Original Article

Practices and diversities in plexus and peripheral nerve blocks: A survey

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Abstract

Background and Aims: Regional anesthesia plays a crucial role in perioperative medicine, influencing both immediate and long-term outcomes. However, there is a lack of data regarding the utilization and practices of plexus and peripheral nerve blocks. We attempted to investigate the practices of plexus and peripheral nerve blocks using a validated questionnaire.

Material and Methods: A questionnaire was validated by 14 experts and was distributed online for the response. There were 1020 responses, and the data are expressed as frequencies and percentages. There were 58.2% females and 41.8% males, including 32.3% of the respondents with more than 20 years of experience and 27.5% having 10–20 years of experience. Participants from teaching hospitals, government, and private college comprised 49.7%, while those from the corporates and private practitioners constituted 50.2%.

Results: Most participants fell into the age range of 31–40 years, followed by 41–50 years. The regional blocks were performed daily by 21.8%, weekly by 23.8%, every 15 days by 38.4%, and monthly by 16% of the participants. Furthermore, 43.6% of the participants discussed the block plan with the patients. The most common blocks of the upper limb and lower limb were the supraclavicular approach of the brachial plexus block (90.8%) and the fascia iliaca (82.5%), respectively.

Conclusions: The present survey highlights the details about the present practices, advantages, and limiting factors for using plexus and peripheral nerve blocks. This is the first data acquired with a validated survey from a South Asian Country, which can be used to compare changes in future practices.

Keywords: Acute pain, nerve blocks, pain management, regional anesthesia

Introduction

Both neuraxial techniques and peripheral nerve blocks (PNBs) are broadly used regional anesthesia (RA) modalities for perioperative pain management globally. There are studies comparing neuraxial versus general anesthesia (GA), which show better remunerative benefits and medical outcomes,[1] like fewer incidences of infections, blood transfusions, adverse respiratory events, and intensive care unit admissions.[2,3] PNBs are used by both anesthesiologists and emergency physicians for perioperative and procedural pain management. Few previous surveys have been conducted on the use of RA and block;[4,5] however, none have used a validated questionnaire.[6] Hence, we

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planned this study to explore the trends and diversities in plexus and PNB practices.

Material and Methods

After obtaining institutional ethics committee approval (T/IM/NF/Anaesth/19/31 dated 19 Aug 2019) and registration with the Clinical Trials Registry-India (CTRI/2019/09/021416 [registered on: 09/25/2019]), a survey questionnaire was designed and validated.[6] This validation process involved 14 experts and took one year (Appendix A). The duration of the study was from September 2019 to January 2022. The survey was sent to the participants through mail and WhatsApp. It included questions focusing on anesthesiologist's experience, preferences of drugs, different modalities, upper limb block, lower limb block, complications, practices, etc., The primary objective of this survey was to look for the present trends and use of regional block practices, and the secondary objective was to look for the reasons for hesitancy in using regional block techniques. Two subsequent reminders were sent after 2 weeks for the follow-up requesting the participants to complete the questionnaire. After sending the initial email with the survey link, subsequent reminders were sent. The survey concluded 1 month after its initial distribution. All the responses were collected, and the data were analyzed using Statistical Package for the Social Sciences 24.0.

Results

There were 58.2% females and 41.8% males among the participants, with a maximum of them in the age range of 31–40 years followed by 41–50 years. Of them, 32.3% had more than 20 years of experience and 27.5% had 10–20 years of experience. Additional demographic details can be found in Table 1.

Figure 1 illustrates the practices of plexus and nerve blocks among practitioners. It shows that 21.8% perform these blocks daily, 23.8% perform them weekly, 38.4% perform them every 15 days (fortnightly), and 16% perform them monthly. Furthermore, 43.6% of the participants engage in preoperative discussions regarding the nerve block plan. It is worth noting that these blocks were not widely utilized in the pediatric population, with 49.7% of participants using them in less than 20% of cases.

