

Regional anaesthesia practices in India: A nationwide survey

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ABSTRACT

Background and Aims: There are no surveys documenting the existing regional anaesthesia (RA) practices in our country. This nationwide survey aims to record the existing RA practices, identify any lacunae that might exist and project the future direction of evolution. **Methods:** This online survey consisting of 31 questions was sent to all members of the Indian Society of Anaesthesiologists and addressed participants' demographic features, central neuraxial block and peripheral nerve block practices, drug selection, RA training and safety measures. The data were analysed using Statistical Package for the Social Sciences version 24.0. All categorical variables were expressed as frequencies and percentages. **Results:** A total of 2141 responses were received, with participants distributed across the country. Forty-two per cent of the respondents reported that more than 60% of surgeries were performed under RA. Most of the participants use 'traditional' test dose for epidural space confirmation. Fifty participants (2.4%) use ultrasound for neuraxial space identification. Twenty per cent of the participants use a checklist for monitoring post-operative epidural analgesia. 6.7% have undergone specialised training in RA. Around 3.5% of the respondents have performed a wrong-side block. 31.4% of the respondents store intralipid in the operating room. **Conclusion:** The current survey highlights the prevailing practices, various deficiencies in monitoring and the need for RA training programmes. The data accrued can serve as a baseline for future comparison.

Key words: Anaesthetics, analgesia, epidural, surveys and questionnaires

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INTRODUCTION

Regional anaesthesia (RA) techniques have been commonly used for surgical anaesthesia and post-operative analgesia. Epidural analgesia and peripheral nerve blocks can provide post-operative analgesia, enhance recovery after surgery and improve patient satisfaction.^[1-4] With ultrasonography (USG) availability, these techniques are extensively being utilised to provide improved peri-operative care.^[5] To the best of our knowledge, a nationwide survey about RA practices in India is lacking. A nationwide survey can provide data about practices at different

hospitals and aid to gain acquaintance with the prevailing clinical practices. The results will guide the training in RA and can improve the safety features required to prevent complications associated with RA

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techniques. The results can be used as a standard for future comparisons and the evolution of RA practices in India. This descriptive survey aims to evaluate the existing RA practices across various institutions, identify any lacunae and project the future direction of evolution.

METHODS

This online cross-sectional study was conducted by the Indian Society of Anaesthesiologists (ISA) from January 1, 2021, to April 30, 2021, after obtaining institutional ethics committee approval and registering with the Clinical Trials Registry- India (CTRI/2020/06/026171). The survey questionnaire was reviewed for content and structure by eight senior consultants with a minimum of 10 years of experience in RA to ensure validity and precision. The survey addresses participants' demographic features, central neuraxial block (CNB) and peripheral neuraxial block (PNB) practices, drug selection, training and safety measures. An electronic questionnaire was created in Google forms (Google, Alphabet Inc, California, USA), a web-based survey research tool that allows users to create surveys using question format templates. Further, as a pilot study, the questionnaire was sent to eight anaesthesiologists not involved in validating the questionnaire to ensure the functioning of the questionnaire in various platforms and rectify ambiguous questions, and their feedback was obtained. The secure link containing the questionnaire was sent to all registered anaesthesiologists of the ISA through their mobile number using WhatsApp messenger (WhatsApp®, MountainView, CA, USA). Subsequently, two electronic reminders were sent through e-mail one month after the initial message. The responses were anonymous, and there was no incentive for participation.

The questionnaire consisted of 31 questions, of which 24 were objective choice type, and seven were of the 'yes' or 'no' type (Annexure 1). All the responses were saved to the Google account of ISA. The data were analysed using Statistical Package for the Social Sciences version 24.0 (SPSS version 24.0, Chicago, Illinois). All categorical variables were expressed as frequencies and percentages.

RESULTS

The survey questionnaire was sent to all the ISA members (life and associate). There were 2141 responses, giving a response rate of 10%. Though

35% of the respondents were from medical college hospitals, there was adequate representation from government hospitals, corporate hospitals and freelancing practitioners. The majority responded that more than 60% of the surgeries are performed under RA [Figure 1]. The participants were distributed throughout the country [Figure 2]. The total number of responses for each question was considered for calculating proportions.

