents from medical schools utilizing problem-based learning or hybrid methods showing better vaccination practices compared to those trained through traditional methods. This underscores the effectiveness of interactive, case-based learning in fostering actionable knowledge and proactive behaviors, suggesting that revising traditional curricula to incorporate these approaches could enhance vaccination practices among healthcare professionals.

Targeted interventions such as specialty-specific training, attitudinal workshops, and systemic improvements—like clearer institutional guidelines and organizational support—are crucial to bridging these gaps. By addressing these factors, healthcare institutions can foster positive attitudes and consistent adherence to adult vaccination practices, ultimately improving public health outcomes.

IV. CONCLUSION

The study examined the knowledge, attitudes, and practices of postgraduate interns and residents across various medical specialties regarding adult routine vaccination. While both groups generally displayed good knowledge about adult routine vaccination, attitudes and practices varied by specialty. Internal Medicine residents often showed negative attitudes, whereas Pediatrics residents consistently demonstrated positive attitudes. Factors such as age, medical education strategy, and training level influenced vaccination

practices, with younger interns adhering better to guidelines, while residents, despite having higher knowledge, often displayed poorer practices and attitudes.

References

Abdulla, E., Johnson, J., Munir, S., & O'Dwyer, R. (2020). Assessing primary health care nurses' knowledge toward immunizations: A quantitative study. *Journal of Public Health Research*, *9*(4), 381-387. https://doi.org/10.4081/jphr.2020.1716

Antonelli-Incalzi, R., Blasi, F., Conversano, M., Gabutti, G., Giuffrida, S., Maggi, S., Marano, C., Rossi, A., & Vicentini, M. (2021). Manifesto on the value of adult immunization: "We know, we intend, we advocate." *Vaccines*, *9*(11), https://doi.org/10.3390/vaccines9111232

Baig, M., Jameel, T., Alzahrani, S. H., Mirza, A. A., Gazzaz, Z. J., Ahmad, T., Baig, F., & Almurashi, S. H. (2020). Predictors of misconceptions, knowledge, attitudes, and practices of COVID-19 pandemic among a sample of Saudi population. *PloS One, 15*(12), https://doi.org/10.1371/journal.pone.0243526

Bulut, E. A., Badak, S. O., Aksoy, H., Fadiloglu, A., & Isik, A. T. (2022). The awareness and attitude of physicians to older adult routine vaccination scheme. *Clinical Interventions in Aging*, *17*, 1581–1588. https://doi.org/10.2147/cia.s382311

Cason, D., & Williams, P. (2021). Vaccinating the unvaccinated adult. Cleveland Clinic Journal of Medicine, *88*(5), 279–285. https://doi.org/10.3949/ccjm.88a.20046

Hajure, M., Tariku, M., Bekele, F., Abdu, Z., Dale, A., Mohammedhussein, M., & Tsegaye, T. (2021) Attitude towards COVID-19 vaccination among healthcare workers: A systematic review. *Infection and Drug Resistance, 14, 3883-3897* https://doi.org/10.2147/IDR.S332792

Hawk, M., Nowalk, M. P., Moehling, K. K., Pavlik, V., Raviotta, J. M., Brown, A. E., Zimmerman, R. K., & Ricci, E. M. (2017). Using a mixed methods approach to examine practice characteristics associated with implementation of an adult immunization intervention using the 4 pillars practice transformation program. *Journal for Healthcare Quality, 39*(3), 153-167.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5422127/

Iguacel, I., Maldonado, A. L., Ruiz-Cabello, A. L., Samatán, E., Alarcón, J., Orte, M. Á., Mateos, S. S., & Martínez-Jarreta, B. (2021). Attitudes of healthcare professionals and general population toward vaccines and the intention to be vaccinated against COVID-19 in Spain. *Frontiers in Public Health*, *9*. https://doi.org/10.3389/fpubh.2021.739003

Jenitha, B., Subbiah, M., & Revwathy, S. (2020). Knowledge and awareness of cervical cancer, its prevention and attitude towards human papillomavirus vaccine among medical students. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, *9*(2), 613-617. https://doi.org/10.18203/2320-1770.ijrcog20200346

Jing, R., Fang, H., Wang, H., & Wang, J. (2022). The role of general attitudes and perceptions towards vaccination on the newly-developed vaccine: Results from a survey on COVID-19 vaccine acceptance in China. *Frontiers in Psychology*, *13*.

