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## ORIGINAL ARTICLE

## A survey of emergency medicine and orthopaedic physicians' knowledge, attitude, and practice towards the use of peripheral nerve blocks



### *Etude des connaissances, attitudes et pratiques des médecins urgentistes et orthopédiques en matière d'utilisation des blocs nerveux périphériques*

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## ABSTRACT

**Introduction:** Peripheral nerve blocks (also known as regional anaesthesia) are currently used by many anaesthesiologists and emergency physicians for perioperative and procedural pain management.

**Methods:** This is a cross sectional descriptive study conducted to evaluate knowledge, attitudes, and current practice towards use of peripheral nerve blocks for lower extremity injuries at Black Lion Hospital, a tertiary trauma centre in Addis Ababa.

**Results:** A standardised survey was conducted with 64 participants working in emergency medicine [30/64 (46.9%)] and orthopaedics [34/64 (53.1%)]. Twenty-three of 64 (35.9%) respondents had received formal training. Knowledge was acquired from didactic/workshop format for 15/23 (65.2%), followed by peer training 6/23 (39.1%). The majority, 62/64 (96.9%), believed that knowledge of general anatomy and nerve blocks are very important. Thirty-one of 64 (48%) of the respondents did not routinely perform peripheral nerve blocks. A majority, 27/31 (87.1%) stated they lacked the required skills. Ultrasound guidance of the femoral nerve 16/33 (48.5%) was the most commonly performed peripheral nerve block, followed by ankle block using anatomic landmarks 15/33 (45.5%). Almost all (15/16) ultrasound-guided nerve blocks were done by emergency medicine providers, while all anatomic landmark guided blocks were done by orthopaedic teams. A majority of the respondents (93.8%) (n = 60) were optimistic that their practice on peripheral nerve blocks would increase in future. A highly significant association was found between previous training on peripheral nerve blocks and the number of peripheral nerve blocks performed in a month; p value = 0.006.

**Discussion:** This study indicates peripheral nerve blocks are likely underutilised due to lack of training. There was a positive attitude towards peripheral nerve blocks but gaps on knowledge and practice.

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## ABSTRACT

**Introduction:** Les blocs nerveux périphériques (également connus sous le nom d'anesthésies locorégionales) sont actuellement utilisées par de nombreux anesthésistes et urgentistes à des fins de gestion de la douleur.

**Méthodes:** Cette étude est une étude descriptive cross sectional menée afin d'évaluer les connaissances, attitudes et pratiques actuelles en matière d'utilisation des blocs nerveux périphériques pour les blessures aux extrémités inférieures au Black Lion Hospital, un centre de traumatologie tertiaire à Addis-Abeba.

**Résultats:** Une étude standardisée a été menée auprès de 64 participants travaillant en médecine d'urgence [30/64 (46,9%)] et en orthopédie [34/64 (53,1%)]. Vingt-trois sur les 64 (35,9%) personnes

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interrogées ont bénéficié d'une formation formelle. Les connaissances ont été acquises sous forme didactique/d'atelier pour 15/23 (65,2%) d'entre eux, suivies d'une formation par les pairs pour 6/23 (39,1%) d'entre eux. La majorité, 62/64 (96,9 %) d'entre eux, considérait que les connaissances en anatomie générale et les blocs nerveux comme très importantes. Trente et un sur 64 (48%) personnes interrogées ne réalisaient pas régulièrement des blocs nerveux périphériques. Une majorité 27/31 (87,1%) de participants a indiqué ne pas disposer des compétences requises. Ultrasound guidance of the femoral nerve 16/33 (48,5%) était le bloc nerveux périphérique réalisé le plus fréquemment, suivi du ankle block using anatomic landmarks 15/33 (45,5%). La quasi-totalité (15/16) des blocs nerveux ultrasound-guided étaient réalisés par des emergency medicine providers, while all anatomic land mark guided blocks étaient réalisés par des équipes d'orthopédistes. Une majorité de personnes interrogées (93,8%) (n = 60) indiquaient être optimistes quant au fait que leur pratique sur les blocs nerveux périphériques augmenterait à l'avenir. Une association hautement significative a été trouvée entre la formation antérieure sur les blocs nerveux périphériques et le nombre de blocs nerveux périphériques réalisés au cours d'un mois; p value = 0,006.

