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Original Research Article

Compliance of Anesthesia Personnel Towards Regional Anesthesia Checklist

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Abstract: *Ensuring adherence to institutional protocols is crucial for minimising complications and enhancing patient safety during regional anaesthesia. Standardised checklists are endorsed globally to improve procedural compliance and promote uniformity in anaesthesia practice.* ***Objective:*** *To assess the compliance of anaesthetists with institutional standard practice protocols for regional anaesthesia at a tertiary care hospital.* ***Methods:*** *A cross-sectional study was conducted in the Anaesthesia Department of National Hospital and Medical Centre, Lahore, from August 2024 to February 2025. A total of 83 anaesthetists were enrolled, including both consultants and postgraduate residents. A standardized pre-procedure checklist comprising 9 items was used to evaluate compliance, based on guidelines provided by the American Society of Regional Anesthesia (ASRA) and the WHO pre-block checklist. Data were analysed using SPSS version 25. Descriptive statistics were computed, and the chi-square test was applied to determine associations between compliance and variables such as designation and type of surgical procedure. A p-value <0.05 was considered statistically significant.* ***Results:*** *Overall compliance with regional anaesthesia protocols was 86%. The highest compliance rates were observed for equipment readiness (97.59%), drug labelling (95.18%), and obtaining surgical consent (93.98%). Compliance during the "time-out" phase was slightly lower at 92.77%. Consultants demonstrated a marginally higher compliance rate (88.5%) compared to postgraduate residents (84.2%). No statistically significant differences in compliance were observed based on anaesthetist designation or type of surgical procedure (p>0.05).* ***Conclusion:*** *High compliance with regional anaesthesia protocols was observed, particularly in equipment preparation, drug labelling, and consent verification. While consultants showed marginally better adherence than residents, overall compliance remained commendable across all practitioner levels. Continued emphasis on checklist implementation and periodic audits can further reinforce adherence to protocol.*

Keywords: Checklist, Compliance, Health Personnel, Regional Anaesthesia

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Introduction

Regional anaesthesia (RA) utilises local anaesthetics (LAs) to numb a surgical site by targeting a group of nerves. Peripheral nerve blocks and central neuraxial blocks are the two main categories. Recently, ultrasonography has enhanced the accuracy and outcomes of these delicate operations, making this type of anaesthesia more common. (1) Regional anaesthesia minimises perioperative respiratory problems and mechanical ventilation compared to general anaesthesia. (2) It reduces 30-day mortality, hospital stays, surgical pain, nausea, and vomiting. (3) Additionally, cardiac patients having intermediate or low-risk non-cardiac operations benefit from regional nerve blocks. (4)

Regional anaesthesia carries its own set of potential complications, which include infection, hematoma formation, systemic toxicity of LAs due to accidental intravascular administration, and significant hemodynamic instability. (4, 5) Like other invasive procedures, it also has a risk of wrong-site nerve block. Numerous studies have investigated the incidence, risk factors, and preventive measures associated with such errors. A thorough pre-block safety checklist and careful patient selection may reduce these potential risks.(6) The WHO surgical safety checklist is extensively used in medicine and has shown promise in reducing surgical mortality and complications. (7)

May 2013 saw the American Society of Regional Anaesthesia survey fellowship directors and graduates. Thus, the nine-point regional anaesthesia checklist was launched in May 2014. When properly used, this checklist has significantly reduced regional anaesthesia-related mistakes and their consequences. (8) However, implementing these checklists is difficult. The attitude of anaesthetic staff, limited training, time constraints, personal biases, cultural barriers, and overlaps with other checklists may hinder their effective use. (9) Checklists play a vital role in facilitating standardised patient care, enhancing safety, reducing errors, improving quality, and fostering better teamwork. They help manage information and reduce cognitive load, enabling clinicians to more effectively identify and address potential errors, ultimately contributing to improved patient outcomes. (10) No research checked anaesthesia residents and consultants' compliance with the regional anaesthesia checklist in any Pakistani clinical setting, despite the presence of standard institutional protocols. This study will therefore lay the foundation stone towards the implementation of institutional best practices.

Methodology

This cross-sectional observational study was conducted in the Department of Anesthesiology at the National Hospital and Medical Centre, Lahore, from August 2024 to February 2025, following approval from the Institutional Ethical Review Board (ERC Number: NHMC/HRD/01/2038). A total of 83 anaesthetists were included in the study. The sample size was calculated using the WHO sample size calculator, based on a 95% confidence level, 6% absolute precision, and an expected compliance rate of 91.6% derived from previous literature (11). Participants were recruited using a non-probability consecutive sampling method.

Eligible participants included anaesthesia personnel of either gender, specifically consultants and third- or fourth-year residents involved in performing regional anaesthesia for elective surgical procedures. Regional anaesthesia procedures conducted in emergency or trauma cases were excluded to maintain consistency in elective surgical settings and protocol adherence. Data were collected from operating rooms assigned to elective cases, while those for emergency and trauma surgeries were excluded from the study scope.

