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ORIGINAL RESEARCH

Knowledge of essential regional ultrasound anatomy in an academic department of anaesthesiology and critical care

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Background: Regional anaesthesia offers significant benefits for pain management, patient satisfaction, and surgical outcomes. Ultrasound-guided regional anaesthesia (UGRA) enhances accuracy and reduces complications; however, it requires thorough knowledge of sonoanatomy to avoid serious injuries. International guidelines now emphasise the concept of "Plan A blocks", promoting standardised UGRA training with set core competencies. This study aimed to assess anaesthetists' knowledge of the regional sonoanatomy of these Plan A blocks.

Methods: After ethical approval, a descriptive, cross-sectional study was conducted at an academic meeting in the Department of Anaesthesiology and Critical Care at Tygerberg Hospital. The questionnaire was face-validated by experienced providers according to published standards and contained general questions and ultrasound images of the seven Plan A blocks. Participants were asked to identify the block and label essential anatomical structures as defined in the literature.

Results: The academic meeting was attended by 54 anaesthetists and all were enrolled. All practised UGRA. According to the assessment, only 25.9% of participants had sufficient knowledge of regional ultrasound anatomy (could identify ≥ 60% of the structures). Most could identify the blocks but were unable to label the structures correctly. A statistically significant relationship could not be shown between anaesthesia experience and overall score on the Plan A blocks section of the questionnaire ($F = 2.07$, $p = 0.07$). A statistically significant relationship was found between experience and participants' self-knowledge rating ($F = 3.49$, $p = 0.006$). Nearly all the participants (98.1%) believed that a formal teaching programme would be beneficial. Barriers to performing UGRA included lack of time, pressure from surgeons and unavailability of equipment.

Conclusion: Core knowledge of ultrasound anatomy is essential for anaesthetists performing UGRA to ensure patient safety and optimal outcomes. This study found that anaesthesia providers at Tygerberg Hospital lack sufficient knowledge of essential regional sonoanatomy specific to Plan A blocks, and suggest implementation of a formal training programme.

Keywords: knowledge, ultrasound-guided regional anaesthesia, training, competency, peripheral nerve block

Introduction

Perioperative pain management is a key component of anaesthesia. Multiple modalities are used for pain management. An integral element is regional anaesthesia, which offers a myriad of benefits, including pain control, increased patient satisfaction, and decreased overall perioperative morbidity.[1] Previously, regional anaesthesia, particularly peripheral nerve blocks (PNB), was performed using anatomical landmarks, nerve stimulators, inducing paraesthesia, and transarterial approaches.[2,3] Although well-quoted in the literature and still performed today, these techniques do not enable one to visualise the accuracy of local anaesthetic deposition, and they carry a higher risk of complications. With the introduction of ultrasound, practitioners can visualise anatomical details of interest and needle pathways to the target nerves, decreasing needle trauma to other structures.[1,4]

Recognition of anatomical structures on ultrasound is an essential skill in ensuring the correct deposition of local anaesthetic and preventing injury to structures like the pleura, blood vessels, and nerves.[5] Training centres worldwide have employed different methods to empower trainees with the knowledge and skills to perform ultrasound-guided regional anaesthesia (UGRA). This includes live needling, gel phantoms, cadaver workshops, and scanning of patients or models to identify sonoanatomical structures and variations.[4,6] However, until recently, no set, formal, and international training standards existed for anaesthesiologists. A concern for committees globally was the standardisation of education in regional anaesthesia, as well as methods of teaching.

Turbitt et al.[7] identified the concept of core blocks with which anaesthetists should be familiar and competent. These were dubbed "Plan A blocks".[7] These PNBs are endorsed as relatively simple regional anaesthetic blocks, offering effective analgesia options for various surgical procedures. They are also considered relatively safer than other, more complex PNB techniques, thereby making training easier for trainees and generalist anaesthetists at all levels. Subsequently, international consensus groups from the American Society of Regional Anesthesia and the European Society of Regional Anaesthesia (ASRA-ESRA) have not only incorporated the use of Plan A blocks but also produced training guidelines and core competencies for anaesthesia centres

worldwide.[8] These guidelines highlight the importance of sound sonoanatomical knowledge and its practical application.[8,9]

The primary objective of this study was to assess the knowledge of regional ultrasound anatomy of these Plan A blocks among the anaesthetists in the Department of Anaesthesiology and Critical Care (DACC) at Tygerberg Hospital (TBH). The results provide information on whether members of the DACC possess sound sonoanatomical knowledge, as measured against international standards of key competency PNBs, and can be used to support the proposal and establishment of a formal regional anaesthesia training rotation within academic hospitals, both locally and nationally.

