Axis-Journal-OF-Health-And-Rehabilitation-Sciences

PREVALENCE OF VACCINE-COUNSELING CONFIDENCE AMONG MBBS STUDENTS DURING PEDIATRIC ROTATIONS AND CAREGIVER SATISFACTION

Original Article

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Acknowledgement: The authors gratefully acknowledge the cooperation of students and caregivers who participated in this study.

Short Title: Vaccine Counseling Confidence Among MBBS Students

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Submission: 10/01/2025 Publication: 31/01/25

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Abstract

Background: Vaccination remains one of the most effective public health interventions, yet vaccine hesitancy persists as a significant global challenge. Healthcare providers' communication, particularly their confidence in counseling, has been shown to strongly influence caregiver perceptions and vaccine acceptance. Medical students during pediatric rotations often serve as frontline communicators with caregivers, but little is known about their confidence levels and the impact on caregiver satisfaction and vaccine intent.

Objective: To estimate counseling confidence among MBBS students during pediatric ward rotations and examine its association with caregiver satisfaction and vaccine intent.

Methods: A cross-sectional study was conducted over four months in a tertiary care teaching hospital in Lahore. A total of 216 MBBS students and 216 caregivers were enrolled. Student confidence was measured using a Likert-scale based self-efficacy tool, caregiver satisfaction was assessed using a modified Patient Satisfaction Questionnaire (PSQ-18), and caregiver vaccine intent was recorded as positive, hesitant, or negative. Descriptive statistics summarized baseline characteristics, while Pearson's correlation and chi-square tests assessed associations between variables.

Results: Among students, 26.9% reported low counseling confidence, 44.4% moderate, and 28.7% high. Caregiver satisfaction scores were favorable, with a mean overall score of 3.7 ± 0.5 on a 5-point scale. Vaccine intent was positive in 75.0% of caregivers, hesitant in 17.6%, and negative in 7.4%. Higher student counseling confidence was positively correlated with caregiver satisfaction ($r = 0.42$, $p < 0.001$) and significantly associated with positive vaccine intent ($\chi^2 = 18.7$, $p = 0.001$).

Conclusion: MBBS students' counseling confidence during pediatric rotations was strongly associated with caregiver satisfaction and vaccine intent. Strengthening communication training within medical education may enhance vaccine advocacy and improve pediatric healthcare delivery.

Keywords: Caregivers, Communication, Confidence, Medical Students, Pediatrics, Vaccination, Vaccine Hesitancy.

Submission: 10/01/2025 Publication: 31/01/25

Introduction

Vaccination remains one of the most significant public health interventions of the past century, credited with reducing childhood morbidity and mortality worldwide (1). Despite the availability of effective vaccines, however, vaccine hesitancy continues to be a global challenge, undermining the progress of immunization programs (2). Caregivers' acceptance of vaccines is not only influenced by cultural and social beliefs but also by the quality of information and counseling provided by healthcare professionals (3). In pediatric wards, medical students are frequently in contact with caregivers, either assisting in patient care or providing health-related information under supervision (4). This interaction places them in a unique position to contribute to vaccine advocacy and education. Yet, their ability to confidently address questions, dispel myths, and guide caregivers toward informed decision-making often depends on the training they receive and the confidence they develop during clinical rotations (5). The concept of counseling confidence in medical students, particularly regarding vaccines, is increasingly being recognized as a vital component of medical education (6). Confidence in communication directly influences not only the clarity of information delivered but also the trust it generates in caregivers (7). Previous research has demonstrated that healthcare providers who express greater assurance when discussing vaccines are more likely to achieve positive caregiver responses, including greater satisfaction and stronger intent to vaccinate (8). Conversely, a lack of confidence or hesitancy among medical trainees may inadvertently reinforce doubts, contributing to vaccine hesitancy (9). This underscores the importance of examining how well-prepared medical students feel when addressing caregiver concerns in pediatric wards, where such discussions are most relevant.

Several studies in developed countries have explored the preparedness of medical students and residents in vaccine counseling, often highlighting gaps in communication skills, inadequate curricular focus, or missed opportunities during clinical exposure. However, evidence from low- and middle-income countries, where vaccine hesitancy presents distinct challenges shaped by misinformation, limited resources, and sociocultural dynamics, remains relatively scarce (10). This gap is particularly concerning in regions where pediatric healthcare systems rely heavily on frontline counseling to ensure vaccine uptake. In these contexts, the attitudes and confidence of medical students may significantly shape caregiver perceptions and, ultimately, vaccination coverage. Caregiver satisfaction, as an outcome of vaccine counseling, also deserves close attention (11). Satisfied caregivers are more likely to adhere to recommended vaccination schedules, report higher levels of trust in medical institutions, and serve as advocates within their communities. Studies have shown that caregivers often evaluate the quality of their child's hospital experience not only on the basis of medical outcomes but also on the interpersonal communication they receive from healthcare staff. For medical students, this dynamic offers a critical opportunity to practice patient-centered communication and to understand the influence of their role beyond clinical decision-making. The ability to link student confidence in vaccine counseling with caregiver satisfaction provides an avenue to better understand the interplay between medical education and public health outcomes.

