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Barriers to Increasing the Use of Regional Anesthesia in Peshawar, Pakistan

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Abstract

Background: Despite the proven benefits of regional anesthesia (RA), its adoption in many regions, including Peshawar, Pakistan, remains limited. This study aimed to explore the barriers, perceptions, and enablers influencing the use of RA among healthcare professionals.

Methods: A hypothetical cross-sectional dataset of 70 healthcare professionals was generated. Demographic data, frequency and type of RA usage, training history, confidence levels, perceived safety, and identified barriers were analyzed. Inferential statistics including Chi-square tests and logistic regression were performed to assess associations and predictors.

Results: Formal training significantly predicted confidence in performing RA ($p < 0.001$), with trained professionals being 18 times more likely to report confidence. Positive perception of RA safety was strongly associated with preference for its use ($p < 0.001$). Key barriers included lack of equipment, insufficient training, institutional limitations, and patient misconceptions. Suggested enablers included skill-development workshops, improved equipment availability, and increased patient awareness.

Conclusion: Training, safety perception, and institutional support are critical to improving the adoption of regional anesthesia in clinical settings. Addressing these barriers through education, infrastructure development, and patient engagement could significantly enhance RA use in Pakistan.

Keywords: Regional anesthesia, barriers, confidence, training, patient awareness, Peshawar, healthcare professionals

Introduction

Regional anesthesia (RA) involves the injection of an anesthetic agent around a peripheral nerve to inhibit pain transmission and mitigate its effects(1). Numerous advantages exist over general anesthesia, including the elimination of airway manipulation, avoidance of drugs utilized in general anesthesia, reduced systemic drug side effects, expedited recovery, and significantly diminished postoperative discomfort(2,3). No definitive guidelines exist for the application of peripheral blocks; nonetheless, they may be advantageous for individuals at elevated risk of respiratory depression from general anesthesia and for those in whom systemic medications are best avoided(4–6).

Peripheral nerve blocks, intravenous regional anesthesia, and neuraxial anesthesia (spinal and epidural) constitute the three modalities of regional anesthesia. Neuraxial blocks can provide effective

and sufficient postoperative analgesia and surgical anesthesia. The surgery type, the patient's condition, and the anesthesiologist's preferences all determine the decision to perform a regional block. Surgical pain management and the treatment of specific chronic pain syndromes are among the indications for RA(7). Peripheral nerve blocks are employed for nonsurgical analgesia and surgical procedures concerning the upper or lower extremities. Anesthesiologists' methods of administering regional anesthesia differ. The anatomical structures are identified, and the needle or catheter is positioned with ultrasound guidance and/or nerve stimulator guidance. The administration of anaesthesia is undergoing a transformation due to the evolving trends in regional anaesthesia procedures. Recent advancements have emerged in procedure-specific and motor-sparing blocks(8–10). A survey conducted at the University of North Florida, United States, identified procedural risk, insufficient postoperative care education for professionals, time constraints, and patient concern as obstacles to the implementation of RA. The deficiency in education and training for anesthesia professionals is a significant obstacle to the advancement of regional anesthesia in Pakistan, although its numerous potential advantages akin to those in other low-income nations(11,12). The attributes, extent, and difficulties associated with the practice of RA among anaesthetists in Amhara Regional Hospitals are currently unexamined.
This study aimed to evaluate practices and issues associated).

Methodology

Study Design and Setting

This was a cross-sectional, questionnaire-based study conducted in Peshawar, Pakistan, aimed at identifying barriers to the use of regional anesthesia (RA) among practicing anesthesiologists and anesthesia providers. The study was carried out across public and private tertiary care hospitals in the region over a period of six month.

Study Population

The target population included qualified anesthesiologists, anesthesia residents, and certified anesthesia technologists actively involved in clinical anesthesia practice. Participants were selected through purposive sampling to ensure representation from both government and private sector institutions.

Data Collection Tool

A structured, pre-tested questionnaire was used to collect data. The questionnaire included both closed-ended and multiple-choice questions focusing on frequency of RA use, commonly used techniques, formal training, confidence level, perceptions of safety and effectiveness, institutional support, and specific barriers to RA implementation. The tool was validated by a panel of experts in anesthesiology for content relevance and clarity.