Methods

This descriptive, cross-sectional study was conducted using a paper-based questionnaire at a single centre at TBH. Ethical approval was obtained from the Health Research Committee of Stellenbosch University (reference number S23/06/146).

Data instrument and collection

The questionnaire contained general questions relating to the participants' qualifications, experience, their daily practice when performing regional anaesthesia, and questions related to learning and training. The questionnaire also contained ultrasound images of the seven essential Plan A PNBs. Participants were asked to name the PNB shown and identify structures according to the labels on the images. The questions were constructed using international standards to assess knowledge of the essential PNBs' sonoanatomy. The questionnaire was face-validated by experts in the field. See the supplementary file for the full questionnaire.

This study was conducted at the DACC's Wednesday afternoon academic meeting (25/10/2023). A one-minute timer was set for each of the ultrasound sonoanatomy image questions. The slides were projected onto a presentation screen visible to the participants present. There were 34 questions in this section, each worth one point. Participants who scored < 50% were judged to have insufficient knowledge, those who scored ≥ 50% to < 60% were judged to have fair knowledge, and participants who scored ≥ 60% were judged to have sufficient knowledge. Experts in the field assisted with score categorisation.

Study population

The participants were members of the DACC who are anaesthesia providers. These included anaesthesia trainees (medical registrars), non-specialist anaesthetists (medical officers), and specialist consultants. Approximately 85 members of the DACC were eligible to participate in the questionnaire. G*Power software was used to perform the power analysis. One of our main analytic results was to measure the association between two categorical variables using Fisher's exact test. It was decided to calculate the sample size in this manner, with a power of 85%, a 5% level of significance, and an effect size of 0.25. Therefore, 35 participants were required for the study. At the meeting, 54 anaesthetists were present and all were enrolled in the study.

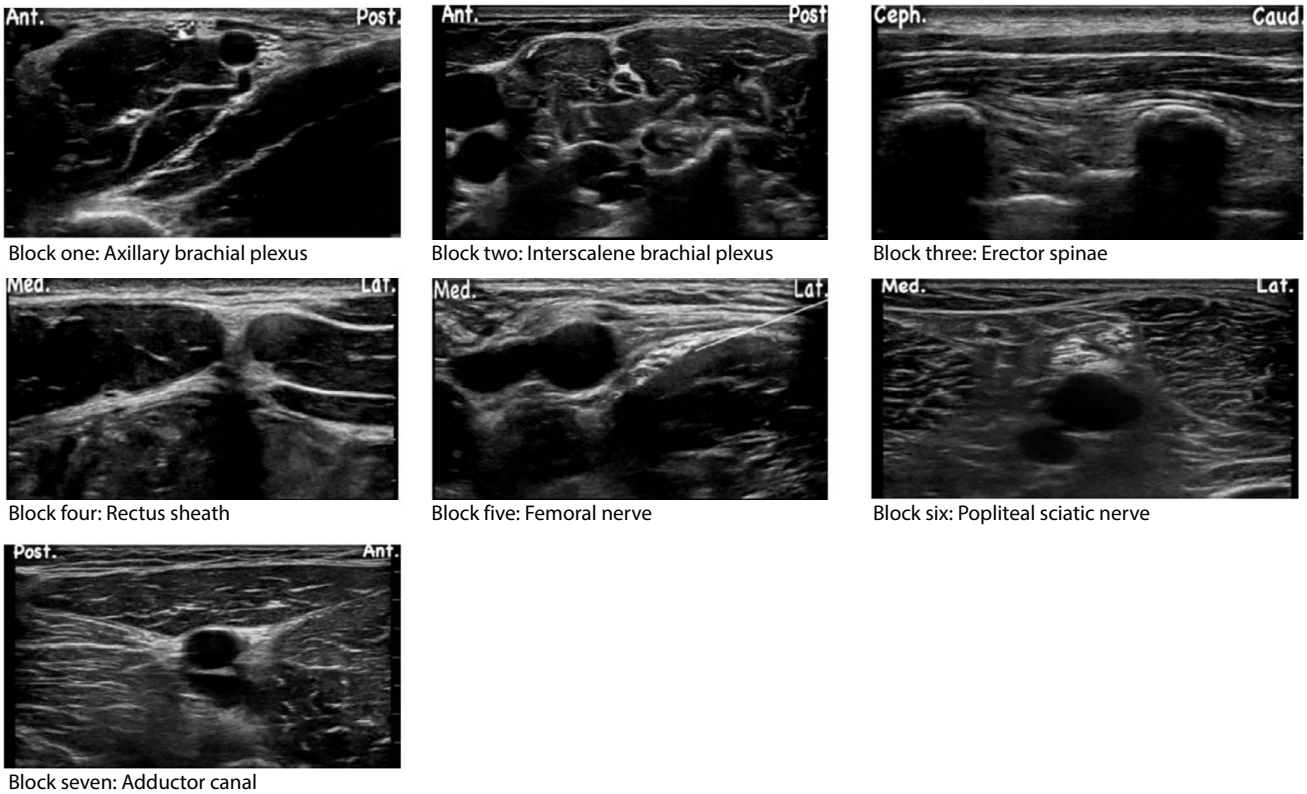

Figure 1: Blocks shown in the questionnaire

Table I: Demographics and daily practices of participants (n = 54)