*Discussion:* Cette étude indique que les blocs nerveux périphériques sont probablement sous-utilisés en raison d'un manque de formation. On a pu observer une attitude positive à l'égard des blocs nerveux périphériques, mais des lacunes en matière de connaissances et de pratique.

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## African relevance

- Pain management appears to be neglected in African acute care settings.
- Regional anaesthesia is an easily, accessible pain management option in low-income settings.
- Ultrasound is a helpful aid when performing nerve blocks in resource-limited settings.

## Introduction

Soft tissue injuries, fractures, burns, and wound infections are a leading cause of morbidity and mortality in low-income African countries, yet 80% of injured persons receive inadequate or no pain treatment [1,2]. Failure to treat acute pain can impact disease recovery and increase the risk of developing chronic pain, which is associated with profound physical psychological and social disability. Untreated pain has also financial impact [3,4].

Peripheral nerve blocks (PNBs) (also known as regional anaesthesia, RA), are currently being used by anaesthesiologists and emergency physicians in more northern settings for perioperative and procedural pain management. PNBs are safe procedures that provide site-specific, rapid pain relief and minimise use of opioid analgesics and associated side effects [5–10]. Use of ultrasound to guide PNB (USPNBs) has increased in the past decade and has been shown to increase accuracy and improve safety and success of regional anaesthesia overall [11,12].

USPNBs have been shown to facilitate recovery, decrease intensive care unit (ICU) and hospital length of stays, and reduce the rate, severity, and duration of delirium associated with acute injury and/or opioid use through good pain control, and are also cost effective [13,14,8,9]. Several randomised trials including Barker et al. (2008) reported a single femoral nerve block resulted in earlier reduction of pain, was an easy and safe technique to perform, and caused minimal delays in other steps to patient care [15].

At this time, the frequency of PNB or USPNB use in emergency centres (ECs) in low-resource settings is unknown, but what little evidence there is suggests minimal use [16]. An extensive literature search resulted in only a few studies found. A cross-sectional descriptive survey carried out among Kenyan anaesthesiologists is representative. 26.2% of respondents stated their training in PNBs was “poor.” Of these, 18.5% and 59.3% of respondents respectively reported “no exposure” and “inadequate exposure” to the procedure during their medical training in anaesthesiology. Additionally, 27.7% reported that they had not

performed a PNB in their careers to date, and only 6.2% routinely performed 10 or more per month [17].

Emergency medicine is new and emerging field in Ethiopia, a low-income country located in the eastern part of Africa. An emergency medicine residency and Masters of Science in emergency medicine along with critical care nursing were established in 2011 in Addis Ababa, home to the national referral trauma centre at Black Lion Hospital (BLH). In 2013, faculty with specialty training offered 14 of the new emergency medicine residents and two orthopaedic staff physicians an intensive course in USPNBs. The course focused on femoral, popliteal, and forearm blocks based on injury patterns of the area [18]. At that time, pain management consisted of either non-steroidal medications like diclofenac or paracetamol or a mild narcotic like tramadol. If procedural sedation and analgesia for procedures were required, a combination of pethidine and diazepam were used, often without cardiac monitoring. Although there were no case reports published, medical records show there have been poor outcomes including cases of respiratory arrest in the BLH emergency centre with this use of unmonitored sedation. In the two years post course, 384 PNB were recorded. Unfortunately, no further procedures have been documented since 2015 as many of the course physicians have transitioned out of residency and moved to other hospitals in the last year.

In preparation for a repeat course and in order to understand how to achieve a more sustainable skill transfer, this study/survey was conceived to assess current knowledge, attitude, and practice of PNBs among emergency medicine and orthopaedics physicians and residents. The study is a qualitative cross-sectional survey. We hypothesised that current use of PNBs is underutilised but that the procedure will be perceived as important to patient care. We also hypothesise a highly significant association between previous training and the number of procedures performed and no significant association between level of training and number of PNBs done per month.

## Methods

We conducted a cross-sectional descriptive survey with paper forms using a questionnaire developed by study investigators. The study population was all emergency centre staff and resident physicians (Year 1–3), and orthopaedics residents (Year 1–4) listed by hospital administration as currently active in their respective departments at Black Lion Hospital in Addis Ababa, Ethiopia. It was felt that BLH would be the best site to survey as it is a specialised trauma centre and national referral hospital for the

Republic of Ethiopia, and was the site for the original educational initiative. Orthopaedic residents were included as they are the consultant group for all extremity injuries. The study was reviewed and approved by the Black Lion Hospital, Emergency Medicine Department Institutional Review Board. All participants provided written consent.