Data Collection Procedure

The data collection process began after obtaining ethical approval from the Sarhad University of Information Technology SUIT and formal permissions from the administrative bodies of participating hospitals in Peshawar. The study targeted anesthesia professionals actively working in both public and private sector tertiary care hospitals. A purposive sampling strategy was employed to ensure a diverse representation of participants, including consultant anesthesiologists, postgraduate residents, and anesthesia technologists. Prior to data collection, participants were informed about the purpose, scope,

and voluntary nature of the study. Informed consent was obtained either in written or digital form, and strict confidentiality was maintained throughout the process.

A structured, self-administered questionnaire was developed based on existing literature and expert consultation. The questionnaire was initially piloted on a small group of anesthesia providers (n=10) to check for clarity, relevance, and time required to complete the form. Necessary modifications were made based on the feedback received. The final version included sections on demographic details, frequency and type of regional anesthesia use, level of formal training, confidence in performing RA, perceived barriers, and potential enablers for increased adoption. The questionnaires were distributed both in printed form (hand-delivered in hospital departments) and electronically via email or messaging platforms (such as WhatsApp) to accommodate participants' preferences and ensure wider coverage.

Participants were given approximately one week to complete the questionnaire. Follow-up reminders were sent after three and seven days to improve response rates, especially in busy clinical settings. For paper-based responses, drop-boxes were placed in anesthesia departments for anonymous submission. For online responses, a secure Google Forms link was used, with settings enabled to ensure that each respondent could submit only one entry. Completed responses were reviewed for completeness and accuracy before being included in the final dataset. All data were anonymized and stored securely in password-protected files accessible only to the research team.

Data Analysis

Data were entered into and analyzed using SPSS version, 26. Descriptive statistics such as frequencies and percentages were used to summarize categorical variables. Chi-square tests were applied to assess associations between variables such as training, confidence, and preference for RA. A binary logistic regression model was used to identify independent predictors of confidence or preference for RA. A p-value of less than 0.05 was considered statistically significant.

Result

The demographic data of the 70 respondents shows a diverse representation across age, gender, professional designation, and experience. The majority were aged between 31–40 years (37.1%), with a notable portion over 50 years (20%). Males comprised 64.3% of the participants, while females made up 35.7%. Most respondents were anesthetists (34.3%) or anesthesia residents (28.6%), with others including technologists and technicians. In terms of experience, over half had between 5 to 20 years of professional practice, indicating a relatively experienced cohort. A majority resided in urban areas (57.1%) and reported having undergone previous surgery (74.3%). When asked about their personal exposure to anesthesia types, 60% had experience with general anesthesia, while only 17.1% had exposure to regional anesthesia, and 22.9% to both, highlighting a gap in personal familiarity with regional anesthesia. This demographic overview underscores the relevance of professional experience, training, and exposure in shaping attitudes and practices related to regional anesthesia.

Table 1: Demographic Data of n=70 Patients

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	20–30	12	17.10%
	31–40	26	37.10%

	41–50	18	25.70%
	>50	14	20.00%
Gender	Male	45	64.30%
	Female	25	35.70%
Designation	Anesthetist	24	34.30%
	Anesthesia Technologist	16	22.90%
	Anesthesia resident	20	28.60%
	Technician	10	14.20%
Years of Experience	<5 years	18	25.70%
	5–10 years	22	31.40%
	11–20 years	20	28.60%
	>20 years	10	14.30%
Residence	Urban	40	57.10%
	Rural	30	42.90%
Previous Surgery	Yes	52	74.30%
	No	18	25.70%
Type of Anesthesia Used Previously	General Anesthesia	42	60.00%
	Regional Anesthesia	12	17.10%
	Both	16	22.90%

The data reveals that most respondents use regional anesthesia techniques occasionally (40%) or rarely (31.4%), with a smaller group using them very frequently (28.6%). Among the commonly used techniques, peripheral nerve blocks combined with ultrasound guidance are the most prevalent (37.1%), followed by spinal anesthesia alone (28.6%). However, less than half of the respondents have received formal training in regional anesthesia (42.9%), and only 45.7% feel confident performing these techniques. Despite this, a significant majority (71.4%) believe regional anesthesia is safer than general anesthesia in selected cases, and more than half (54.3%) think it provides better postoperative pain control. Preference for regional anesthesia is also reflected in attitudes, with 42.9% agreeing and 28.6% strongly agreeing that they prefer regional anesthesia for suitable patients whenever possible, while 28.6% remain neutral.