Experience	*n*	%
Role in the DACC and years of experience		
Medical officer < 2	1	1.8
Medical officer > 2	1	1.8
Registrar < 2	17	31.4
Registrar > 2	15	27.8
Consultant < 5	12	22.2
Consultant > 5 to 10	2	3.7
Consultant > 10	6	11.1
Qualification		
None	7	12.9
Diploma in anaesthesia	26	48.1
FCA or equivalent	18	33.3
Subspecialist/fellowship	3	5.6
Everyday practice		
Average peripheral blocks performed per week		
0–5	50	92.6
6–10	4	7.4
11–15	0	0
> 15	0	0
PNB technique		
Ultrasound guidance only	41	75.9
Ultrasound guidance and a nerve stimulator	13	24.1
Landmark technique only	0	0
Landmark technique and a nerve stimulator	0	0
Blocks most regularly performed*		
TAP	42	19.6
Supraclavicular	41	19.2
Erector spinae	33	15.4
Interscalene	18	8.4
Popliteal sciatic	11	5.1
Adductor canal	11	5.1
Wrist	11	5.1
Fascia iliaca infrainguinal	10	4.7
Rectus sheath	8	3.7
Subcostal TAP	6	2.8
Ankle block	6	2.8
Femoral nerve	6	2.8
Fascia iliaca suprainguinal	5	2.3
Axillary block	4	1.9
Superior trunk	1	0.5
Other	1	0.5
Online applications regularly used*		
NYSORA	39	37.9
AnSo	30	29.1
YouTube	24	23.3
ESRA	8	7.8
Other	2	1.9
Self-rating of regional ultrasound anatomy knowledge (1 = novice, 5 = expert)		
1	11	20.4
2	8	14.8
3	24	44.4
4	8	14.8
5	3	5.6
Are you aware of all the known risks/complications of each block you perform?		
Yes	35	64.8
No	9	16.7
Not sure	10	18.5
Regarding informed consent		
I always take verbal consent (quick)	27	50
I always take verbal consent (detailed)	24	44.4
I always take written consent with a detailed explanation	3	5.5
I do not take consent	0	0
Regarding performing nerve blocks in adults		
I always do nerve blocks awake	40	74.1
I always do nerve blocks asleep	1	1.8
I do a combination of asleep and awake nerve blocks	13	24.1
If you cannot visualise sonoanatomy, do you continue with the block?		
Yes	3	5.5
Usually	1	1.8
Sometimes	18	33.3
Never	32	59.3

* Multiple answers could be selected, count sums to more than n = 54.
DACC – Department of Anaesthesiology and Critical Care, NYSORA – New York School of Regional Anesthesia, PNB – peripheral nerve block, TAP – transversus abdominis plane, FCA – Fellowship of the College of Anaesthetists of South Africa, ESRA – European Society of Regional Anaesthesia

Data management and analysis

The data were collected using a paper-based questionnaire, and responses were captured on Microsoft Excel. Python 3.12 was used to analyse the data collected. The outcomes were measured using descriptive statistics. Frequencies and percentages were reported for categorical variables, and medians and interquartile ranges were reported for non-normally distributed continuous variables. One-way analysis of variance (ANOVA) was used to assess associations between continuous and categorical variables, while Fisher's exact test was used to evaluate associations between categorical variables. A pie chart was used to illustrate categorical variables, and a box plot was used for continuous variables. All tests were evaluated at an alpha of 0.05, with a p-value < 0.05 considered significant.

Results

The demographic information and daily practices of performing PNBs are summarised in Table I. Most participants (75.9%) reported that they performed PNBs using ultrasound guidance

only. Blocks done with ultrasound guidance and nerve stimulation were reported by 24.1% of participants, and none performed blocks with the landmark technique only. The most common blocks performed by participants are also listed in Table I. Questions and responses related to learning and training are presented in Table II.

The second part of the questionnaire contained the images of Plan A blocks. Figure 1 depicts the Plan A blocks used for the study. The images were used with permission from the AnSo (Anaesthesia Sonoanatomy) mobile application.