The common position adopted for performing the neuraxial technique is the sitting position (46.6%). The commonly used needle size and type is 25G with a bevelled tip [Table 1]. Co-loading of intravenous (IV) fluids is mainly practised. Almost 90% of the respondents encountered post-dural puncture headache in less than 2% of patients. The loss of resistance to air is the most common method used for epidural space identification (64.5%). 6.7% of the respondents had undergone fellowship or certificate course training in performing PNBs. Around 46% of the respondents perform PNBs under USG guidance, and 28.6% perform using landmark technique. 55.4% of the respondents routinely evaluate motor and sensory blockade recovery after peripheral nerve blocks and document it.

Bupivacaine is the most common drug used for spinal anaesthesia, and opioids are the commonly used adjuvant [Table 2]. Around 16% of the respondents use off-label drugs as adjuvants in spinal anaesthesia. Test dose containing lignocaine and adrenaline is commonly used in obstetric and non-obstetric patients. The combination of bupivacaine and lignocaine is commonly used (61.1%) in PNBs. Dexamethasone, opioids and dexmedetomidine are widely used drugs as adjuvants in PNBs. Several off-label drugs like sodium bicarbonate, tramadol, midazolam, ketamine, magnesium sulphate, buprenorphine, butorphanol and hyaluronidase are used as adjuvants in PNBs.

The majority (89.1%) of the respondents used epidural catheters, and 23.5% used perineural catheters for post-operative analgesia [Table 3]. A combination of opioids and local anaesthetics (LA) is commonly used in epidural analgesia. 20.1% of the respondents used a checklist for monitoring post-operative epidural analgesia. 73.4% of the respondents mark and confirm the site of the block before performing the block. 3.5% of the respondents have performed a wrong side block. 31.4% of the respondents store intralipid in the operating room [Table 4]. Around 60% of the

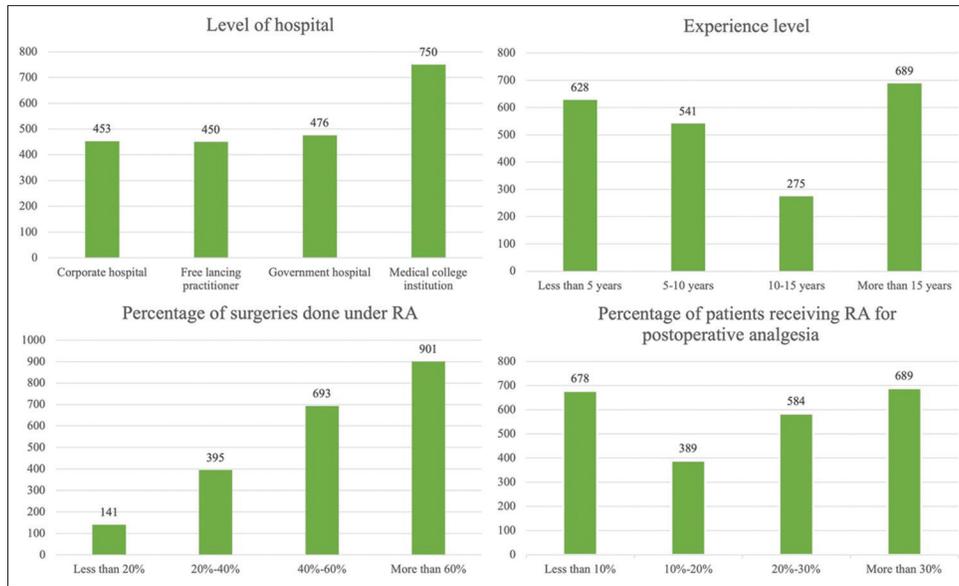


Figure 1: Participants' characteristics. Bar height represents number of respondents. RA: Regional anaesthesia

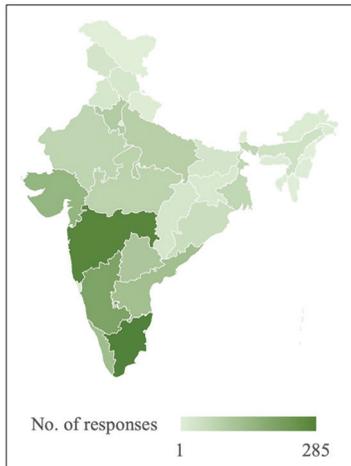


Figure 2: Statewise distribution of participants

respondents have seen one or more complications following RA.