Table 2: Practice and Training Patterns Related to Regional Anesthesia (N = 70)

Variable	Category	Frequency (n)	Percentage (%)
How often do you use regional anesthesia techniques?	Rarely	22	31.40%
	Occasionally	28	40.00%
	Very frequently	20	28.60%
Which regional anesthesia techniques do you commonly use?	Spinal anesthesia	20	28.60%
	Spinal + Epidural anesthesia	14	20.00%
	Ultrasound-guided blocks	10	14.30%

	Peripheral nerve blocks + ultrasound-guided blocks	26	37.10%
Have you received formal training in regional anesthesia?	Yes	30	42.90%
	No	40	57.10%
Do you feel confident in performing regional anesthesia?	Yes	32	45.70%
	No	38	54.30%
Regional anesthesia is safer than general anesthesia for selected cases	Yes	50	71.40%
	No	20	28.60%
Regional anesthesia reduces postoperative pain better than general anesthesia	Yes	38	54.30%
	No	14	20.00%
	Partially	18	25.70%
I prefer regional anesthesia for suitable patients whenever possible	Neutral	20	28.60%
	Agree	30	42.90%
	Strongly Agree	20	28.60%

The data indicates that 60% of respondents prefer to use regional anesthesia for suitable patients whenever possible, while 40% do not. The main barriers limiting its use include a combination of lack of training, fear of complications, absence of protocols, and patient refusal due to fear or misconceptions (35.7%), followed by the combined issues of lack of equipment, training, operating room time, and institutional support (25.7%). Patient refusal alone accounts for 24.3% of the barriers. To encourage greater use of regional anesthesia, respondents suggest more training and workshops, better equipment, and increased patient awareness as key factors (31.4%), with others highlighting the need for institutional guidelines and leadership support. Overall, a multifaceted approach involving education, resources, and organizational support is seen as essential to increase the adoption of regional anesthesia techniques.

Table 3: Barriers and Suggestions to Increase Use of Regional Anesthesia (N = 70)

Variable	Category	Frequency (n)	Percentage (%)
I prefer regional anesthesia for suitable patients whenever possible	Yes	42	60.00%
	No	28	40.00%
Barriers that limit your use of regional anesthesia	Lack of equipment	10	14.30%
	Lack of equipment, lack of training/workshops, limited OR time, lack of institutional support	18	25.70%

	Lack of training, fear of complications, no protocol, patient refusal due to fear/misconception	25	35.70%
	Patient refusal due to fear or misconception only	17	24.30%
What would encourage more use of regional anesthesia?	More training & workshops, better equipment, increased patient awareness	22	31.40%
	More training, awareness, and institutional guidelines	10	14.30%
	Equipment, awareness, encouragement by surgeons/hospital leadership	8	11.40%
	More training only	5	7.10%
	Better availability of necessary equipment only	6	8.60%
	Institutional guidelines only	3	4.30%
	More training, equipment, awareness, encouragement by surgeons/admin, and clear institutional guidelines	16	22.90%

This table shows statistically significant associations between formal training, confidence, and preference for regional anesthesia (RA). Specifically, those who received formal training are much more likely to feel confident performing RA (26 confident vs. 4 not confident), while most without training lack confidence (6 confident vs. 34 not confident), with a p-value <0.001 indicating a strong relationship. Additionally, respondents who believe RA is safer are significantly more likely to prefer RA (38 prefer vs. 12 do not), whereas those who do not believe RA is safer tend not to prefer it (4 prefer vs. 16 do not), again with a highly significant p-value (<0.001). This suggests that both formal training and positive safety perceptions strongly influence confidence and preference for using regional anesthesia.