Block one, axillary brachial plexus block – 38.9% of the participants (n = 21) could identify the block, whereas 7.4% (n = 4) correctly answered 4/4 questions. For the remaining participants, 11.1% (n = 6) answered 3/4 questions correctly, 18.5% (n = 10) answered 2/4 questions correctly, 7.4% (n = 4) answered 1/4 questions correctly, and 55.6% (n = 30) answered no questions correctly.

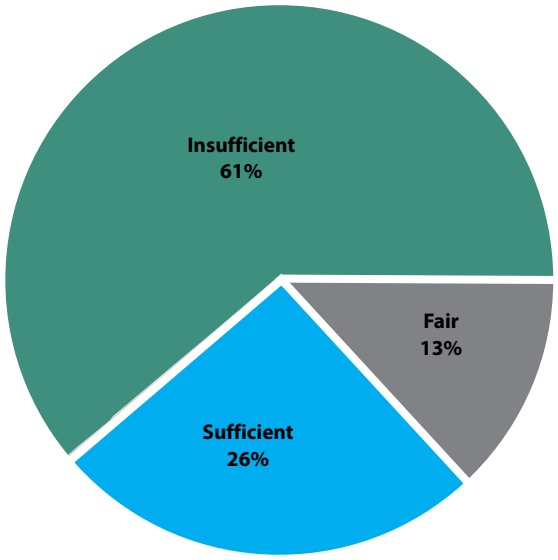

Figure 2: Categorisation of scores in the Department of Anaesthesiology and Critical Care

Table II: Aspects of learning and training (n = 54)

Is ultrasound-guided performance of a regional technique an important skill for anaesthetists?	***N***	**%**
Yes	54	100
Usually	0	0
Sometimes	0	0
Never	0	0
What are the barriers to performing ultrasound-guided PNBs in your setting?*		
Lack of time	47	27.1
Pressure from the surgeon	31	17.9
Lack of appropriate equipment	27	15.6
Lack of confidence and knowledge of anatomy	25	14.5
Lack of own skills and knowledge of practical abilities	24	13.9
Surgical factors (type of surgery)	10	5.8
Patient refusal	9	5.2
How did you gain the knowledge and skills to perform PNBs?*		
Use of online applications and videos	47	41.6
Formal accredited teaching programme	31	27.4
Self-trained	25	22.1
Peer-to-peer training	10	8.8
Do you feel a formal teaching programme will benefit/improve your regional anaesthesia skills?		
Yes	53	98.1
Maybe	1	1.9
No	0	0
Which learning platform do you prefer to improve your skill set and performance?*		
Hands-on workshops (cadavers/live patients)	47	34.3
Online workshops/webinars	25	18.2
Simulation-based training	10	7.3
All of the above	31	22.6
None	24	17.5

* Multiple answers could be selected, count sums to more than n = 54.
PNB – peripheral nerve block

Block two, interscalene brachial plexus – 64.8% of the participants (n = 35) could identify the block, whereas 14.8% (n = 8) correctly answered 5/5 questions. For the remaining participants, 14.8% (n = 8) answered 4/5 questions correctly, 20.4% (n = 11) answered 3/5 questions correctly, 14.8% (n = 8) answered 2/5 questions correctly, 3.7% (n = 2) answered 1/5 questions correctly, and 31.4% (n = 17) answered no questions correctly.

Block three, erector spinae – 72.2% of the participants (n = 39) could identify the block, whereas 25.9% (n = 14) correctly answered 4/4 questions. For the remaining participants, 33.3% (n = 18) answered 3/4 questions correctly, 20.4% (n = 11) answered 2/4 questions correctly, 9.3% (n = 5) answered 1/4 questions correctly, and 11.1% (n = 6) answered no questions correctly.

Block four, rectus sheath – 70.4% of the participants (n = 38) could identify the block, whereas 29.6% (n = 16) correctly answered 4/4 questions. For the remaining participants, 16.7% (n = 9) answered 3/4 questions correctly, 22.2% (n = 12) answered 2/4 questions correctly, 14.8% (n = 8) answered 1/4 questions correctly, and 16.7% (n = 9) answered no questions correctly.

Block five, femoral nerve – 48.1% of the participants (n = 26) could identify the block, whereas 5.6% (n = 3) correctly answered 5/5 questions. For the remaining patients, 24.1% (n = 13) answered 4/5 questions correctly, 12.9% (n = 7) answered 3/5 questions correctly, 5.6% (n = 3) answered 2/5 questions correctly, 5.6% (n = 3) answered 1/5 questions correctly, and 46.3% (n = 25) answered no questions correctly.

