

## Barriers to the routine use of peripheral nerve blocks in some tertiary hospitals in Nigeria

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### Abstract

**Background:** Regional anaesthesia is rapidly becoming a viable alternative to general anaesthesia in the care of the surgical patient. However, there appears to be limited use of regional anaesthesia for surgery and pain management. This study determined the scope and barriers to the use of regional anaesthesia in the practice of anaesthetists in Nigeria.

**Methods:** This survey using a structured questionnaire, addressed participants' demographic features, proficiency in regional anaesthesia (central neuraxial and peripheral nerve block practices), type of equipment available in the hospital for regional anaesthesia, and level of education and training. All physician anaesthetists were required to complete the questionnaire except the nurse anaesthetists. All categorical data were expressed as frequencies and percentages.

**Results:** A total of 120 questionnaires were distributed to the participating institutions and 109 were returned with a response rate of 90.8%. The majority (71.6%) were males with a male-to-female ratio of 2.52: 1. Performances of upper or lower limb blocks show 71(65.1%) had experience with upper or lower limb block. The performance of central neuraxial blocks was very high; subarachnoid blocks (100%), epidural blocks (85%), and caudal blocks (78.1%) respectively. Lack of required skills accounted for the leading reason why peripheral nerve blocks were not performed in the upper limb (81.5%), as against the least reason which is the non-availability of an ultrasound machine (7.4%) for lower limb blocks.

**Conclusion:** Anaesthetists in Nigeria are interested in performing various regional techniques. Poor workforce development and access to appropriate technology are limitations to the routine performance of peripheral nerve blocks.

**Keywords:** Regional anaesthesia, ultrasound-guided, peripheral nerve blocks, barriers

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## INTRODUCTION

There is a trending shift away from general anaesthesia to regional blocks for the provision of anaesthetic services by anaesthesiologists in Nigeria as well as elsewhere. Regional anaesthesia has become a major technique of choice in clinical practice of anaesthesia due to its avoidance of unwanted effects of anaesthetic drugs and the concomitant stress response during laryngoscopy and intubation associated with general anaesthesia. These numerous benefits of regional anaesthesia or peripheral nerve blocks (PNB) on patients have generated wide acceptance in the clinical practice of anaesthesia and pain management. These benefits are mainly on safety, access, and cost of care.<sup>1-3</sup> Specifically, regional anaesthesia has the potential to minimize poor outcomes when compared to general anaesthesia, especially in low and middle-income countries (LMICs). Anaesthesia-related mortality is linked to airway difficulties or respiratory problems, perioperative volume resuscitation, or postoperative complications.<sup>1,4,5</sup> These risk factors for poor outcomes after anaesthesia may be mitigated or ameliorated with regional anaesthesia when indicated.

Information on the scope of regional anaesthesia in Nigeria is limited to occasional research reports by various authors on specific evaluation of particular blocks.<sup>6-9</sup> However, Rukewe and colleagues attempted to determine the scope of regional anaesthesia in a cross-sectional study. Their results indicate that spinal anaesthesia was the major regional technique (92.9%), epidural was 15% and PNBs was 2.9%. Nevertheless, the authors did not identify the barriers to a robust use of the epidural and peripheral nerve blocks. Identifying the limitations to the comprehensive deployment of regional anaesthesia in routine practice by anaesthesiologists in Nigeria may engender the development of strategies for improving the use of regional techniques and maximizing its potential benefits on good postoperative outcomes. It may be imperative to investigate the scope of regional anaesthesia in Nigeria and identify barriers to the wholesome application of regional anaesthesia, where feasible, in providing patient care. The results may be used as a standard for future comparisons and the evolution of regional

techniques in the annals of anaesthesia in Nigeria. Therefore, this questionnaire-based survey determined the scope and barriers to the use of regional anaesthesia in the practice of anaesthetists in Nigeria.

## MATERIAL AND METHODS

This cross-sectional study was conducted in 6 hospitals across Nigeria. The survey questionnaire was scrutinized for content and context by 4 senior consultants in active anaesthesia practice to ensure validity. The survey addressed participants' demographic features, proficiency in regional anaesthesia (central neuraxial and peripheral nerve block practices), type of equipment available in the hospital for regional anaesthesia, and level of education and training. Information on confidence and barriers at performing peripheral nerve blocks and the use of peripheral nerve stimulators or ultrasound-guided regional anaesthesia were enquired from respondents. The survey questionnaire was sent to 6 tertiary institutions in Nigeria having obtained the workforce capacity of each department of anaesthesia. All nurse anaesthetists in any of these hospitals were excluded.