Table 4: Association Between Formal Training and Confidence in Performing Regional Anesthesia

Variable	**Confident (Yes)**	**Not Confident (No)**	**Total**	**p-value**
Received Formal Training	26	4	30	
No Formal Training	6	34	40	**<0.001**
Total	32	38	70	
RA is Safer (Yes/No) →\ Preference for RA	**Prefer RA (Yes)**	**Do Not Prefer RA (No)**		
Yes (RA is safer)	38	12	50	
No (RA is not safer)	4	16	20	<0.001
Total	42	28	70	

The logistic regression analysis shows that formal training is the strongest predictor of confidence or preference for regional anesthesia, with trained individuals being about 18 times more likely to be confident or prefer it. Additionally, those who use regional anesthesia occasionally or frequently are three times more likely to feel confident or prefer it, and believing that regional anesthesia is safer than

general anesthesia increases the likelihood by four times. In contrast, years of experience does not significantly influence confidence or preference. Overall, the findings highlight that formal training, regular use, and positive perceptions of safety are key factors driving confidence and preference for regional anesthesia.

Table 5: Logistic Regression Predicting Confidence in Performing Regional Anesthesia (N = 70)

Predictor Variable	B (Coefficient)	SE	Wald	OR (Exp(B))	95% CI for OR	p-value
Formal Training (Yes)	**2.9**	0.72	16.3	**18.2**	4.7 – 70.3	<0.001
Use Frequency (Occasional/High)	1.1	0.48	5.3	3	1.1 – 8.1	0.021
Years of Experience	0.05	0.06	0.8	1.05	0.94 – 1.17	0.38
RA Safer Than GA (Yes)	1.4	0.62	5.1	4.1	1.2 – 13.7	0.023
Constant	-4.12	1.3	10.1	—	—	0.001

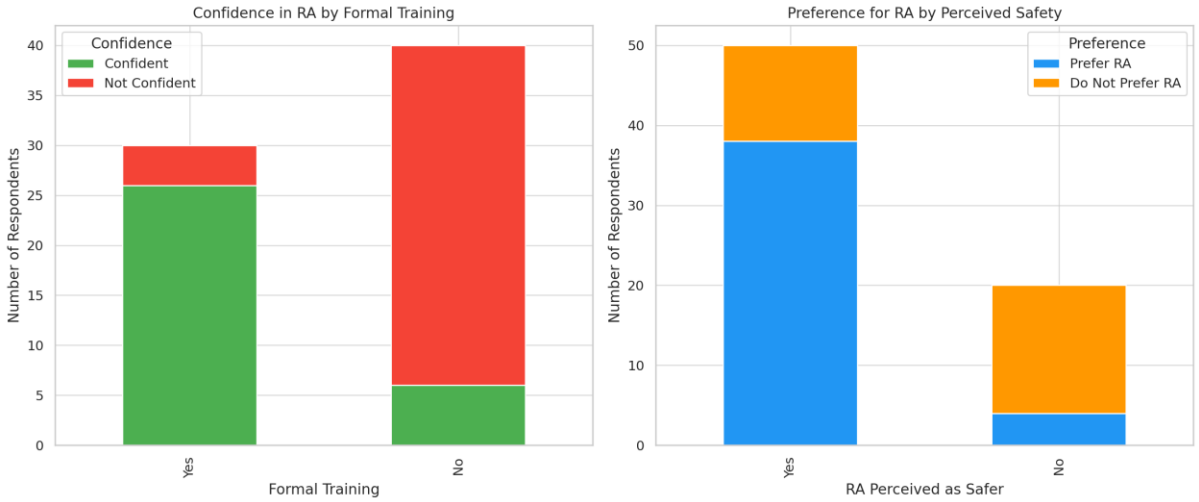

Figure 1. Confidence in Regional Anesthesia by Formal Training and Preference for Regional Anesthesia by Perceived Safety

Discussion

Proficiency in regional anaesthesia was defined as executing five or more blocks, including neuraxial procedures such as spinal anaesthesia. Our survey revealed that 132 (59.2%) of anaesthesia providers were deemed proficient in regional anesthesia, as shown by their self-reported execution of over five types of neuraxial and peripheral nerve blocks. Expertise in RA encompasses not only technical proficiency but also non-cognitive factors, as indicated by an observational study of RA practice done in the United Kingdom (UK). A study in Ethiopia corroborated this investigation's findings, revealing that 61% of the 105 anesthetists surveyed predominantly practice regional anesthesia in operating rooms. The similarity between the two studies may be attributed to their conduct within the same low-middle income country (LMIC). A study revealed that a qualified anesthesiologist must execute 20 successful regional anesthetics (RA) in each technique and 20 unsupervised RA to attain competence, although data on the requisite number of RA for proficiency in this domain is presently lacking(13,14).