Compliance with institutional protocols for regional anaesthesia was assessed using a direct observation method, with all observations

conducted by the principal investigator to ensure consistency and minimise inter-observer bias. A standardised 9-point checklist was used, adapted from the guidelines of the American Society of Regional Anaesthesia (ASRA) and the World Health Organisation's preoperative surgical safety checklist (12). The checklist included the following items: (1) verification of patient identity using two criteria, (2) assessment of allergy and anticoagulation status, (3) confirmation of the surgical procedure and consent, (4) verification of the block plan and proper site marking, (5) availability and correct labeling of equipment and medications, (6) readiness of resuscitation equipment, (7) application of appropriate ASRA-recommended monitors and provision of intravenous access, sedation, and supplemental oxygen as needed, (8) adherence to aseptic technique, and (9) performance of a procedural "time-out" before needle insertion or when performed by a different team member or in a different position.

Each item was marked as compliant only if performed completely and correctly. The overall compliance was calculated based on full adherence to all checklist items. Observational data were recorded on a structured proforma by the investigator herself to ensure uniformity in data collection. Statistical analysis was carried out using SPSS version 25. Quantitative variables, such as age and anaesthetist experience, were presented as mean ± standard deviation (SD). In contrast, qualitative variables, including gender, designation, type of surgical procedure, and compliance status, were reported as frequencies and percentages. Stratification was done to control for potential effect modifiers, and post-stratification analysis was conducted using the Chi-square test to determine the significance of associations between modifiers and compliance levels. A p-value of less than 0.05 was considered statistically significant (13).

Results

A total of 83 participants were included, comprising 26 consultants and 57 postgraduates. The mean ages of consultants and graduate residents were 45.92 ± 7.06 and 28.65 ± 1.16 years, respectively. The mean experience of consultants and postgraduate residents was 15.04 ± 6.02 years and 3.60 ± 0.49 years, respectively.

In terms of gender, there was a higher number of male consultants (65.4%) than there were female postgraduates (71.9%). In terms of surgical procedures performed, there were more cases of obstetrics and general surgery as the most common disciplines (27.71% cases each), and other cases of orthopaedics (18.07%), urology (16.87%), and plastic surgery (9.64%). (Table 1) Adherence to the regional compliance block pre-procedure checklist was overall favourable. For instance, the identification of the patient using two identifiers, the verification of the block plan and site marking, the use of suitable ASRA monitors, and the use of sterile techniques all demonstrated 100% adherence. Compliance with the readiness of equipment and drug labelling had a high rate of 97.59%. The review of allergies and anticoagulation status followed a starting rate of 95.18%, while the surgical consent rate stood at 93.98%. Nonetheless, the compliance regarding the "time-out" phase, especially before the needle is inserted, was slightly low at 92.77%. (Table 2) These results underscore the high compliance with safety measures around the procedures among the participants. The overall compliance rate was 86%. Together with the compliance indices, the postgraduate consultants' difference in postgraduate compliance with consultants showed a slightly higher rate of adherence to compliance, 88.5%, compared to 84.2% among consultants; however, this difference proved not to be statistically significant (p-value = 0.745). Efforts to compare compliance indices between broad classes of surgical procedures showed no significant differences. Urology and general surgery achieved the highest rates of compliance at 92.9% and 91.3%, respectively, while orthopaedic and plastic surgery recorded the lowest compliance rates at 73.3% and 75%, respectively. Despite such differences, the p-value in this respect, 0.443, is non-significant, implying that the differences were indeed not significant. (Table 3)

Table 1: Study participants' characteristics (n=83)

	Consultant	Post Graduate	Total
	26	57	83
Age	45.92±7.06	28.65±1.16	34.06±9.00
Experience	15.04±6.02	3.60±0.49	7.10±6.30
Gender			
Male	17(65.4%)	16(28.1%)	33
Female	9(34.6%)	41(71.9%)	50
Surgical Procedure			
Obstetrics	7(26.9%)	16(28.1%)	23
General Surgical	6(23.1%)	17(29.8%)	23
Orthopaedic	4(15.4%)	11(19.3%)	15
Plastic Surgery	4(15.4%)	4(7%)	8
Urology	5(19.2%)	9(15.8%)	14

Table 2: Regional Block Pre-Procedure Check List (n=83)

Sn		Yes	No
1	Patient is identified, 2 criteria	83(100%)	0(0%)
2	Allergies and anticoagulation status are reviewed.	79(95.18%)	4(4.82%)
3	Surgical procedure/consent is confirmed.	78(93.98%)	5(6.02%)
4	The block plan is confirmed, and the site is marked.	83(100%)	0(0%)
5	The necessary equipment is present, and the drugs/solutions are labelled.	81(97.59%)	2(2.41%)
6	Resuscitation equipment is immediately available: airway devices, suction, vasoactive drugs, and lipid emulsion.	81(97.59%)	2(2.41%)
7	Appropriate ASRA monitors are applied; intravenous access, sedation, and supplemental oxygen are provided, if indicated.	83(100%)	0(0%)
8	Aseptic technique is used, involving hand cleansing, the use of a mask, and sterile gloves.	83(100%)	0(0%)
9	"Time out" is performed before needle insertion for each new block site if the position is changed, separated in time, or performed by another team	77(92.77%)	6(7.23%)