We also explored the various factors in favor of the plexus and nerve blocks, along with the barriers in practicing them by various participants [Table 2]. Improved outcome and pain relief was the most common reason for using these blocks by

Table 1: Sociodemographic profile of the study participants (*n*=1020)

Variables	Number	Frequency
Age (in years)		
20–30	72	7.1
31–40	340	33.3
41–50	329	32.3
51–60	200	19.6
>60	79	7.7
Gender		
Male	594	58.2
Female	426	41.8
Qualification		
MD/DNB student*	89	8.7
3–5 years PD	149	14.6
>5–10 years PD	172	16.9
>10–20 years PD	281	27.5
>20 years PD	329	32.3
Workplace		
Government college	186	18.2
Private college	135	13.2
Teaching hospital	187	18.3
Corporate	238	23.3
Private practitioner	274	26.9

**MD/DNB - Doctor of Medicine/Diplomate of National Board; PD- Post Degree*

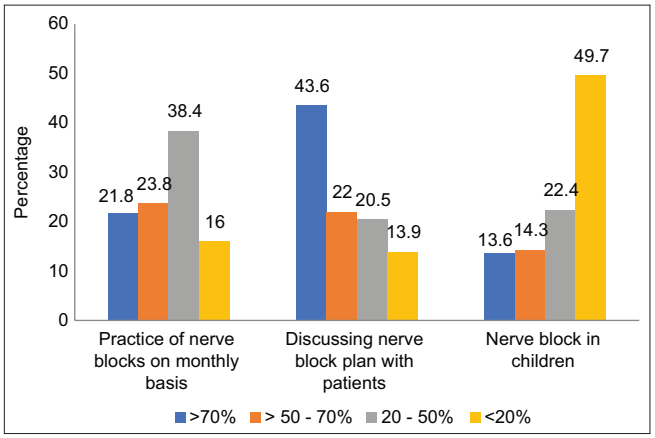

Figure 1: Plexus and nerve block practices among the practitioners

69.5% of the participants. However, 46.9% of participants noted the time factor as the major limiting factor for less use of the nerve blocks, followed by the surgeon's factor (43%) and equipment issues (33.6%). Pre-Conception and Pre-Natal Diagnostic Techniques act, patient refusal, and knowledge/experience were reported by around 19% each [Figure 2].

Majority of the blocks (83.5%) were done in the operation theaters, followed by the preoperative areas (10.2%). Details of the skin preparation, ultrasound (USG) probe asepsis, localization methods, the preferred choice of anesthesia, use of sedation, and source of training are detailed in Table 2. Single injection was used by 72.1% of the participants. Bupivacaine with lignocaine combination was used by 56.1% of participants, followed by bupivacaine (41.5%) and ropivacaine (39.9%).

Table 2: Factors associated with the practice of nerve blocks

Variables	Number	Frequency
Place of performing blocks		
Operating room	852	83.5
Preoperative area	104	10.2
Dedicated procedure room	51	5.0
Recovery area	13	1.3
Skin preparation		
Povidone-iodine	268	26.3
Chlorhexidine with alcohol	252	24.7
Spirit	73	7.2
Combination of the above	427	41.9
USG probe asepsis		
Sterile gloves	313	30.7
Biofilm cover	134	13.1
Camera cover	159	15.6
Chlorhexidine with alcohol	151	14.8
Povidone-iodine	59	5.8
None	78	7.6
Not applicable	126	12.4
Localization of plexus/nerve		
Landmark technique	432	42.4
PNS guide	284	27.8
USG guide	602	59.0
USG with PNS guide	234	22.9
Use of monitor before block		
Always	987	96.8
High-risk patients	18	1.8
Pediatric patients	1	0.1
None	14	1.4
Preferred choice		
GA	14	1.4
RA	740	72.5
GA with RA for pain relief	175	17.2
Patient's decision	91	8.9
Sedation before block		
Always	222	21.8
Apprehensive patients only	210	20.6
Pediatric patients only	107	10.5
Both apprehensive and pediatric patients	385	37.7
Never	96	9.4
Source of training		
Self-practice	663	65.0
Fellowship	148	14.5
Courses and workshop	662	64.9
During PG	406	39.8
Internet	546	53.5