The questionnaire consisted of 21 questions, of which 15 required binary responses (yes or no), and the remaining 6 were structured to elicit open responses. There were questions on experience with the various peripheral nerve blocks or central neuraxial blocks in terms of witnessing or performing the specified block. The data were analysed using the Statistical Product and Service Solutions (SPSS v.20 IBM SPSS, New York, USA). All categorical data were expressed as frequencies and percentages.

## RESULTS

A total of 120 questionnaires were distributed to the participating institutions based on the number of anaesthetists in each hospital and 109 were returned with a response rate of 90.8%. The demographic characteristics are shown in Table 1. The majority of respondents (71.6%) were males with a male-to-female ratio of 2.52: 1. The age range with the highest number of respondents was between 26-36yrs (47.7%) with a mean age of 37.53 years. The Registrar cadre of the respondents was 49.5% and 27.5% were

Senior Registrars while approximately 23% were consultants. The distribution of years of experience is shown in Table 1, and 44% of the respondents had worked for more than 5 years as anaesthetists.

Table 2 shows that 96.3% have had previous experience with regional anaesthesia and 56% use Peripheral Nerve Stimulators in their centres and 31.2% deployed ultrasound machines for regional blocks.

Table 3 shows the different responses to whether specified blocks were witnessed or performed. There was not much difference between the rate of witnessed or performed interscalene or supraclavicular blocks. Axillary block had a higher rate of performance than witnessed (N = 45). The infraclavicular block had a higher rate of observation than performance (42 vs. 18). The rate of observation of the various lower limb blocks was higher than the rate of performance as shown in Table 3. The lower limb blocks which included posterior lumbar plexus, femoral 3 in-1 block, fascia iliaca compartment blocks, sciatic nerve block, ankle block, and popliteal block showed that Femoral 3 in-1 block (n = 27) was the most performed lower limb blocks while fascial iliaca compartment block (n = 62) and sciatic nerve block (n = 62) were the most witnessed lower limb blocks. The least performed lower limb block was the posterior lumbar plexus block with a (n = 6) performance rate.

Subarachnoid block was the most witnessed or performed central neuraxial block (100%) by the respondents. The rate of other central neuraxial blocks (epidural, caudal) was marginally higher as observed than performed.

Lack of skills accounted for the leading reason why peripheral nerve blocks were not performed in the upper limb 81.5% as against the least reason which was the non-availability of an ultrasound machine (7.4%) for lower limb blocks (Table 4).

The various sources of skill acquisition are shown in Table 5. The skills for performing these peripheral blocks were mostly obtained during departmental in-house training (65.1%), while 5.5% acquired skills through post fellowship sub-specialty training in regional anaesthesia.

**Table 1: Demographic and professional characteristics**

Features	Frequency (n)	Percentage (%)
Age (yr)	37.7±	N/A
<b>Sex</b>		
Male	78	71.6
Female	31	28.4
<b>Cadre</b>		
Registrar	54	49.5
Senior registrar	30	27.5
Consultant	25	22.9
<b>Years of experience</b>		
1 – 2	39	35.8
3 – 4	22	20.2
>5	48	44.0

**Table 2: Practice approach to peripheral nerve blocks (PNB)**

Practice Approach	Response	Frequency (n)	Percentage (%)
<b>Performed PNB</b>	Yes	105	96.3
	No	4	3.7
<b>Anatomical site</b>	Yes	90	82.6
	No	19	17.4
<b>Use of peripheral nerve stimulator</b>	Yes	61	56
	No	48	44
<b>Use of Ultrasound-guided regional block</b>	Yes	34	31.2
	No	75	68.8

**DISCUSSION**

The survey response rate of 90.8% appears adequate with a majority of respondents being registrars, males in their mid-30s, and practice as anaesthetists was for over 5 years. Most of the respondents had previous experiences with regional anaesthesia (96.3%), used peripheral nerve stimulator (56%), and occasionally used ultrasound machine (31.2%) which were readily

**Table 3: Types of blocks and performance characteristics**

Region	Block Type	Witnessed (n/%)	Performed (n/%)
<b>Upper limb</b>	Interscalene	30	31
	Supraclavicular	24	29
	Axillary	30	45
	Infraclavicular	42	18
<b>Lower limb</b>	Posterior lumbar plexus	60	6
	Femoral 3 in 1	52	27
	Fascial iliacal compartment	62	16
	Sciatic nerve	62	16
	Popliteal	60	23
	Ankle block	62	24
	<b>Central Neuraxial block</b>	Subarachnoid block	100
	Epidural	100	85
	Caudal	96	75