A 17-item survey was pre-tested. Questions were derived based on review of existing practice, knowledge of current practices, and discussion with experts in the field. The final survey consisted of multiple choice and free text response questions as depicted in the [appendix](#). The respondents filled the data. Participants were consented before study start. Surveys were given to participants by trained research assistants. Participants were given time to ask questions. Participants were given forms and then requested to return the form to the assistants once complete. To ensure duplicate surveys were not received from the same respondents and to ensure responder autonomy, participants were assigned a unique study number that was kept in a separate file from names of participants.

Peripheral Nerve Block (PNB) was used in the questionnaire as synonymous with regional anaesthesia. Responses were entered into a database and analysed using SPSS version 20 (IBM Corp. Released 2011, NY, USA). Descriptive statistics were listed and chi-square tests were used to analyse association of different variables.

## Results

A total of 64/82 (78%) participants returned the surveys and were included in the study with 30/64 (46.9%) and 34/64 (53.1%) working in emergency medicine and orthopaedics, respectively ([Table 1](#)).

Overall, 23/64 (35.9%) of respondents indicated that they had received training in PNBs for pain management. Among these, the training method was predominantly from a course or workshop in their residency program 15/23 (65.2%), followed by peer-on-peer bedside clinical education 6/23 (39.1%) ([Table 2](#)).

Sixteen out of 23 (69.6%) of participants were satisfied, while 1/23 (4.3%) was very satisfied with previous training. Four of 23 (17.4%) were neither satisfied nor dissatisfied, while 2/23 (8.7%) dissatisfied with previous training.

The following question was asked to test baseline knowledge, with responses categorised as either yes/no: “Does a negative aspiration abolish intravascular injection?” Thirty-five of 64 (54.7%) participants replied that negative aspiration does not abolish intravascular injection. Twenty-three of 64 (35.9%) responded that negative aspiration abolishes possibility of intravascular injection, and 6/64 (9.4%) did not know whether a negative aspiration test abolished possibility of intravascular injection. Thirty-seven of 64 (57.8%) participants agreed to the statement: “PNB has inferior pain control than general anaesthesia”. Twenty-seven of 64 (42.2%) did not agree to this statement.

Rank of participant importance of PNB to medical practice, patient education, need for additional sedation, and need to know general anatomy are noted in [Table 3](#).

**Table 1**  
Staff and resident year of training summary, Black Lion Hospital.

	Emergency medicine n (%)	Orthopaedics n (%)	Total n (%)
Staff	4 (6.3)	–	4 (6.3)
First year resident	15 (23.4)	8 (12.5)	23 (35.9)
Second year resident	6 (9.4)	13 (20.3)	19 (29.7)
Third year resident	5 (7.8)	6 (9.4)	11 (17.2)
Fourth year resident	–	7 (10.9)	7 (10.9)
Total	30 (46.9)	34 (53.1)	64 (100)

**Table 2**  
Source of knowledge.

	n (%)
Course or workshop	15 (62.5)
Peer-on-Peer bedside teaching	6 (39.1)
Self-taught	2 (8.7)

Respondents were asked to rank the priority of nerve block analgesia together with five other essential steps in the management of an EC patient with lower extremity injuries. Medical assessment was ranked first priority in both groups. Orthopaedic specialists and emergency practitioners differed on whether a PNB or an orthopaedic referral should be prioritised as the final action ([Table 4](#)).

No respondent answered the question “What factors do you think limit more widespread use of nerve blocks in lower extremity injuries patient management?” Twenty-three of 64 (35.9%) respondents reported performing 1–4 PNBs per month, while 10/64 (15.6%) respondents perform 5–10 per month. Thirty-one of 64 (48.4%) participants reported having done no PNBs. Of the 31 respondents who had never performed a PNB, 27 (87.1%) reported lack of the required skills, 4 (12.9%) reported lack of equipment, 4 (12.9%) expressed concern that patient care was delayed while taking time to perform a PNB, 3 (9.7%) reported lack of lidocaine (bupivacaine and other longer acting agents not available in Ethiopia), 2 (6.5%) reported concerns over a delay in achieving adequate anaesthesia and analgesia, and 2 (6.5%) unreliability of analgesia after doing a PNB. Of the 33 respondents who had performed PNB, the femoral USPNB was the most common (n = 16; 48.5%), followed by the ankle block using anatomic landmarks (n = 15; 45.5%). Almost all [17/18 (94.4%)] USPNBs were done by emergency medicine faculty and house staff, while the vast majority [15/16 (93.8%)] PNBs using anatomic landmarks were done by the orthopaedic team. One USPNB ankle block was reported by a final-year orthopaedic resident ([Fig. 1](#)).