GA=general anesthesia, PG=postgraduation, RA=regional anesthesia, USG=ultrasound

Dexamethasone was the most commonly used adjuvant by 57.9% of the participants, while the stimulating needle was preferred by 52.4% of the participants [Table 3]. Complications and perceptions of the physicians about the disadvantages and changes in the practices are summarized in Table 4. Intralipid was still not present in the set-up of 45.5% of participants. The most commonly used block of the upper limb was the supraclavicular approach of the brachial plexus block (90.8%), followed by the interscalene approach (69.7%) and the axillary approach (62.2%). Regarding the lower limb blocks, fascia iliaca block was used by 82.5%, followed by the lumbar plexus block (50.7%) [details are given in Figure 3]. Details of the regional society membership are given in Figure 4. Advanced training and courses have got an impact on the block practices [details are given in Table 5].

Discussion

Adequate postoperative analgesia is an essential requirement in modern medicine due obvious reasons.[1] RA techniques have been found to offer distinct advantages over GA, particularly for limb surgeries.[2,3] Consequently, there has been an increased adoption of these techniques for perioperative pain management. Few surveys on RA exist,[4,5] and none have employed a validated questionnaire.

Singh *et al.*[6] have developed a validated questionnaire specifically designed to assess the practices of regional blocks, which provides a standardized and reliable tool for evaluating the block's usage in clinical practice, thus making it a robust practice document. This questionnaire was shared via email, WhatsApp messenger (WhatsApp LLC, Delaware Limited liability company), and other social media platforms to eligible physicians. A total of 1020 physicians completed the questionnaire.

Our study suggested a significant increase in the number of nerve blocks performed.[7-9] We found the usage of nerve blocks by 21% of the respondents in more than 70% of their patients and by 45% of the respondents in more than 50% of their patients every month. These numbers are notably higher than what has been reported in earlier studies.[10]

Although effective communication of the plan of surgery and anesthesia is important to reduce the anxiety and stress response in the perioperative period, resulting in better outcomes,[11] we found that this was implemented by 43.6% of the participants. Approximately 69.5% of the respondents experienced improved outcome with a block, which was in agreement with previous studies.[12] Other studies also reiterate an improved outcome due to RA, achieved by lowering the pain scores, Deep vein Thrombosis (DVT), blood loss, transfusion requirements, operating time, and length of stay.[13-15]

However, anesthesiologists do encounter difficulties in implementing RA. Interestingly, the primary barriers include time factors (time needed for the procedure) (46.9%) and surgeon factors (surgeon's perspective or interference in anesthesia plan) (43%). According to surveys conducted by Boyd *et al.*,[16] time constraint was a significant hurdle for clinicians, in comparison to GA. In addition, surgeon's perceptions were also noted as a major obstacle to the