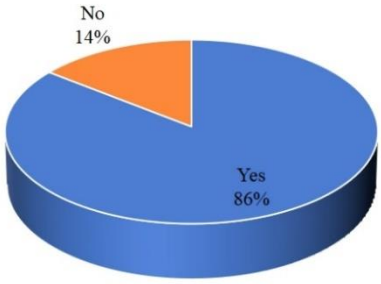

Figure 1: Compliance with the checklist among study participants (n=83)

Table 3: Comparison of compliance about Designation and Surgical procedure (n=83)

	Compliance with the list		p-value(*)
	Yes	**No**	
Consultant	23(88.5%)	3(11.5%)	0.745
Post graduate	48(84.2%)	9(15.8%)	
Procedure			
Obstetrics	20(87%)	3(13%)	0.443
General Surgical	21(91.3%)	2(8.7%)	
Orthopaedic	11(73.3%)	4(26.7%)	
Plastic Surgery	6(75%)	2(25%)	
Urology	13(92.9%)	1(7.1%)	

Note: (*) Fisher's Exact test

Discussion

The compliance of anaesthesia personnel with regional anaesthesia checklists is crucial for enhancing patient safety and minimising errors. Research has shown that the implementation of structured checklists significantly boosts adherence among anaesthesia teams. (13)

In the current study, high compliance with safety measures was observed, particularly in equipment readiness (97.59%), drug labelling (95.18%), and surgical consent (93.98%). However, compliance during the "time-out" phase was slightly lower, at 92.77%, and overall compliance ultimately resulted in 86%. Consultants demonstrated a somewhat higher rate of adherence to compliance, at 88.5%, compared to postgraduate residents, at 84.2%. Previous studies have found varying results of compliance. One study by Arbizo et al, has reported increase in compliance rates from 20% to 85% following the introduction of structured time-out checklist for RA. (14) Contrast to current results, one survey by O'Donoghue and Mannion S found overall compliance rate higher among non-consultants 94.4% vs 91.6%, with consultants, P=0.045. (15) In another study, implementation phase compliance for correct time out reached to 85%, close to the current study observations. (16) Despite these improvements, several barriers hinder effective checklist use, including time constraints and insufficient training. (17) One study reviewed 874 articles, reporting that 92% studies demonstrated the effectiveness of checklists in anaesthesia. The findings highlighted that checklists reduce human error, enhance patient safety and teamwork, and improve the quality of care. Additionally, anaesthesia-specific checklists were found to be valuable for provider handoffs, emergency scenarios, and routine procedures beyond the WHO surgical time-out. (18) Another study concluded that there is a significant correlation between operating room nurses' compliance with the Surgical Safety Checklist and patient safety during surgical procedures. However, in the current study, nurses were not included. (19) In the audit by Fuchs et al, overall adherence to pre-induction checklists was found to be lower, 57.3%. (20)

In urgent surgical situations, checklist completion rates decline sharply, emphasising the need for better integration into high-pressure settings. (21) Reduced compliance during emergency cases, can be attributed to the intense time pressures faced by the team, particularly when managing hypoxia or cardiac arrest.(22) Dynamic implementation strategies, such as multidisciplinary oversight and regular feedback, are more effective than static methods, leading to higher compliance rates. Additionally, continuous education and simulation exercises play a crucial role in addressing knowledge gaps and improving teamwork. (23) Adherence to the WHO surgical checklist enhances patient outcomes, and pre-induction checklists have been shown to reduce severe events, improve intubation success, and lower hypoxic incidents during tracheal intubation, though their impact on mortality remains unclear. Variability in outcomes highlights the need for more research on long-term adherence and its role in fostering a culture of patient safety. (24)

A limitation of this study is that it only included doctors, without considering the educational training level or specific background related to the safety checklist. The impact of different levels of training and education on checklist compliance and patient safety was not assessed, which could have provided a more comprehensive understanding of the factors influencing adherence. Future studies should include a broader range of healthcare professionals and examine how varying levels of education and training might affect compliance and outcomes.

Conclusion

The study demonstrated high compliance with safety measures, particularly in terms of equipment readiness, drug labelling, and obtaining surgical consent. Overall, compliance was 86%, with postgraduate consultants showing slightly higher adherence than consultants, and no

significant differences in compliance were found across various surgical procedures. To further enhance compliance, it is recommended that non-compliant doctors receive targeted training and supervision, fostering personal accountability and adherence to the checklist.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC- NHMC/HRD/01/2038)
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

AZ (PGR)
Manuscript drafting, Study Design,
FH (PGR)
Review of Literature, Data entry, Data analysis, and drafting articles.
SAK (Consultant)
Conception of Study, Development of Research Methodology Design,

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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