RA techniques were commonly used in the daycare setting too. 390 (18.7%) respondents used spinal anaesthesia, and 485 (23.2%) used PNBs for daycare surgeries. In the paediatric setting, caudal anaesthesia remains the most common [1546 (73.3%)] technique. However, the participants also used nerve blocks [706 (33.5%)] and spinal-epidural techniques [1088 (51.6%)]. Around 118 (5.6%) respondents never use any RA techniques in the paediatric population.

DISCUSSION

This survey aimed to document the existing RA practices in our country. The survey questionnaire

was divided into categories like demographic factors, neuraxial and PNB techniques, drug selection, post-operative pain management, safety measures and RA in the daycare and paediatric settings.

Most respondents (35%) were from medical college institutions, but other hospitals were also equally represented in the survey. Also, 32% of the respondents had more than 15 years of experience in anaesthesia. 42.3% responded that more than 60% of the surgeries are performed under RA. This finding does not come as a surprise given the numerous advantages of RA with superior equipment like USG, better needles and catheters and drug availability (drugs with better toxicity profiles), making it more popular among anaesthesiologists and patients alike.^[6] The respondents who performed more than 60% of surgeries under RA predominantly belonged to government medical colleges or were freelancing practitioners. It is probably because of the ease of managing patients and also the ability to provide surgical anaesthesia with a single drug in RA.

CNBs are the most commonly performed RA techniques worldwide. In this survey, 50% responded that they preferred the sitting position for administering spinal anaesthesia and used a 25G bevelled tip needle. Almost 90% of the respondents encountered PDPH in less than 2% of patients. Bupivacaine remains the standard drug used in spinal anaesthesia given its long duration of action and availability. These findings are consistent with those from other nationwide

Table 1: Neuraxial and peripheral nerve block techniques

Parameter	n (%)
Position to perform CNBs	
Lateral	568 (26.6)
Position according to patients' comfort	568 (26.6)
Sitting	997 (46.7)
Common needle size used	
23G	434 (20.3)
25G	1050 (49.2)
26G	391 (18.3)
27G	258 (12.1)
Common type of needle used for spinal anaesthesia	
Bevelled tip needle	1808 (84.7)
Pencil tip needle	326 (15.2)
Intravenous fluids before initiating spinal anaesthesia	
Co-load all patients	741 (34.7)
Preload all patients	673 (31.5)
Preload or co-load selective patients	674 (31.5)
Never	44 (2)
Incidence of post-dural puncture headache	
Less than 2%	1881 (88.7)
2%-5%	208 (9.8)
More than 5%	30 (1.4)
Method for epidural space identification	
Loss of resistance to air	1817 (85)
Loss of resistance to saline	492 (23.1)
Hanging drop method	364 (17.1)
Ultrasound	51 (2.4)
Training for performing PNBs	
Certificate course/Fellowship	142 (6.7)
Residency	1209 (57.7)
Workshops/Online content	743 (35.4)
Performing PNBs under general anaesthesia	
Yes	785 (37.1)
No	1331 (62.9)
Technique to perform PNBs	
Combined USG with nerve stimulator	240 (11.3)
Landmark	604 (28.6)
Nerve stimulator	277 (13.1)
USG guided	988 (46.8)
Evaluation and documentation of sensory and motor recovery following nerve blocks	
Yes	1160 (55.4)
No	933 (44.5)

n- number, CNB- central neuraxial blockade, G- gauge, PNBs- peripheral nerve blocks, USG- ultrasonography

surveys.^[6,7] Opioids are the most common adjuvants used in spinal anaesthesia. The use of off-label drugs has always been prevalent. Though stringent guidelines have been issued for off-label drugs in research, their use will remain in practice.^[8] More rigid documentation, reporting and record-keeping may pick up various drugs' advantages and toxicity profiles. In the current survey, three hundred and fifty respondents acquiesced to using other off-label drugs in spinal anaesthesia.

An ideal epidural test dose should identify the intrathecal and intravascular placement of catheters so that complications due to drug injection into the wrong space could be avoided without causing any complication by itself.^[9] Most respondents in this survey commonly use the traditional test containing a small dose of lignocaine and adrenaline in both the non-obstetric and obstetric populations, albeit a lower percentage in the latter. In the obstetric population, adrenaline containing test dose can give inconclusive results, making it controversial.^[9] Due to the various adverse effects of adrenaline on the foetal circulation and ambiguous heart rate variability in a patient in labour, the use of test dose and its validity has always been a matter of study.^[10] In the current survey, 21.4% of the respondents do not use a test dose to confirm epidural catheter placement in the obstetric population.