https://doi.org/10.3389/fpsyg.2022.841189

Laupèze, B., Del Giudice, G., Doherty, M. T., & Van der Most, R. (2021). Vaccination as a preventative measure contributing to immune fitness. *Npj Vaccines*, 6. https://doi.org/10.1038/s41541-021-00354-z

Lim, X., Madhumitha A., Zaw, M., Mandyam, N. K., Chia, H. X., & Lucero-Prisno, D. E. (2023). Geospatial mapping of 2-hour access to timely essential surgery in the Philippines. *BMJ Open*, *13*(12), 1-8. https://doi.org/10.1136/bmjopen-2023-074521

MacDougall, D. M., Halperin, B. A., MacKinnon-Cameron, D., Li, L., McNeil, S. A., Langley, J. M., & Halperin, S. A. (2015). The challenge of vaccinating adults: attitudes and beliefs of the Canadian public and healthcare providers. *BMJ Open*, *5*. https://doi.org/10.1136/bmjopen-2015-009062

Mohamed, N. A., Solehan, H. M., Mohd Rani, M. D., Ithnin, M., & Che Isahak, C. I. (2021). Knowledge, acceptance and perception on COVID-19 vaccine among Malaysians: A web-based survey. *PloS One*, *16*(8). https://doi.org/10.1371/journal.pone.0256110

Özışık, L., Calik Basaran, N., Oz, S. G., Sain Guven, G., & Durusu Tanriover, M. (2017). Perceptions and attitudes of patients about adult vaccination and their vaccination status: Still a long way to go? *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, *23*, 3178–3184. https://doi.org/10.12659/msm.901856

Panaligan, M., Rosario, M. C., Zotomayor, R., Zamora, G., Bibera, G. L., Alejo, A. D., & Javier, J. (2023). The landscape of herpes zoster management and prevention in the Philippines: Proceedings from two advisory boards. *Human Vaccines & Immunotherapeutics, 19*(2). https://doi.org/10.1080/21645515.2023.2263989

Pelullo, C. P., Della Polla, G., Napolitano, F., Di Giuseppe, G., & Angelillo, I. F. (2020). Healthcare workers' knowledge, attitudes, and practices about vaccinations: A cross-sectional study in Italy. *Vaccines*, *8*(2), *148*. https://doi.org/10.3390/vaccines8020148

Vanathy, K., Priyadarshini, R., Bhosale, N. K., Sreenivasan, S., & Easow, J. M. (2022). Knowledge, attitude and practice towards COVID-19 vaccination among medical students in a Tertiary care hospital of Southern India. *Journal of Clinical and Diagnostic Research*, *16*(9), 1-6 https://doi.org/10.7860/jcdr/2022/55780.16821

Whitaker, J. A., Poland, C. M., Beckman, T. J., Bundrick, J. B., Chaudhry, R., Grill, D. E., Halvorsen, A. J., Huber, J. M., Kasten, M. J., Mauck, K. F., Mehta, R. A., Olson, T., Thomas, K. G., Thomas, M. R., Virk, A., Wingo, M. T., & Poland, G. A. (2018). Immunization education for internal medicine residents: A cluster-randomized controlled trial. *Vaccine*, *36*(14), 1823–1829. https://doi.org/10.1016/j.vaccine.2018.02.082

Whitaker, J., Poland, C., Thomas, K., Chaudhry, R., Halvorsen, A., Wingo, M., Huber, J., Olson, T., Thomas, M., Mauck, K., Bundrick, J., Kasten, M. J., Virk, A., Grill, D., Mehta, R., & Poland, G. (2015). Mind the gap: Knowledge, attitudes, and practices of internal medicine residents toward

adult immunizations. *Open Forum Infectious Diseases*, *2*(suppl_1). https://doi.org/10.1093/ofid/ofv133.1409

Wiley, R., Shelal, Z., Bernard, C., Urbauer, D., Toy, E., & Ramondetta, L. (2017). Team-based learning module for undergraduate medical education: A module focused on the human papilloma virus to increase willingness to vaccinate. *Journal of Cancer Education, 34*, 357–362. https://doi.org/10.1007/s13187-017-1311-7

Winarto, H., Habiburrahman, M., Dorothea, M., Wijaya, A., Nuryanto, K. H., Kusuma, F., Utami, T. W., & Anggraeni, T. D. (2022). Knowledge, attitudes, and practices among Indonesian urban communities regarding HPV infection, cervical cancer, and HPV vaccination. *PloS One*, *17*(5). https://doi.org/10.1371/journal.pone.0266139

World Health Organization. (n.d.). *WHO immunization data portal*. https://immunizationdata.who.int/listing.html?topic=vaccine-schedule&location=PHL