Moreover, vaccine intent—the caregiver's willingness to have their child immunized after receiving information—is a powerful measure of the effectiveness of counseling. While structural barriers such as access and availability remain important determinants of vaccine uptake, intention often reflects the immediate impact of the healthcare encounter. Identifying whether medical students' counseling confidence is associated with caregiver vaccine intent can help medical educators design targeted interventions that not only improve student training but also directly contribute to higher immunization rates. Given these considerations, the present study was designed to estimate the prevalence of vaccine-counseling confidence among MBBS students during their pediatric rotations and to examine its relationship with caregiver satisfaction and intent to vaccinate. By addressing this understudied aspect of medical education, the study aims to highlight both the strengths and gaps in current clinical training. The findings are expected to provide actionable insights for curriculum development, emphasizing the role of communication skills and confidence-building in shaping future physicians' ability to serve as effective vaccine advocates. Ultimately, the objective of this study is to determine how student confidence in vaccine counseling correlates with caregiver satisfaction and vaccine intent, thereby contributing to improved strategies for medical training and pediatric healthcare delivery.

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Methods

This cross-sectional study was carried out over a period of four months in the pediatric wards of a tertiary care teaching hospital in Lahore. The primary aim was to assess counseling confidence among MBBS students during their pediatric rotations and to explore its association with caregiver satisfaction and vaccine intent. A structured methodological approach was followed to ensure reliability and replicability. The study population comprised MBBS students in their clinical years who were undergoing pediatric ward rotations during the study period, along with caregivers of admitted children who received vaccine-related counseling from these students. Students were included if they were currently posted in pediatrics, had direct interaction with caregivers under faculty supervision, and consented to participate. Exclusion criteria included students from non-clinical years, those who had completed their pediatric rotations earlier, or those unwilling to participate. On the caregiver side, participants were eligible if they were primary decision-makers regarding their child's immunization and had received vaccine-related counseling from the students. Caregivers with language barriers preventing communication, those unwilling to provide informed consent, or those whose children were critically ill were excluded. The sample size was calculated using the single population proportion formula, considering an anticipated prevalence of counseling confidence among medical students at 50% due to lack of prior local data, a 95% confidence interval, and a 5% margin of error. This yielded a required sample size of 196 students. To account for potential non-response and incomplete data, the final target sample was increased by 10%, giving a sample size of 216 students. A corresponding number of caregiver participants were enrolled to assess satisfaction and vaccine intent following student counseling. Data collection was carried out using structured, pre-validated questionnaires tailored for both students and caregivers. For students, counseling confidence was measured using a Likert-scale based tool adapted from validated communication self-efficacy instruments, with domains assessing knowledge of vaccines, ability to address caregiver concerns, and confidence in recommending immunization. Caregiver satisfaction was measured through a modified version of the Patient Satisfaction Questionnaire (PSQ-18), adapted for the pediatric counseling context, covering aspects of clarity, empathy, and trust during student interactions. Vaccine intent was assessed by a single-item measure asking caregivers whether they were willing to proceed with age-appropriate vaccination following the counseling session, with responses categorized as positive, hesitant, or negative.

All questionnaires were administered face-to-face by trained research assistants who were not directly involved in clinical care, to minimize bias. The student questionnaire was completed immediately after their ward counseling interaction, while the caregiver questionnaire was completed within one hour of receiving counseling. Responses were anonymized to ensure confidentiality. Prior to data collection, pilot testing was conducted with a small group of students and caregivers to assess clarity and comprehension of items, and necessary modifications were made accordingly. Data analysis was conducted using SPSS version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant characteristics and key study variables. Counseling confidence was analyzed as both a continuous score and categorized into low, moderate, and high confidence based on predefined cut-offs. Caregiver satisfaction scores were also treated as continuous variables, while vaccine intent was analyzed categorically. Associations between student counseling confidence and caregiver satisfaction were examined using Pearson's correlation coefficient, as both variables followed a normal distribution. For the relationship between counseling confidence and categorical vaccine intent, chi-square tests were applied. Independent sample t-tests and one-way ANOVA were used where appropriate to compare mean confidence scores across demographic subgroups. A p-value of less than 0.05 was considered statistically significant.