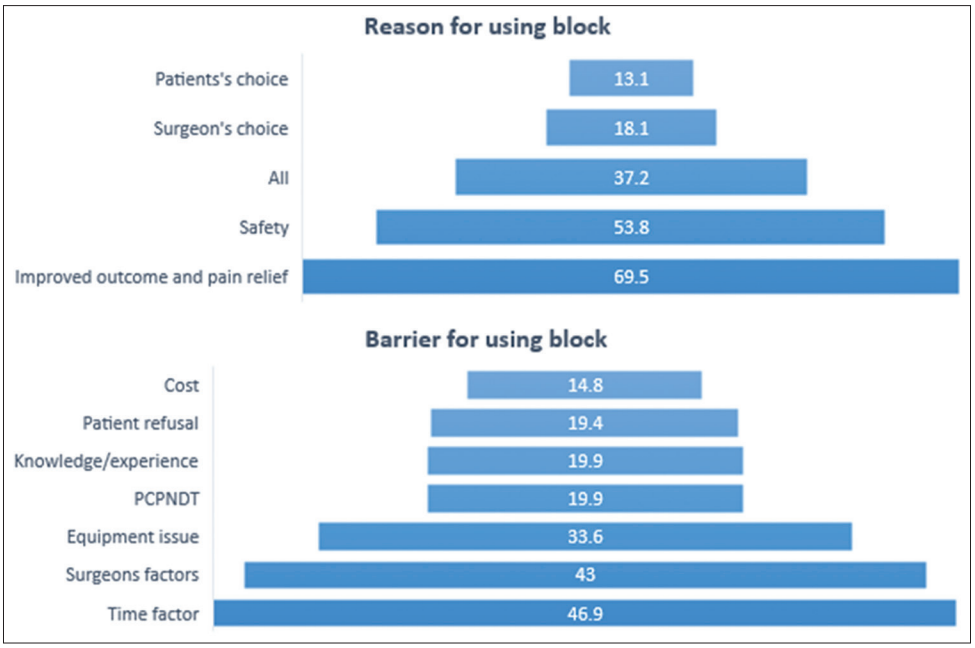

Figure 2: Most appropriate reasons and barriers for using nerve blocks. PCPNDT = Pre-Conception and Pre-Natal Diagnostic Techniques

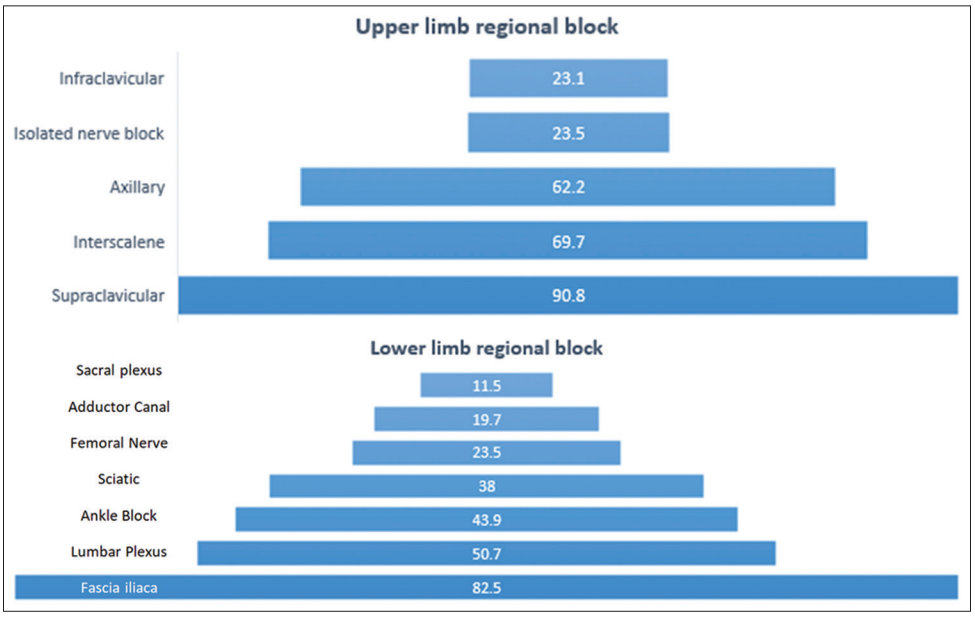

Figure 3: Commonly performed upper and lower limb regional blocks

practice of RA.[17,18] We found patient refusal (19.4%) and cost (14.8%) also as contributing factors among the barriers.