When respondents were asked about their future practice, a majority of the respondents [60/84 (60.9%)] were optimistic that their practice on PNB would increase in the future, while 6.3% did not know. No one responded to the question “What should be central point of the training on peripheral nerve blocks in the future?”

Chi square test was done to check for associations between survey variables. A highly significant association was found between previous training on PNBs and the number of PNBs performed in a month (p-value 0.006). There were no significant associations between the level of training in PNBs and the number of PNBs done in a month, between year of EC experience and number of PNBs, and between ranking importance of nerve blocks in field of study and number of PNBs performed.

## Discussion

This survey was designed to assess orthopaedics and emergency physician's knowledge, attitude, and practice towards PNBs pending the schedule of a formal course at Black Lion Hospital, Ethiopia's national trauma referral centre. The survey was also intended to inform course designers at other African continental trauma institutions on local demographics, background, attitudes, knowledge, and practice of PNBs in emergency medicine and orthopaedic departments.

Both the emergency and orthopaedic department participated equally in this study, with a majority (78%) of eligible participants returning the questionnaire. Of these, participants were split evenly between the two departments, which is encouraging given

**Table 3**  
Perceptions on the performance of peripheral nerve blocks (n = 64).

Attitude	Very Important n (%)	Important n (%)	Somewhat Important n (%)	Not Important n (%)
Importance of PNB in your field of study	62 (96.9)	2 (3.1)	0	0
Importance of knowledge of relevant anatomy for PNB	62 (96.9)	1 (1.6)	1 (1.6)	0
Importance of patient education on procedure of PNB	42 (65.6)	19 (29.7)	1 (1.6)	2 (3.1)
Importance of additional sedation when performing PNB	6 (9.4)	17 (26.6)	19 (29.7)	22 (34.4)

**Table 4**  
Prioritisation of tasks.

	Rank for emergency (n = 31)	Rank for orthopaedics (n = 33)
Medical assessment	1	1
Parenteral analgesia	2	2
X-ray	3	4
Blood work	4	3
Nerve block	5	6
Ortho referral	6	5

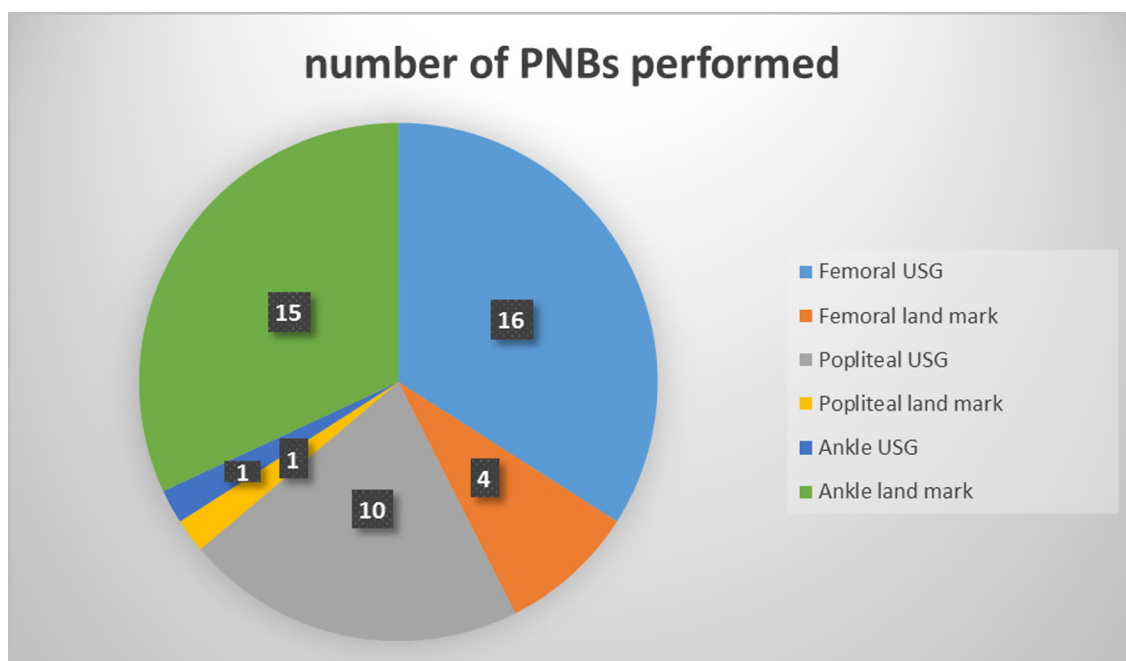
that both services participate equally in the management of the acute trauma patient in this setting. First and second year residents were more likely to have participated in the survey, which could either reflect a more open attitude towards PNBs as a pain management tool or indicate more familiarity with the procedure. Either way, we interpret this as a favourable environment for future education endeavours.