Ethical approval was obtained from the Institutional Review Board of the affiliated medical university prior to commencement of the study. Informed written consent was taken from all student and caregiver participants, with assurances that participation was voluntary and that refusal would not affect their academic evaluations or their child's medical care. Confidentiality was strictly maintained by coding questionnaires and storing data in password-protected systems accessible only to the research team. In sum, the study employed a rigorously designed cross-sectional methodology with clear inclusion criteria, validated outcome measures, and robust statistical techniques to investigate the interplay between MBBS students' vaccine-counseling confidence and caregiver responses. This methodological framework ensures that the study not only provides credible findings but can also be replicated in similar clinical education settings to inform curricular improvements and enhance vaccine advocacy practices.

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Results

The study enrolled 216 MBBS students and an equal number of caregivers during pediatric ward rotations in Lahore. The mean age of the student participants was 22.4 ± 1.2 years, with a nearly equal gender distribution (50.9% male, 49.1% female). Most of the students were from the 4th year (57.4%), while the remainder were in their final year (42.6%). Among caregivers, the mean age was 34.7 ± 7.5 years, with females representing the majority (69.4%) (Table 1). In terms of vaccine-counseling confidence, 26.9% of the students reported low confidence, 44.4% reported moderate confidence, and 28.7% reported high confidence (Table 2, Figure 1). The mean overall confidence score corresponded to a moderate level across the group, with higher proportions of final-year students reporting high confidence compared to those in the 4th year.

Caregiver satisfaction with the counseling sessions reflected consistently positive ratings. The mean score for clarity was 3.8 ± 0.7, for empathy 3.6 ± 0.6, and for trust 3.7 ± 0.6, with the overall satisfaction score averaging 3.7 ± 0.5 on a 5-point Likert scale (Table 3). These findings suggested generally favorable perceptions of the quality of interactions provided by the students. Caregiver vaccine intent after receiving counseling was predominantly positive, with 75.0% expressing willingness to proceed with vaccination, 17.6% categorized as hesitant, and 7.4% reporting a negative response (Table 4, Figure 2). A significantly higher proportion of caregivers counseled by students with high confidence reported positive intent compared to those counseled by students with low confidence.

Statistical analysis revealed a positive correlation between student counseling confidence and caregiver satisfaction ($r = 0.42$, $p < 0.001$). Chi-square analysis further demonstrated a significant association between counseling confidence and caregiver vaccine intent ($\chi^2 = 18.7$, $p = 0.001$). Students with high counseling confidence were associated with greater caregiver satisfaction scores and a markedly higher likelihood of positive vaccine intent. Overall, the results demonstrated that while a substantial proportion of students reported moderate confidence in vaccine counseling, higher confidence levels were strongly linked to caregiver satisfaction and willingness to vaccinate. These findings highlighted the importance of enhancing student preparedness for vaccine-related communication in pediatric clinical training.

Table 1: Demographic Characteristics of Participants

Variable	*Mean/Number*	*SD/%*
Age (years)	22.4	±1.2
Gender (Male)	110	50.9%
Gender (Female)	106	49.1%
Year of Study (4th)	124	57.4%
Year of Study (Final)	92	42.6%
Caregiver Age (years)	34.7	±7.5
Caregiver Gender (Female)	150	69.4%
Caregiver Gender (Male)	66	30.6%

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Table 2: Distribution of Student Counseling Confidence

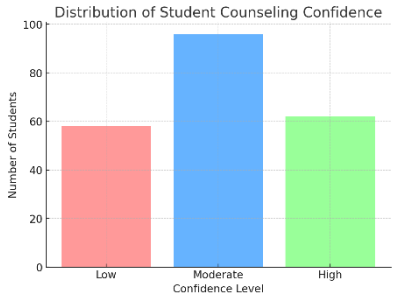
Confidence Level	*Frequency*	*Percentage*
Low	58	26.9%
Moderate	96	44.4%
High	62	28.7%

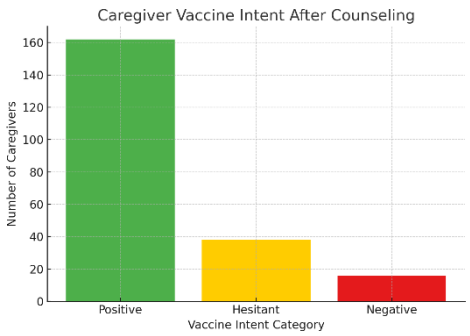
Table 3: Caregiver Satisfaction Scores

Domain	*Mean Score*	*SD*
Clarity	3.8	0.7
Empathy	3.6	0.6
Trust	3.7	0.6
Overall Score	3.7	0.5