Clinicians expressed a high level of comfort (83.5%) in practicing RA in the operating room, and only 5% of them had dedicated procedure rooms for the blocks. For skin preparation before injection, 41.9% of clinicians followed standard sterilization methods like a combination of povidone-iodine and chlorhexidine with alcohol. Meanwhile, 26.3% used only povidone-iodine and 24.7% adhered to the latest guidelines recommending chlorhexidine with alcohol for preventing surgical site infections.[19-21] The USG probe's asepsis was maintained by sterile gloves (30.7%), biofilm cover (13.1%), camera cover (15.6%), chlorhexidine with alcohol (14.8%), povidone-iodine (5.8%), and/or combinations of these techniques. It was also found that most practitioners used USG (59%),42.4% used landmark guidance, and Peripheral Nerve Stimulator (PNS) guide was used by 27.8% of responders. USG with PNS was used by 22.9% of the participants. This reflects the inclination of the users toward USG-guided blocks.[22,23]

Table 3: Use of medication and equipment during nerve block

Variables	Number	Frequency
Preferred mode of nerve block		
Single injection	735	72.1
Catheter for infusion in adults	12	1.2
Both	272	26.7
Catheter for pediatric patients	1	0.1
Preferred drug		
Bupivacaine	423	41.5
Ropivacaine	407	39.9
Lignocaine	193	18.9
Bupivacaine with lignocaine	572	56.1
Ropivacaine with lignocaine	187	18.3
Others[a]	35	3.4
Preferred adjuvant		
Clonidine	202	19.8
Dexamethasone	591	57.9
Dexmedetomidine	251	24.6
Fentanyl	211	20.7
Soda bicarbonate	150	14.7
None	172	16.9
Others[b]	41	4.0
Preferred needle		
Echogenic	232	22.7
Stimulating	534	52.4
Short bevel	191	18.7
Hypodermic	279	27.4
Spinal	320	31.4
Tuohy	91	8.9
Other[c]	17	1.7
Documentation of RA		
Anesthesia chart/e-logbook	742	72.7
Separate form	58	5.7
Patient's file	199	19.5
No documentation	21	2.1

[a]*Other drugs of choice were levobupivacaine (1.9%), lignocaine with adrenaline (0.5%).* [b]*Other preferred adjuvants were adrenaline (0.7%), buprenorphine (1.6%), butorphanol (0.3%), magnesium sulfate (0.2%), midazolam (0.2%), morphine (0.3%) and nalbuphine (0.1%).* [c]*Other preferred choices of needles were 18 G, 20 G, 22 G, and 24 G IV cannula needle (1.7%). RA=regional anesthesia*

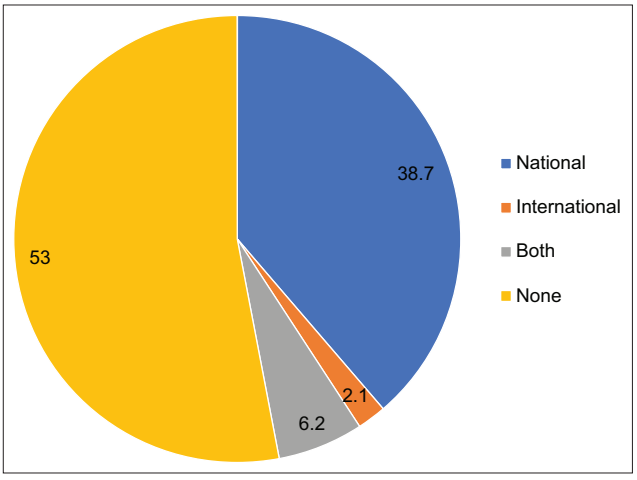

Figure 4: Member of regional anesthesia society

The survey participants demonstrated a high adherence rate (96.8%) for performing blocks under minimum standard monitoring, as recommended by various guidelines.[24-26] A positive impact of RA on enhanced recovery and improved healthcare is also supported by the existing literature.[27] In addition, most of the participants (72.5%) expressed a preference for RA when it can be utilized for a procedure. Furthermore, 37.3% of the participants indicated their inclination to use sedation for apprehensive and pediatric patients before administering blocks. RA training through fellowship was acquired by 14.5% of the participants, while 64.9% had attended courses and workshops. The survey also clearly showed the preference for supraclavicular brachial plexus block by 90.8%, fascia iliaca block by 82.5%, and lumbar plexus block by 50.7% of the participants.