Block six, popliteal sciatic nerve – 55.6% of the participants (n = 30) could identify the block, whereas 5.6% (n = 3) correctly answered 6/6 questions. For the remaining participants, 7.4% (n = 4) answered 5/6 questions correctly, 14.8% (n = 8) answered 4/6 questions correctly, 3.7% (n = 2) answered 3/6 questions correctly, 12.9% (n = 7) answered 2/6 questions correctly, 16.7%

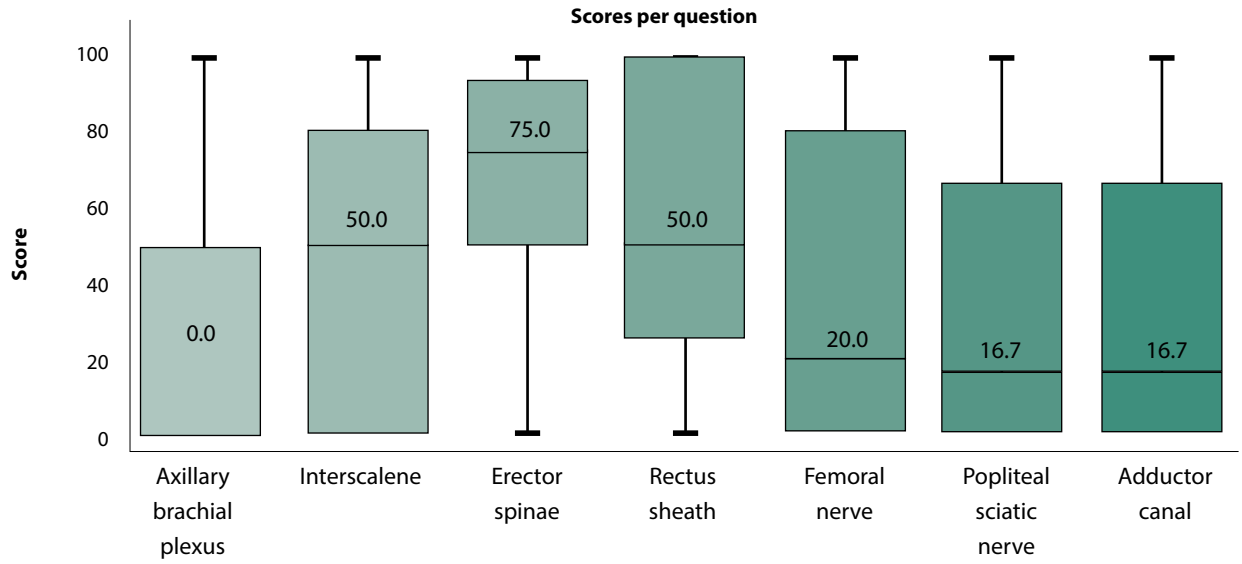

Figure 3: Boxplot depicting scores per question

(*n* = 9) answered 1/6 questions correctly, and 38.9% (*n* = 21) answered no questions correctly.

Block seven, adductor canal – 42.6% of the participants (*n* = 23) could identify the block, whereas 3.7% (*n* = 2) correctly answered 6/6 questions. For the remaining participants, 16.7% (*n* = 9) answered 5/6 questions correctly, 11.1% (*n* = 6) answered 4/6 questions correctly, 5.6% (*n* = 3) answered 3/6 questions correctly, 1.8% (*n* = 1) answered 2/6 questions correctly, 12.9% (*n* = 7) answered 1/6 questions correctly, and 48.1% (*n* = 26) answered no questions correctly.

The second part of the questionnaire contained a total of 34 questions, including block identification. In summary, 61% (*n* = 33) scored < 50%, 13% (*n* = 7) scored 50–60%, and 25.9% (*n* = 14) scored ≥ 60%. Figure 2 illustrates the categorisation of scores in the DACC. The boxplot in Figure 3 depicts the distribution of scores for blocks one to seven.