USG has integrated itself into various aspects of the world of anaesthesiologists. From vascular catheter insertion to PNBs to pre-operative echocardiography, USG finds its use all around. The use of USG has brought about a paradigm shift in RA. USG-guided PNB has become the gold standard, as reflected by almost half (46.8%) of the respondents performing PNBs under USG guidance. In previously published studies from China and Greece, anatomical and nerve stimulator (NS) guided blocks were more common, respectively. This could be because USG was not as accessible then as it is now and could also be due to limited expertise.^[6,7] Though not so prevalent in CNBs, the increasing incidence of obesity and patients with challenging anatomy presenting for surgeries has brought the need for innovative techniques in identifying the epidural/spinal space.^[11-13] In the present survey, most respondents mentioned that they use the loss of resistance to air to identify the epidural space, but 51 respondents used USG to identify the epidural space. Of these 51 respondents, 26 belonged to a medical college hospital. Anaesthesiologists in medical college hospitals update themselves regularly and will probably be the first to incorporate the latest advances in their clinical practice.

A combination of bupivacaine and lignocaine was used in PNBs to have the best of both worlds, namely, faster onset and prolonged duration of action. Nevertheless, with the advent of USG and NS, precise needle location is possible, enabling drug deposition very close to the nerve bundles facilitating faster onset.^[5] It should be emphasised that co-administration of bupivacaine and

Table 2: Drug selection

Parameter	n (%)
Drug commonly used in spinal anaesthesia	
Bupivacaine	2106 (98.6)
Ropivacaine	22 (1)
Other drugs	6 (0.2)
Adjuvants used in spinal anaesthesia	
Clonidine	663 (31.1)
Opioids	1746 (82)
Other off label drugs like dexmedetomidine	350 (16)
Never	174 (8.1)
Epidural test dose in non-obstetric patients	
3 mL 1.5% Lignocaine with adrenaline 15 µg	1597 (75.5)
3 mL Lignocaine 2%	256 (12.1)
No test dose	214 (10.1)
Other drugs	46 (2.1)
Local anaesthetic commonly used in PNBs	
Bupivacaine	513 (24.3)
Bupivacaine + lignocaine	1291 (61.1)
Ropivacaine	307 (14.5)
Adjuvant used in PNBs	
Dexamethasone	1248 (62.5)
Opioids	789 (39.5)
Dexmedetomidine	712 (35.6)
Clonidine	345 (17.2)
None	77 (3.8)
Other drugs	60 (3)

n- number, PNBs- peripheral nerve blocks

Table 3: Post-operative pain management

Parameter	n (%)
Use of epidural for post-operative analgesia	
Yes	1893 (89.1)
No	231 (10.8)
Drug routinely used for post-operative epidural analgesia	
Both opioids and local anaesthetics	1626 (78.5)
Local anaesthetics	326 (15.7)
Opioids	118 (5.7)
Monitoring of patients receiving epidural analgesia	
No checklist but SpO ₂ , RR, HR, BP	1347 (65)
No monitoring	43 (2)
Only SpO ₂	265 (12.7)
Using a checklist	417 (20.1)
Use of perineural catheters for post-operative analgesia	
Yes	492 (23.5)
No	1600 (76.4)

n- number, SpO₂- Peripheral oxygen saturation, RR- respiratory rate, HR- heart rate, BP- blood pressure

lignocaine may increase the potential for toxic effects when maximum doses of both are used. Dexamethasone remains the most common adjuvant added, followed by opioids and clonidine. Dexmedetomidine, another alpha-2 agonist, has been used as an adjuvant in clinical and research settings.^[14,15]

Epidural catheters are quite commonly used by 89% of the respondents. However, perineural catheters are

not that commonly used; 23.5% of participants used peri-neural catheters for post-operative analgesia. The lesser use of perineural catheters could be due to a lack of knowledge, availability and training in securing perineural catheters. Only 20% of the respondents use a designated checklist to monitor for complications. Rest follow routine vitals monitoring, and 12% of the respondents only monitor peripheral oxygen saturation, which could cause concern. Following PNBs, 44.5% of the respondents do not check the motor and sensory blockade recovery. There should be defined guidelines for the required level of monitoring depending on the type of post-operative analgesia and the need to follow the same, which could make RA for post-operative analgesia management safer and, in turn, well received.