Most participants who got training from courses/workshops were satisfied with their previous training, and there was a significant association between previous training and the number of PNBs performed in a month. Little peer-to-peer transfer of skill was reported. This suggests a course/workshop would be an appropriate model for future education. That said, we also suggest more study as to what part of the courses/workshops are most helpful for learning as a minority of participants were not satisfied with this as a training method. General knowledge of PNBs was mixed. Only one half were able to correctly answer whether negative

aspiration before injection abolished the risk of intravascular injection. This indicates a need to address both technique and safety considerations during the course.

Most importantly, almost all of the emergency medicine and orthopaedic participants reported knowledge of PNBs as important to their field of study, regardless of department. This response is not only encouraging of a favourable environment but also indicative of the need to address including orthopaedics specialists in future training programs. Often, in more resourced environments, emergency medicine specialists are the targets of PNB initiatives and there is little information on how and when to include the orthopaedic specialty. The greatest limitations to performing PNBs were reported as lack of adequate training. This limitation can theoretically be resolved with future courses and better follow-up. However, lack of readily available equipment and appropriate medications (lidocaine) were also cited, and will need to be addressed in future emergency centre planning to facilitate use of the skill.

A majority of participants ranked the steps of medical assessment as a higher priority in management of the trauma patient compared to addressing pain management for an injury. This is similar to results from both Toronto emergency medicine physicians and Kenyan anaesthesiologists [17,19]. There was, however, a difference in prioritisation of PNB versus an orthopaedic consultation between the orthopaedic and emergency medicine services in the following order of tasks to be performed in the injured patient. The orthopaedic department ranked requesting their consultation as a higher priority task than performing a PNB for pain management, aiming for definitive therapy. This highlights the



**Fig. 1.** Number of PNBs performed by respondent.

importance of pre-course discussion between the two services on how a patient will be managed in the emergency centre.

A majority of the respondents [60/64 (93.8%)] were optimistic that their practice on PNBs would increase in the future. There were, however, no responses to the open-ended questions regarding what factors limit more widespread use and what should be the central focus of training. This is unfortunate, as these responses may have guided future course structure and helped establish a proactive department environment to maintain a sustained use of this procedure. It is unclear if these questions were potentially not understood or whether participants were uncomfortable giving suggestions, or had no suggestions to give.

Although response rates were good, the sample size is small and thus difficult to generalise results to a large population. The questions regarding previous source of training, level of satisfaction, and number of PNBs done per month may be affected by recall bias, which could affect the reliability of the respondents' response.

### Conclusions

This study indicates PNBs are likely underutilised due to lack of previous training, which could impact the number of PNBs done in a month. The study revealed a positive attitude towards PNBs but a gap on knowledge and practice. There was delay in giving pain control for those patients with lower extremity injuries. Early use of pain control should be considered in a management of those patients.

Emergency physicians are using ultrasound for nerve blocks, which is a safe and effective guide method. It is important for other specialties (particularly orthopaedics) to have training in collaboration with the emergency medicine specialists.

### Conflicts of interest

The authors declare no conflicts of interest.

### Dissemination of results

Results from this study were shared with staff members at Tikur Anbesa Specialised Hospital. The results were also presented at the third Ethiopian Society of Emergency Professionals conference.

### Authors' contributions

The authors have all contributed equally to the conception of the work including the acquisition, analysis, or interpretation of data, drafting and revising, and final approval of the version to be published, and agreed to be accountable for all aspects of the work.

### Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.afjem.2017.04.003>.

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