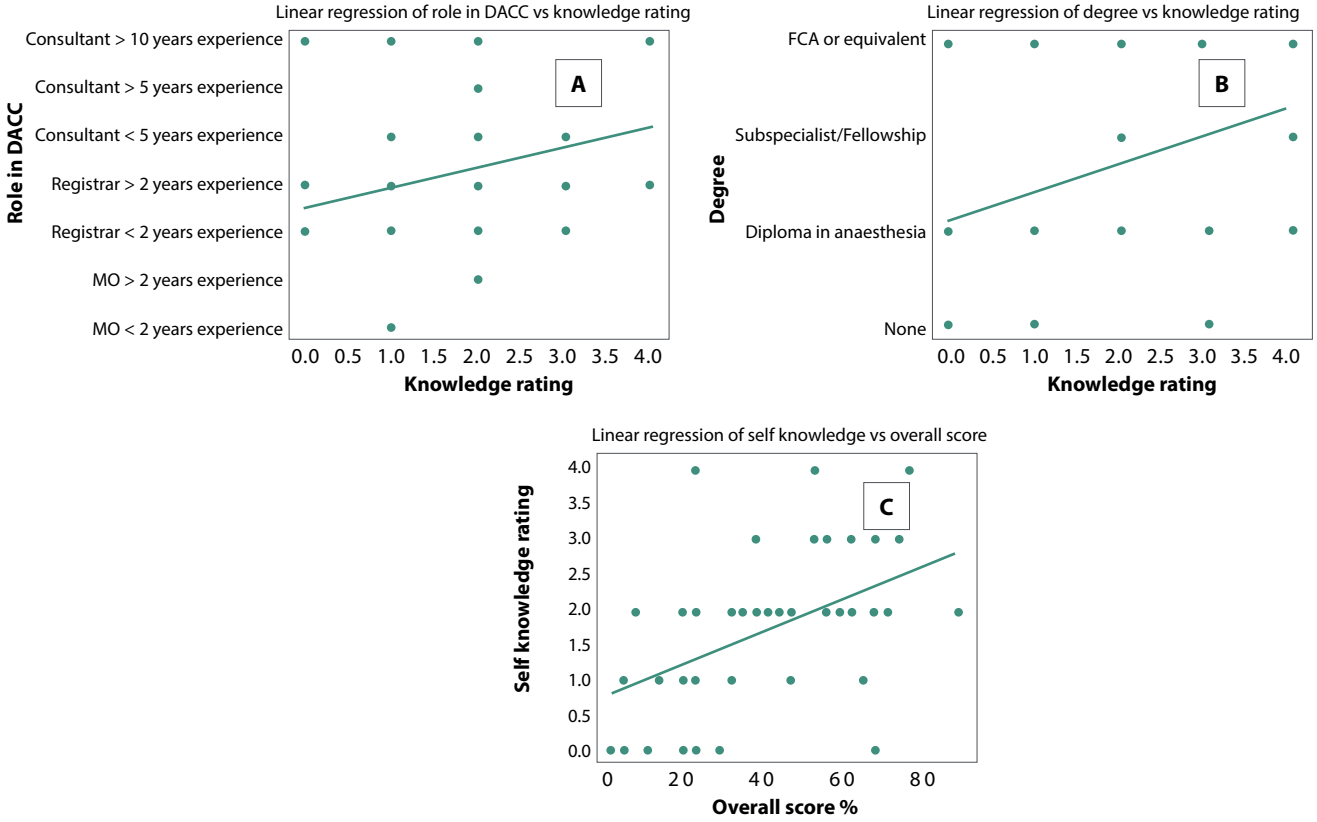

Figure 4: Linear regressions for variables
Graph A – linear regression of role in DACC versus knowledge rating.
Graph B – linear regression of degree versus knowledge rating.
Graph C – linear regression of degree of self-knowledge rating versus overall score.
DACC – Department of Anaesthesiology and Critical Care, FCA–Fellowship of the College of Anaesthetists of South Africa, MO – medical officer

The boxplot indicates the score per block. Each box spans the interquartile range of each question (from lower to upper quartile), representing the middle 50% of scores, with the median score noted. The whiskers span from the minimum to the maximum scores.

Utilising an ANOVA test, no statistically significant relationship could be confirmed between experience (measured either as a participant's role in the department or measured by degree earned) and overall score on the Plan A blocks section of the questionnaire ($F = 2.07$, $p = 0.07$, and $F = 1.54$, $p = 0.21$). However, a statistically significant relationship was found between experience and participants' self-knowledge rating ($F = 3.49$, $p = 0.006$) when measured against "role in DACC", and ($F = 3.35$, $p = 0.026$) when measured against "degree obtained".

This correlation was further investigated via linear regression, which revealed a positive correlation between experience and self-knowledge rating. A positive correlation was observed when measuring experience as "role in the DACC" ($r = 0.35$, $p = 0.01$). This is statistically significant, although the low Pearson correlation coefficient suggests that other factors may also influence the relationship, as the model's variability is not entirely explained by "role in the DACC" alone. Spearman's correlation coefficient was used to investigate whether the relationship might be non-linear; however, the results ($r = 0.39$, $p = 0.002$) suggested that this is unlikely. When measuring experience as "degree", the same positive correlation existed ($r = 0.31$, $p = 0.02$). Exploration with Spearman's correlation similarly confirmed that the relationship is equally explained when accounting for non-linear relationships ($r = 0.32$, $p = 0.02$). Further investigation into other confounding variables could be explored in further studies (Figure 4).