Most of the respondents were trained in PNBs as a part of their residency. Only 6.7% had undergone a certificate course or a fellowship in RA. In a survey in the US, they found that even after satisfying the requirement of various accreditation societies, residents did not feel competent enough to perform all the PNBs.^[16] It has been observed that there is increased demand for continuing education beyond residency.^[17] Also, the consultants might not be trained in USG guided nerve blocks due to the unavailability of the USG facility during their learning period. Fellowships or workshops in RA enable us to bridge this knowledge gap. With emerging new blocks, ranging in use from pre-operative period to emergency room to palliative care, it is important now more than ever to introduce new national RA fellowship programmes enabling better learning and training.

Local anaesthetic systemic toxicity (LAST) is a severe complication seen following RA when there is an intravascular injection of LA. Its incidence has been very low, but when it does occur, it can be fatal. Almost 20% of the respondents have witnessed LAST. With the increased use of RA in various locations, there has been increased attention towards preventing and treating LAST, and several international guidelines have been issued for the same.^[18] Intralipid has been mentioned in all the guidelines as the only possible therapy for reversing the LA actions. It is the authorities' responsibility to ensure the availability of intralipid in areas where local anaesthetics are administered. National health services (NHS) recommends stocking at least 1500 mL of intralipid as part of the antidotes with instructions for its use. However, only 33.4% responded affirmatively to stocking intralipid, which

Table 4: Safety measures

Parameter	n (%)
Marking and confirming the site of the block before performing peripheral nerve blocks	
Yes	1541 (73.4)
No	556 (26.5)
Performed a wrong side block	
Yes	75 (3.5)
No	2027 (96.5)
Complications seen following regional anaesthetic techniques	
Haematoma	588 (28.2)
IV injection	540 (25.9)
LAST	343 (16.4)
Nerve injury	232 (11.1)
Never	829 (39.8)
Routine storage of intralipid in the operating room	
Yes	663 (31.4)
No	1444 (68.5)

n- numbers, IV- intravenous, LAST - local anaesthesia associated systemic toxicity

pinpoints the need for published Indian guidelines for various aspects of RA, which are tailored to the Indian scenario and ensure better compliance. In the survey by Huang and Gao^[7] only 20.4% of respondents agreed to stocking intralipid routinely.

75% respondents agreed to mark the site before performing the blocks. Wrong side block has been getting increased attention lately, with several measures taken in the form of ‘time-out’ before block performance to prevent the occurrence.^[19] Our survey found that 3.5% of the respondents have performed a wrong side block. The occurrence of wrong side blocks can be remedied by introducing policy changes like mandatory time-out and site-marking before the procedure and ensuring compliance.

The use of spinal and PNBs for daycare surgery has increased tremendously due to better analgesia, reduced need for opioid-based analgesia following RA, resulting in increased patient demand for RA, reduced hospital stay, and in return, costs.^[18] Most (40.1%) of the respondents use spinal and PNBs for daycare surgeries in the current survey. The increased use of PNBs in paediatric settings points to a better understanding of the blocks, availability of USG and advanced instruments for paediatric PNBs.^[20] In a survey conducted in paediatric RA practices, though the most common technique remains caudal block, 72% of the respondents use caudal, epidural and PNBs.^[21] A similar response was obtained in the current survey too.

This study had the following limitations. As with any survey, this survey also has non-respondent

bias. Though the response rate was low, the number of responses was quite significant and was on par with several published surveys. Though anonymity encouraged unbiased answers, we could not validate the accuracy of the responses. The survey was a cross-sectional study; prospective studies would be preferable for more objective documentation of longitudinal practices over time. Several other vital areas in RA practice, like RA in patients with coagulopathy, use of plane blocks, and use of sham blocks, need to be addressed; however, the most important topics were chosen to keep the survey more concise.^[22]

CONCLUSION

This survey brings to the forefront several essential issues in the field of RA in the Indian setting. Though several advancements were noted in the field of RA, there were also some imperfect practices still followed, which needs adaptation. The survey also highlights the escalating demand for dedicated RA fellowships or courses for better quality-focused RA education. This survey acts as a record of the existing nationwide RA practices and will serve as a reference for future comparison.