Table 4: Complications and perceptions of physicians for nerve blocks

Variables	Number	Frequency
Disadvantages		
Low success rate	97	9.5
Time required to establish	447	43.8
Poor acceptability	182	17.8
None	430	42.2
Others[a]	47	4.6
Complications		
LA toxicity	338	33.1
Neurologic deficit	174	17.1
Wrong side block	58	5.7
Pneumothorax	177	17.4
Respiratory depression	156	15.3
Cardiac arrest	26	2.5
None	377	37.0
Others[b]	100	9.8
Change in practice following complications		
Efforts to improve skill and knowledge	551	54.0
Changed to PNS guided	119	11.7
Changed to USG guided	277	27.2
Changed drug concentration	183	17.9
Changed drug volume	241	23.6
Stopped RA practice	8	0.8
Not applicable	223	21.9
Others[c]	30	2.9
Presence of 20% intralipid RA cart		
Yes	566	55.5
No	454	45.5

[a]*Other disadvantages where it cannot be used in certain scenarios, uncooperative patients, cost, lack of equipment, failure, surgeon unwillingness, and, in some cases, patient factors.* [b]*Other complications were accidental subdural/intravascular injection (1.1%), affective dyspnea, anaphylaxis, inadequacy/failure of block (1.5%), equipment failure, convulsion (0.8%), and prolonged block (0.9%).* [c]*Other changes in practices were change in needle, accept failure and use alternative methods, adjustment of patient position, establish safety protocol, keeping intralipid stock, slow injection, change in drug, vigilant monitoring. RA=regional anesthesia, USG=ultrasound*

The use of continuous catheter technique has emerged with the availability of atraumatic catheters and advantages like better analgesia and functional recovery. However, catheter migration, breakage, and dislodgement were noted.[28,29] The majority of participants (72.1%) preferred a single injection for blocks, whereas 26.7% of the participants preferred using a catheter after bolus injection.

Table 5: Effect of specialized courses on block practices

Variables	Fellowships and courses *n* (%)	Practice and internet *n* (%)	*P*
Gender			
Male	126 (53.8)	466 (59.5)	0.123
Female	108 (46.2)	317 (40.5)	
Age in years			
20–30	37 (15.8)	34 (4.3)	<0.001
31–40	90 (38.5)	250 (31.9)	
41–50	67 (28.6)	260 (33.2)	
51–60	29 (12.4)	171 (21.8)	
>60	11 (4.7)	68 (8.7)	
Qualification			
MD/DNB	34 (14.5)	55 (7.0)	<0.001
3–5 years	51 (21.8)	97 (12.4)	
5–10 years	43 (18.4)	128 (16.3)	
10–20 years	58 (24.8)	222 (28.4)	
>20 years	48 (20.5)	281 (35.9)	
Workplace			
Govt. college	40 (17.1)	145 (18.5)	0.002
Private college	26 (11.1)	109 (13.9)	
Teaching hospital	48 (20.5)	139 (17.8)	
Corporate	74 (31.6)	163 (20.8)	
Private practitioners	46 (19.7)	227 (29.0)	
Frequency of use of regional block			0.794
>70%	56 (23.9)	164 (20.9)	
50–70%	53 (22.6)	190 (24.3)	
20–50%	89 (38.0)	302 (38.6)	
<20%	36 (15.6)	127 (16.2)	
Discussing regional block with patients			0.015
>70%	112 (47.9)	331 (42.3)	
50–70%	38 (16.2)	186 (23.8)	
20–50%	58 (24.8)	150 (19.2)	
<20%	26 (11.1)	116 (14.8)	