Correlation was also explored between the self-knowledge rating and the overall score for the Plan A blocks section of the questionnaire. Utilising ANOVA, a statistically significant relationship was found ($F = 155.3$, $p < 0.001$). A Pearson correlation revealed a positive correlation ($r = 0.46$, $p < 0.001$), and a Spearman's correlation ($r = 0.47$, $p < 0.001$) supported a linear relationship, although other confounding variables are likely (Figure 4).

The correlation between the number of blocks performed per week and the overall score was also explored. Utilising an ANOVA test, the relationship between blocks performed per week and the overall score was not statistically significant ($F = 3.62$, $p = 0.06$). It should be noted that very few participants performed more than five blocks per week, so these numbers may not be overly robust.

Discussion

To the best of the authors' knowledge, this is the first study in South Africa to evaluate anaesthetists' knowledge of the essential regional ultrasound anatomy of Plan A blocks. The Colleges of Medicine of South Africa (CMSA) does not specify in the curriculum that regional ultrasound interpretive skills are a specific competency that anaesthesia trainees need to achieve. However, knowledge of regional ultrasound anatomy is integral in performing UGRA, as stipulated by ASRA-ESRA guidelines.[10] Kathrada et al.[11] found that a lack of teaching in South Africa at the postgraduate level was a critical barrier to using ultrasound. They found that only 23.7% of respondents received ultrasound training as registrars.[11]

This study revealed that anaesthesia staff at the DACC at TBH lack knowledge of essential regional ultrasound anatomy for Plan A blocks, as indicated by the score categorisation. Only 25.9% of the participants were deemed to have sufficient knowledge (Figure 2). It was interesting to note that many of the participants were able to identify the blocks but could not identify the labelled structures correctly. The initial task highlighted by the joint ASRA-ESRA guidelines for UGRA is the identification of key anatomical landmarks, such as muscles, fasciae, bones, and blood vessels.[4]

An in-depth and sound understanding of relevant ultrasound anatomy is paramount for recognising pertinent anatomical structures. Novice learners without this knowledge may have difficulty moving on to more "advanced sonoanatomy" and associated blocks. Therefore, due to poor sonoanatomical knowledge, trainees and specialists will default to pattern recognition. This means they can only identify scan results if they match textbook images, rather than truly understanding the underlying anatomy and its variations. Consequently, the PNB may fail as structures vary among patients, or injection of local anaesthetic may occur in incorrect structures or spaces, resulting in harmful consequences to patients.[4]

The inability to conceptualise three-dimensional anatomical knowledge into two-dimensional sonoanatomy can impact block safety, leading to risks such as incorrect needle placement, intravascular injection of local anaesthetic, local anaesthetic toxicity, and injury to vital structures. These complications can be life-threatening or result in permanent damage. Therefore, regional anaesthesia providers must possess a solid understanding of both general anatomy and sonoanatomy to prevent these complications.[12]

Participants were asked about their awareness of the risks and complications associated with each block they perform. While 64.8% reported awareness, 16.7% were unaware, and 18.5% were unsure. This indicates that over 30% of providers acknowledge insufficient knowledge of UGRA risks. This lack of knowledge can lead to significant morbidity and suboptimal patient care. Additionally, it is greatly concerning that 41% of participants reported they would continue with a block even when they cannot identify the sonoanatomy. This implies an increased risk of injury to vital structures.

No statistically significant difference was found between years of experience and knowledge of regional ultrasound anatomy. The lack of a formal teaching curriculum for regional ultrasound anatomy at TBH can explain this knowledge gap. This is mainly because no formal stipulations are present in

specialist training requirements and assessments for regional anaesthesia in the current South African curriculum. Kathrada et al.[11] found that the two most significant barriers to ultrasound use among anaesthesia trainees in South Africa are the lack of appropriate equipment and insufficient teaching and training in the postgraduate setting. Despite 74% of participants in our study not having sufficient knowledge of ultrasound anatomy, only 15% reported this as a barrier to their practice. However, the participants did highlight the necessity of a formal UGRA training programme.

A survey by Bellew et al.[13] in the United Kingdom assessed the training experiences in regional anaesthesia, supporting the introduction of a formal regional anaesthesia programme and highlighting the need for trainees to access UGRA training. Access to training is essential for acquiring adequate UGRA skills. In this study, 47% of participants used online applications and videos. These included NYSORA, AnSo, YouTube, and ESRA platforms. Only 27.4% of participants gained knowledge from formal accredited teaching programmes, again highlighting the lack of formal UGRA training.