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Conflicts of interest

There are no conflicts of interest.

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Annexure 1: Questionnaire:

General information:

Your hospital level:

- Free lancing practitioner
- Corporate hospital
- Medical college institution
- Government hospital

Years of experience:

- Less than 5 years
- 5–10 years
- 10–15 years
- More than 15 years

Enter your state:

What percentage of surgeries in your department are done under regional anaesthetic techniques?

- Less than 20%
- 20-40%
- 40-60%
- More than 60%

What percentage of patients undergoing surgeries receive regional anaesthesia for post-operative analgesia?

- Less than 10%
- 10-20%
- 20-30%
- more than 30%

Questions:

In what position do you routinely perform neuraxial techniques?

- Lateral
- Sitting
- Position depends on patient

What type of needle do you commonly use for spinal anaesthesia?

- Beveled tip needle
- Pencil tip needle

What needle size do you commonly use for performing spinal anaesthesia?

- 23G
- 25G
- 26G
- 27G

Do you routinely administer intravenous fluids before initiating spinal anaesthesia?

- Preload all patients
- Co-load all patients
- Preload or co-load on selective patients (eg: prolonged fasting)
- Never

Which local anaesthetic agent is commonly used in spinal anaesthesia?

- Bupivacaine
- Ropivacaine
- Other drugs

What is the incidence of post-dural puncture headache in your hospital?

- Less than 2%
- 2-5%
- More than 5%

What adjuvants do you use in spinal anaesthesia?

- Opioids
- Clonidine

Annexure 1: Contd...

Other off label drugs like dexmedetomidine

Never

What method do you use for epidural space identification?

- Loss of resistance to saline
- Loss of resistance to air
- Hanging drop method
- Ultrasound

What drug do you use for epidural test dose in non-obstetric patients?

- 3 mL Lignocaine 1.5% with adrenaline 15 µg
- 3 mL Lignocaine 2%
- Other drugs
- No test dose.

What drug do you use for epidural test dose in obstetric patients?

- 3 mL Lignocaine 1.5% with adrenaline 15 µg
- 3 mL Lignocaine 2%
- Other drugs
- No test dose.

Do you use epidural analgesia for providing post-operative analgesia?

- Yes
- No

Which drug do you routinely use for post-operative epidural analgesia?

- Opioids
- Local analgesics
- Both opioids and local anaesthetics

How are the patients receiving epidural analgesia monitored?

- Using a checklist
- No checklist but SpO₂, RR, BP
- Only SpO₂
- No monitoring

What kind of training have you undergone for performing peripheral nerve blocks?

- Certificate course/fellowship
- Workshops/online content
- Residency

Which local anaesthetic agent is commonly used in peripheral nerve blocks?

- Bupivacaine
- Ropivacaine
- Bupivacaine + lignocaine

Do you perform peripheral nerve blocks under general anaesthesia?

- Yes
- No

Do you mark and confirm the site before performing peripheral nerve blocks?

- Yes
- No

Have you performed a wrong side peripheral nerve block?

- Yes
- No

Which techniques do you use to perform peripheral nerve blocks?

- USG guided
- Landmark
- Nerve stimulator
- Combined USG with nerve stimulator

Contd...

Contd...

Annexure 1: Contd...

Which complications have you seen following regional anaesthetic technique?

- Local anaesthetic systemic toxicity
- Nerve injury
- IV injection
- Haematoma
- Never seen

Does your hospital routinely store intralipid in the operating room?

- Yes
- No

Which adjuvants do you use in peripheral nerve blocks for extremity surgery?

- Dexamethasone
- Dexmedetomidine
- Clonidine
- Opioids
- Others

Do you routinely evaluate recovery of sensory and motor functions and document the same following nerve blocks?

- Yes
- No

Do you secure perineural catheters for post-operative analgesia?

- Yes
- No

What regional anaesthetic techniques do you use for daycare surgery?

- Spinal
- Nerve blocks
- Both spinal and nerve blocks
- Never

Which regional anaesthetic techniques do you perform in paediatric patients?

- Spinal/epidural
- Caudal
- Nerve blocks
- Never

SpO₂ - peripheral oxygen saturation, RR- respiratory rate, BP- blood pressure, USG-ultrasonography.