Bupivacaine with lignocaine is still the most used drug for blocks, although Ropivacaine is a promising alternative with a reduced toxicity potential.[30-32] Among the participants, 56.1% preferred to use a mixture of bupivacaine and lignocaine, 41.5% preferred bupivacaine, and 39.9% preferred ropivacaine. In addition, 57.9% of participants used dexamethasone, while dexmedetomidine, fentanyl, and clonidine were the adjuvants used by 24.6%, 20.7%, and 19.8% of the participants, respectively, to prolong blocks. The preferred needle for blocks was the stimulating needle by 52.4%, the spinal needle by 31.4%, the hypodermic needle by 27.4%, and only 22.7% used an echogenic needle. Most of the participants (72.7%) documented the block in the anesthesia chart or e-logbook, 19.5% in the patient's file, and 5.7% of the participants had separate forms for block documentation. The survey participants (43.8%) perceived the time required to establish as a disadvantage, as reported by Dohlman *et al.*[33] However, 42.2% of the participants did not see any disadvantages of nerve blocks.

Among the various complications, Local Anesthetic Systemic Toxicity (LAST), neurologic deficits, and cardiovascular events have been the most concerning ones.[9,32,34] Nerve block-related complication was not witnessed by 37% of the participants, while 33.1% have seen Local Anesthetic (LA) toxicity and 17.1% and 17.4% have dealt with neurologic deficit and pneumothorax, respectively. The complications faced by participants triggered changes in practice, where 54% of them made efforts to improve skill and knowledge, 27.2% upgraded to USG for guidance of nerve blocks, 23.6% changed the drug volume used, and 0.8% stopped RA practice. LAST is one of the concerning complications of RA practice, and various guidelines have urged the availability of intralipid as the reversal for the same, if it occurs.[9,32,34,35] The safety parameter for practicing block ensures the presence of intralipid in the RA cart, and 55.5% of the participants did have 20% intralipid in the RA cart before the block all the time.

Conclusions

The purpose of this survey was to evaluate the existing perception and practice of RA among anesthesiologists. It stands as a unique survey, employing a validated questionnaire that enables us to gain valuable insights. These insights can aid experts in formulating guidelines and recommendations for the practice of RA, ultimately contributing to its advancement and improvement.

Study data availability

De-identified data may be requested with reasonable justification from the authors (email to the corresponding author) and shall be shared after approval as per the authors' institution policy.

Patient consent statement

Participants' consent was implied (online survey).

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Appendix A: Final Questionnaire

Dear Anaesthesiologist,

You are requested to take part in the survey for "Plexus and Nerve block Practices in India" which will help us to study the usage and practices of various blocks and to develop a national Plexus and blocks registry in future. Your consent is voluntary and this would take 10-15 min. Collected data will be used for the analysis while maintaining the anonymity. We appreciate your 'Time and Knowledge Sharing', thank you for taking up the survey.

1) Sex: Male/Female, Mail ID (optional)-…….

2) Age: A) 20-30 years B) 31-40 years C) 41-50 years D) 51- 60 years E) >60 years

3) Your Current professional experience: Degree- MD/DNB, Post degree- PD

A) MD/DNB student B) 3-5 years PD C) >5-10 yrs PD D)>10-20 yrs PD E) >20 yrs PD

4). Your working Area: (Teaching hospital-DNB course)

a) Government college B) Private college C) Teaching Hospital D) Corporate

E) Private Practitioner

5). How frequently are you using Blocks for perioperative care on monthly case basis?

A) >70% B) >50-70% C) 20-50% D) <20%

6) How frequently do you discuss the Nerve block plan with your patient?

A) >70% B) >50-70% C) 20-50% D) <20%

7) Most appropriate reason according to you for using regional blocks:

A) Safety B) Improved outcome and Pain relief C) Patient's Choice D) Surgeon's choice E) All of the above

8) Where do you perform the blocks mostly?