Comprising a collaborative review of multidisciplinary specialists, Mahmood et al.[14] emphasised the importance of ultrasound training among anaesthesia trainees. The paper strongly suggested that institutions should implement a structured perioperative ultrasound training programme for trainees and assessment tools to benchmark competency based on national and international standards.[14]

Anaesthesia trainees must first acquire a solid theoretical knowledge base before practising UGRA. Therefore, training should focus on practical skills, like real-time ultrasound execution, image optimisation, and clinical decision-making. Objective assessments, such as checklists and global rating scales (GRS), are crucial for providing specific feedback and tracking progress.[4] The Regional Anaesthesia Procedural Skills (RAPS) tool is validated for assessing various procedures. These cost-effective tools can be implemented at regional and teaching facilities to enhance skills and ensure patient safety, regardless of the provider's seniority.[4,15]

The three nerve blocks that anaesthetists at TBH performed the most were transversus abdominis plane (TAP) blocks, supraclavicular blocks, and erector spinae blocks. Interestingly, the erector spinae block is the only one of these that is a Plan A block. This is probably due to the ease of performing the block, with few complications noted.

Table II highlights the barriers to learning and performing PNBs in this cohort. A shortage of time was the most common barrier, followed by pressure from surgical personnel to continue the surgery without blocks, and a lack of appropriate equipment. At the time of the survey, TBH had 20–25 theatres operating daily, with a maximum of four ultrasound machines available for nerve blocks at any time. The lack of available equipment is a significant deterrent, resulting in staff being unable to perform regional anaesthetic techniques. Consequently, patient care and pain management are compromised.

Regarding potential learning platforms, participants indicated that hands-on workshops were preferred (Table II). By using live models for anatomical identification, ultrasound scanning, and fresh cadaver specimens, trainees can practise imaging in real-time in a stress-free environment without the pressure of wasting theatre time and risking patient harm.[16] ASRA-ESRA suggest that anaesthesia training programmes implement a simulation-based programme using gel phantoms, where technical skills such as hand-eye coordination and needling techniques can be improved, thereby enhancing block success rates and minimising harm to patients.[4]

Study limitations

The study has several limitations. Not all members of the department were present, which decreased the sample size and potentially skewed the results. The images used in this study were all obtained from the AnSo mobile application. This could have given some participants an added advantage if they regularly use the application, as the images would have been familiar to them. Furthermore, using resources from one platform limits the potential of other, potentially better images from other platforms from being used, which may have affected the result interpretation. The projected images may not have been optimal or clear. This could have impacted the participants' ability to identify structures accurately. The timing of the slides may have been too short for the sample population to identify the blocks and visualise details. No practical skills were examined, such as needle-ultrasound coordination.

Lastly, this study examined a relatively small sample size compared to the rest of the Western Cape and nationally, as some centres may have already implemented regional anaesthesia rotations as part of their curriculum. Therefore, the results may not be generalisable to other hospitals or regions. The study also does not include other important aspects of regional anaesthesia, such as local anaesthetic dosages, consent, and local anaesthetic systemic toxicity management. These are also deemed vital and fundamental in UGRA.

Recommendations

Further studies should be conducted at the provincial and national levels to assess the knowledge of essential regional ultrasound anatomy among anaesthesia providers. A similar questionnaire regarding experience, aspects of learning shortfalls, and training should be distributed provincially and nationally to ascertain knowledge and daily practice of regional anaesthesia. A larger, multicentre study would strengthen the findings and enable broader conclusions to be drawn. Furthermore, future studies can be conducted to assess the knowledge of essential regional ultrasound anatomy using high-quality, standardised imaging to improve the accuracy of results.

This study did not focus on the practical assessment of UGRA techniques. Future studies can incorporate a continuous

practical component to test skills development, such as needle-ultrasound coordination and the real-time application of UGRA techniques using validated checklists and GRS. This would impart a more in-depth assessment of competence regarding the performance of UGRA. This information can be used to motivate the introduction of a national, set curriculum within academic institutions for postgraduate training.

At TBH, there is currently no formal regional anaesthesia curriculum. It is recommended that a structured curriculum with set aims and competencies be implemented to facilitate adequate training and skills development among trainees, according to international standards. This will enable trainees to overcome the learning curve associated with performing UGRA, allowing them to achieve the required regional anaesthesia competencies as specialist anaesthesiologists, ultimately leading to better patient care and safety.

Conclusion

Thorough knowledge of ultrasound anatomy is essential for anaesthetists performing UGRA to ensure patient safety and optimal outcomes. This study found that anaesthesia providers at TBH lack a sound understanding of essential regional sonoanatomy for Plan A blocks. Moreover, this study found that 41% of participants reported being willing to continue with a block even when they could not identify the sonoanatomy. This may compromise patient safety. To enhance patient safety and outcomes, it would be beneficial for the department to implement a formal training programme to empower the anaesthesia providers to acquire the necessary skills to perform UGRA safely.

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Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

Ethical approval was granted by the Stellenbosch University Health Research Ethics Committee (reference number S23/06/146).

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