Table 4: Caregiver Vaccine Intent After Counseling

Intent Category	*Frequency*	*Percentage*
Positive	162	75.0%
Hesitant	38	17.6%
Negative	16	7.4%





Discussion

The findings of this study provided important insights into the confidence levels of MBBS students in vaccine counseling during pediatric ward rotations and how these levels were reflected in caregiver satisfaction and vaccine intent (12). The results indicated that although the majority of students demonstrated moderate confidence, a substantial proportion still reported low confidence, underscoring the variability in preparedness among future physicians (13). Importantly, higher counseling confidence was strongly associated with both increased caregiver satisfaction and positive vaccine intent, suggesting that communication skills and

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confidence are not merely educational outcomes but determinants of real-world health behaviors (14). These findings align with international evidence highlighting the influence of healthcare providers' communication on vaccine acceptance. Studies from high-income countries have consistently demonstrated that physician confidence in addressing vaccine concerns enhances caregiver trust and adherence to immunization schedules (15). In contrast, lack of confidence or perceived hesitation has been shown to amplify doubts and fuel vaccine hesitancy. The current study extended this understanding to a South Asian context, where medical students in training often act as first-line communicators with caregivers (16). The observed associations reinforce the view that communication training during undergraduate education is as critical as clinical skill development. The association between student confidence and caregiver satisfaction carries particular significance (17). Caregivers who reported greater satisfaction tended to perceive counseling as clearer, more empathetic, and more trustworthy. These domains of satisfaction not only improve the immediate patient-caregiver relationship but also have long-term implications for health-seeking behaviors within communities (18). Previous literature has emphasized that satisfied caregivers are more likely to comply with vaccination schedules, recommend immunization to peers, and return for follow-up care. Therefore, the link between medical student communication and caregiver satisfaction represents a key educational and public health intersection. Vaccine intent after counseling was overwhelmingly positive among caregivers, yet the hesitancy reported by nearly one-fifth of participants demonstrates that challenges remain. The association between high counseling confidence and greater intent to vaccinate suggests that improved student training could directly reduce hesitancy rates (19). This observation supports the notion that interpersonal encounters within healthcare settings can be decisive in shaping vaccine decisions, even when broader societal misinformation persists. The results contribute to a growing body of evidence indicating that communication training has measurable impacts on vaccine uptake.

The strengths of this study included its structured methodology, adequate sample size, and the use of validated tools for measuring both student confidence and caregiver satisfaction (20). The simultaneous assessment of caregiver vaccine intent added further robustness, providing a direct behavioral outcome linked to counseling encounters. Conducting the study in a real-world hospital setting enhanced ecological validity, as interactions were observed in the same context where students practice and caregivers make health decisions (21). Nevertheless, the study carried certain limitations that must be acknowledged. Being cross-sectional in nature, it captured associations rather than causal relationships (22). The assessment relied on self-reported confidence levels, which may not fully reflect actual communication skills. Similarly, caregiver satisfaction and intent were measured immediately after counseling, limiting the ability to capture long-term adherence to vaccination schedules. The single-center setting in Lahore may restrict generalizability to other institutions with differing curricula or healthcare structures. Furthermore, potential observer bias, despite mitigation efforts, could not be entirely excluded.

Future research should focus on longitudinal designs that follow caregivers beyond hospital discharge to examine actual vaccination outcomes, thereby linking student counseling confidence to real immunization coverage. Interventional studies introducing structured communication training modules into pediatric rotations could provide evidence of effectiveness in raising confidence and improving caregiver outcomes. Multi-center studies across diverse contexts would help establish the consistency of these findings and explore variations across educational environments. In addition, qualitative investigations exploring caregiver perspectives on student communication could add depth to the quantitative results, shedding light on specific communication behaviors that drive satisfaction and intent. In summary, the study highlighted the pivotal role of MBBS students' counseling confidence in shaping caregiver perceptions and intentions during pediatric ward rotations. It contributed to an underexplored area of medical education in South Asia and underscored the need for integrating structured vaccine communication training into undergraduate curricula. The findings reinforced the notion that communication is a clinical skill with direct implications for public health outcomes, particularly in the context of vaccine acceptance.

Conclusion

This study demonstrated that MBBS students' confidence in vaccine counseling during pediatric rotations was significantly associated with caregiver satisfaction and vaccine intent. While most students exhibited moderate confidence, higher confidence levels were strongly linked to more favorable caregiver outcomes. These findings highlight the importance of strengthening communication training within medical education to enhance vaccine advocacy and improve pediatric healthcare delivery.

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AUTHOR CONTRIBUTIONS

Author	Contribution
Majida Khan****	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Zubair Ahmad	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published

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Submission: 10/01/2025 Publication: 31/01/25