**Table 4: Factors against the performance of upper limb regional blocks**

Response	Frequency (n)	Percentage(%)
Lack of skills	44	81.5
No PNS	6	11.1
No USS	4	7.4
No PNS/USS	0	0

**Table 5: Sources of skill acquisition**

Response	Frequency (n)	Percentage(%)
Departmental training	71	65.1
College update	2	1.8
Regional anaesthesia	14	12.8
Independent learning	10	9.2
Regional fellowship	6	5.5

available in their centres. The performance of upper limb blocks was consistently more than the number of respondents who have witnessed the block except for the infraclavicular blocks in

which the performance of blocks was about 50% of the number that have witnessed the blocks. In contrast, the performance of lower limb blocks was consistently lower than the number that witnessed the procedure. However, the performance of central neuraxial blocks was consistently very high. Similarly, Obasuyi *et al*<sup>10</sup> have noted that more surgeries in the upper limb were done under general anaesthesia than regional techniques, while most lower limb surgeries were done under regional techniques than general anaesthesia in their study on the appropriateness of choice of anaesthesia for orthopaedic surgeries in a developing country. A major limitation to the performance of peripheral nerve blocks was due to the absence of relevant skills (64.5%) while other factors (35.5%) were attributable to the non-performance of peripheral nerve blocks. The source of skills acquisition in regional blocks was mainly in-house training (65.1%).

The response rate for this study is high with predominantly young physician anaesthetists. This is consistent with the demographic characteristics of trainees in the anaesthesia programme in Nigeria.<sup>7</sup> Teixeira *et al*<sup>11</sup> showed that most respondents also have a similar characteristic of age distribution between 31 – 41 years. The preponderance of male, younger registrars contrasts the observation by Teixeira *et al*,<sup>11</sup> that showed a female preponderance of 70%. The majority being female trainees in their setting may be due to cultural, religious predisposition, or the locale of practice. Fincham *et al*<sup>12</sup> advised the adoption of response rate criteria set by Draugalis *et al*<sup>13</sup> (greater than 75%) to improve the response rate transparency and generalizability of the survey results.

Localization of peripheral nerves is the hallmark of success with peripheral nerve blocks in regional anaesthesia. Approaches to localization of these peripheral nerves entail the use of blind or anatomical approach, the use of peripheral nerve stimulator, ultrasonography, and a combination of peripheral nerve stimulator and ultrasonography. The anatomical approach which has been used in practice for a very long time as access to establishing regional anaesthesia has its shortcomings such as injury to adjacent nerves, patchy or failed block, and poor safety profile. However, the anatomical

approach is the major option for the respondents in this survey (82.6%). The inability to correctly determine the definitive placement of the needle tip around the nerve gave room to the introduction of the peripheral nerve stimulator (PNS). The advent of PNS had widespread acceptance and usage. The introduction of ultrasound-guided regional anaesthesia (USGRA) however, allowed direct visualization of the block needle tip, targeted nerve, and local anaesthetic injectate spread.<sup>14</sup> USGRA conferred a high success rate with a concomitant increase in safety profile. Despite the comparative advantages of the PNS or USGRA, these approaches were found to be of limited practice in this survey.

There is a plethora of evidence indicating the superiority of regional anaesthesia over general anaesthesia in terms of safety.<sup>15-17</sup> Nevertheless, there is still underutilization of neuraxial anaesthesia or peripheral nerve block,<sup>15</sup> despite its numerous advantages. The limited utilization of peripheral nerve blocks (PNBs) or neuraxial anaesthesia (NA) is often associated with barriers like anaesthetic experience, additional time for the block, and resource requirements.<sup>16,17</sup> Indeed, the observations in our survey indicate that lack of experience by the attending anaesthetist, non-availability of a peripheral nerve stimulator or ultrasound machine were factors limiting the practice of peripheral nerve blocks. However, neuraxial anaesthesia that may not be dependent on hi-tech resources was wholesomely deployed in the management of patients. The limited experience of the anaesthetist with peripheral nerve block is not unconnected with the critical deficiencies in anaesthesia resources in Low-Medium Income Countries (LMICs).<sup>18</sup> Some authors have proffered solutions to mitigate these barriers including workforce development<sup>19</sup> and not being necessarily too reliant on technology.<sup>20</sup> Perhaps the anatomical approach may be emphasized or local hospital administrators should be encouraged to invest in technology as well as post fellowship training in regional anaesthesia. Therefore, a well-cultivated policy plan would improve the utilization of peripheral nerve blocks for anaesthesia and pain management.