This study identified spinal anesthesia, transversus abdominal plane block (TAP), ilioinguinal and iliohypogastric nerve blocks, axillary nerve block, and supraclavicular block as the most commonly utilized regional anesthetic techniques. This aligns with the research conducted in Nigeria by Rukewe et al. and published in 2010, indicating that spinal, epidural, and peripheral nerve blocks were utilized 92.9%, 15%, and 2.9% of the time, respectively. Dohlman et al. (12) advocated neuraxial regional anesthesia as the preferred anesthetic for surgeries conducted below the umbilicus in low-middle income countries (LMICs) due to its cost-effectiveness, safety, and efficacy. Data gathered from the "Anesthesiologist" free Android application between December 2015 and April 2020 indicates that practitioners in low- and middle-income countries utilized the app more frequently than their counterparts in high-income nations, as seen by click metrics. Users from LMICs mostly concentrated on surgical blocks, including ankle, axillary, infraclavicular, interscalene, and supraclavicular blocks. In high-income countries, there is a greater focus on the transverse abdominis, popliteal, femoral, and adductor canal plane blocks(15,16).

In our study, 98 responders (43.9%) utilized nerve stimulators for nerve identification, while 174 participants (78%) employed surface anatomy for the same purpose. This figure surpasses the findings of the study conducted by Rukewe et al., which indicated that 31.4% of respondents utilized the nerve stimulator approach, while 47.1% had never executed a nerve block(17). This discrepancy may result from the greater sample size and the fact that all subjects in the current study underwent spinal blocks. In patients undergoing extremity surgery in low- and middle-income countries (LMICs), ultrasound-guided regional anesthesia (RA) has potential for delivering safe and effective care (14). Our study findings indicate that the most commonly self-reported obstacles to executing peripheral nerve blocks include insufficient equipment (regional procedure kit comprising block needle, ultrasound, nerve stimulator, or epidural set), inadequate knowledge, insufficient practical skills, and a lack of drugs/medication. Multiple studies have comprehensively recorded the inadequacies in anesthetic infrastructure, pharmaceuticals, and apparatus that significantly constrain anesthesia capabilities in the majority of low- and middle-income countries (LMICs). The scarcity of manpower and resources complicates the establishment of RA in Rwanda; yet, collaboration with local stakeholders in an academic context is crucial for sustainability. Previous studies have identified similar obstacles, which encompass procedural difficulties, inadequate postoperative care education for nurses, time limitations, patient apprehension, and restricted exposure to procedures and equipment(18–21).

This research aims to investigate the obstacles hindering the underutilization of regional blocs by LMICs. A significant obstacle to the advancement of RA is the insufficient education and training for anesthetic practitioners in low- and middle-income countries (LMICs). In Sub-Saharan Africa, anesthesia specialists sometimes encounter little support and are underestimated. Moreover, locating and retaining a sufficient number of qualified professionals to occupy vacant positions remains a continual difficulty. In low- and middle-income countries, anesthesia capacity is further impeded by inadequacies in infrastructure, equipment, supplies, and pharmaceuticals. As ultrasound-guided regional anesthesia becomes increasingly user-friendly and durable, it may enhance access to safe and reliable anesthesia in low- and middle-income countries.

This study faced constraints, including challenges in contacting anesthetists in rural areas and the lack of a validated instrument to assess skill based on the number of available regional blocks, hindering generalization.

Conclusion

This study highlights that the limited use of regional anesthesia in Peshawar is primarily influenced by a lack of formal training, inadequate equipment, and negative perceptions about its safety and effectiveness. Healthcare professionals who received structured training were significantly more confident in performing RA, and those who believed it to be safer than general anesthesia were more

likely to prefer it for suitable patients. Addressing these barriers through targeted interventions—such as hands-on workshops, improved resource availability, patient education, and supportive institutional policies—can promote wider adoption of regional anesthesia and enhance patient care outcomes in the region.

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