A) Operating room B) Pre-operative area C) Dedicated procedure room D) Recovery area

9) What are the barriers to practice regional blocks in your set-up? (May mark multiple choices)

A) Surgeon's factors B) Equipment Issues C) Time factor D) Knowledge/Experience E) Cost factor F) Patient Refusal G) PCPNDT

10) Your best source of training in nerve block?

A) Self practice B) Fellowship C) Courses and workshops D) During PG E) Internet

11) Skin preparation done before block by:

A) Povidone iodine B) Chlorhexidine with alcohol C) Spirit D) Combination of A and B

12) USG Probe asepsis method commonly used is:

A) Sterile gloves B) Bio film covers C) Camera cover D) Chlorhexidine with alcohol rubs

E) Dip the probe in povidine iodine F) None

13) How do you localize plexus/nerves before blocks?

A) Landmark technique B) PNS guided C) USG Guided D) USG with PNS guided

14) Do you routinely attach monitors before block?

A) Always B) Only for high risk patients C) Only for pediatric patients D) No

15) If a procedure can be done safely under either regional (RA)/General Anaesthesia (GA), what is your preferred choice?

A) GA B) RA C) GA with RA for Pain relief D) Patient's decision

16) Do you use peripheral nerve blocks in children?

A) >70% B) >50-70% C) 20-50% D) <20%

17) Do you sedate your patients before blocks?

A) Always B) Apprehensive patients only C) Only pediatric patients D) Both B and C E) Never

18) Preferred mode of plexus/nerve block practice at your place:

A) Single injection B) Catheter for infusion in adults only C) Both single injection/catheter D) Catheter for infusion in pediatric patients only

19) Preferred drugs used for plexus and nerve blocks:

A) Bupivacaine B) Ropivacaine C) Lignocaine D) Bupivacaine with lignocaine

E) Ropivacaine with Lignocaine F) Other (Please specify)……

20) What is your preferred adjuvant for a peripheral nerve block?

A) Clonidine B) Dexamethasone C) Dexmedetomidine D) Fentanyl

E) Soda bicarbonate F) Other (Please specify)……. G) None

21) What kind of needles do you use for blocks?

A) Echogenic Needles B) Stimulating nerve block needle C) Short bevel Needles

D) Hypodermic needles E) Spinal needle F) Tuohy Needle G) Other…….

22) Does the cost of a block needle restrict its usage in your practice?

A) Always B) Occasional C) Rarely D) Never

23) How do you document regional blocks?

A) Anesthesia chart/e-logbook B) Separate form C) patient file D) No documentation

24) In your opinion, disadvantages of Regional Blocks are: (May mark multiple choices)

A) Low success rate B) Time required to establish C) Poor acceptability D) None

E) Others….

25) Complications that you have seen during regional Block: (May mark multiple choices)

A) LA toxicity B) Neurological deficits C) wrong side blocked D) Pneumothorax

E) Respiratory Depression F) Cardiac Arrest G) None H) Others…….

26) Practice changes done after witnessing the complication: (May mark multiple choices)

A) Effort to improve skills and knowledge B) changed to PNS guided C) Changed to USG guided D) Changed drug concentration E) Changed drug volume F) Stopped RA practice

G) Not Applicable H) Others……

27) Most Common Upper limb block performed:

A) Interscalene B) Supraclavicular C) Infraclavicular D) Axillary E) Isolated Nerve blocks

28) Most Common Lower limb block performed:

A) Femoral Nerve block B) Fascia Iliaca Block C) Sciatic Nerve block D) Lumber plexus block E) Adductor canal Block F) Ankle Block G) Sacral Plexus Block

29) Do you have 20% intra-lipid in your regional anaesthesia cart? A) Yes B) No

30) Are you member of any Regional anaesthesia society?

A) Yes, National B) Yes, International C) Both A and B D) No