Regional blocks especially peripheral nerve blocks are often not only used for anaesthesia but also for postoperative analgesia. Experience with upper limb blocks compared with lower limb blocks seems very novel in that upper limb blocks have no regional block substitute, unlike the lower limb blocks where central neuraxial blocks (subarachnoid block or epidural) may suffice. An axillary brachial plexus block is the most widely used regional anaesthetic technique for forearm or hand surgery.<sup>21</sup> Our study showed that the axillary block was the most performed among the upper limb blocks and was closely followed by the interscalene block. There is a poor performance rate of lower limb peripheral nerve blocks and the femoral (3 in 1) nerve block appears more frequently performed in the lower limb category.

There is a differential in the level of performance of regional blocks. The rate of performance of the upper limb blocks is higher than lower limb blocks. However, there appears to be more overall use of central neuraxial blocks by the respondents. The reason for the high level of central neuraxial block is not very clear. However, the practice of central neuraxial blocks is not dependent on hi-tech applications for nerve localization. The endpoint for the subarachnoid block is distinct with the flow of cerebrospinal fluid (CSF), while the tactile sensation of a 'give' may indicate the localization of the epidural space. Furthermore, there is no deficiency in skill acquisition for the central neuraxial technique, unlike the peripheral nerve blocks that showed that the skill required for the performance of these blocks may be a limitation to its widespread use. Indeed, Broking and Waurick<sup>22</sup> challenged the American or European concept in structured teaching of peripheral nerve blocks and neuraxial blocks. This suggestion underscores the difficulties with skill transfer in the conduct of regional anaesthesia, especially peripheral nerve blocks. The low rate of the practice of peripheral blocks for the lower limb may have been encouraged by the ease of the conduct of central neuraxial blocks. Our results indicate that lower limb blocks are practiced less frequently than upper limb blocks. Perhaps, the higher rate of upper limb peripheral block techniques may have been similar to the rate for lower limb blocks if there were similar neuraxial blocks for the upper limb

like the lumbar approach. This observation of the difference in the performance of upper limb blocks and lower limb blocks seems to be limited to low resource centres like Nigeria<sup>8</sup> as there is a comprehensive similar frequency of use of peripheral nerve blocks for upper or lower limb procedures elsewhere.<sup>15,23</sup>

Skill acquisition in the practice of peripheral nerve block or neuraxial block could be from multiple sources. Skills in neuraxial blocks appear adequate in our centres. In contrast, the acquisition of the relevant techniques of peripheral nerve block is low. Training in the various departments of anaesthesiology is the leading point of skill acquisition from our data. The limited capacity development in most LMICs could still be a limiting factor.<sup>20,24</sup> Indeed, Schnitter<sup>24</sup> emphasized the barriers to the widespread uptake of regional anaesthesia to be due to a combination of factors including equipment and training. The global shortage in workforce capacity in anaesthesiology may be exaggerated in Nigeria (like other LMIC's), due to the lopsided distribution of anaesthesiologists, as most specialists are in tertiary hospitals located in the urban regions. However, there is a growing number of anaesthesiologists developing their careers in various subspecialties of anaesthesia including regional anaesthesia<sup>25</sup> and this may be a bright light on the horizon.

The findings of this survey should be interpreted within the context of some limitations. First, it is a survey and therefore a weak extrapolation for practice patterns. Furthermore, it may have been more representative of national figures if all hospitals were recruited to participate. Trying to involve all anaesthesiologists in Nigerian hospitals may have been strenuous, due to the highly unstable employment situation amongst doctors in Nigeria. Nevertheless, the observations from this survey provide insights into the practice pattern on regional anaesthetic options for anaesthesia and pain management. Our findings from this questionnaire survey are however generalizable especially due to the high response rate. The standardization of the questionnaires by the participating consultants may have engendered appropriate responses to the questions. Thus, the practice of peripheral nerve blocks and neuraxial anaesthesia should

be encouraged even in the absence of appropriate technology.

## CONCLUSION

In conclusion, the questionnaire survey shows that anaesthesiologists in Nigeria are interested in performing various regional techniques; central neuraxial block, followed by upper limb block, and lower limb blocks. Poor workforce development and access to appropriate technology employing ultrasound-guided regional anaesthesia, and peripheral nerve stimulators are limitations to the routine performance of peripheral nerve blocks. It may be necessary to organize more training workshops for anaesthesiologists on peripheral nerve blocks in collaboration with international agencies or societies of anaesthesiologists as well as enhance more post fellowship training in regional anaesthesia.

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## Conflicts of interest

There are no conflicts of interest

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