ORIGINAL ARTICLES

Local Anesthesia in Arterial Puncture: Nurses' Knowledge and Attitudes

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OBJECTIVE: Local anesthesia is rarely used in arterial puncture, even though it is recommended. The aim of this study was to examine attitudes and beliefs among nurses and third-year undergraduate nursing students in hospital training regarding the use of local anesthesia when performing arterial puncture and to assess their knowledge of the technique.

MATERIAL AND METHODS: Nurses and nursing students were issued a 15-item questionnaire consisting of 2 parts. The first part contained questions on the nurse's use of local anesthesia when extracting arterial blood for analysis and the second part involved questions regarding technical knowledge of this test. The results of nurses from the respiratory medicine department, nurses from the rest of the hospital, and nursing students were compared.

RESULTS: The questionnaire was answered by the 131 the nurses surveyed. Valid questionnaires were returned by 17 of the 19 nursing students surveyed. Questionnaires returned by nurses from the respiratory medicine department (n=11) were separated from those returned by the rest of nurses. Local anesthesia was used routinely by 7 nurses (5%), of whom 3 (27%) belonged to the respiratory medicine department; local anesthesia was not used by any of the nursing students. The main reasons given by nurses for not using local anesthesia were lack of knowledge (54%), need to perform 2 punctures when anesthesia is used (11%), belief that the same amount of pain is caused with anesthesia (8%), and success on the first attempt at arterial puncture (7%). The main reason given by student nurses for not using local anesthesia was also lack of knowledge (53%), followed by the fact that it was not used by the nurses (24%). Most of those surveyed (63%) indicated a desire to receive anesthesia should they undergo arterial puncture.

CONCLUSIONS: Local anesthesia is used very little in arterial puncture. Knowledge about how to perform arterial blood extraction for blood gas analysis is insufficient and needs to be improved among both nurses and nursing students. Nonetheless it is noteworthy that most of those surveyed indicated a preference for receiving local anesthesia if they were to undergo the procedure. These data should be taken into consideration when training nurses to perform arterial puncture.

Key words: *Nursing. Arterial blood gas analysis. Pain. Arterial puncture. Anesthesia.*

Anestesia local en la punción arterial: actitudes y conocimientos de enfermería

OBJETIVO: Aunque se recomienda el uso de anestesia local para la realización de la punción arterial, su empleo es muy escaso. El propósito del estudio ha sido conocer la actitud y los prejuicios sobre el empleo de la anestesia local para la realización de la punción arterial entre los profesionales de enfermería y alumnos de tercer curso de la diplomatura de enfermería en prácticas hospitalarias en nuestro hospital, así como el grado de conocimiento de la técnica.

MATERIAL Y MÉTODOS: Se pasó a enfermeros y estudiantes de enfermería un cuestionario que constaba de 15 preguntas, divididas en 2 partes: una hacía referencia al uso de la anestesia local en la extracción de una gasometría arterial, y en la segunda se preguntaba por conocimientos técnicos de la prueba. Se compararon los resultados de los enfermeros de la Unidad de Neumología con el resto de profesionales del hospital, así como de los profesionales y estudiantes de enfermería.

RESULTADOS: Contestaron el cuestionario los 131 enfermeros encuestados. De los 19 alumnos de tercer curso de enfermería, fueron válidas 17 encuestas. Del total de profesionales se separó a los enfermeros/as de la Unidad de Neumología (n = 11). Utilizaban habitualmente anestesia local 7 profesionales (5%), de los que 3 (27%) pertenecían a la Unidad de Neumología, mientras que ningún alumno de enfermería la usaba. Entre los profesionales, los principales motivos para no utilizar la anestesia fueron: desconocimiento (54%), necesidad de realizar 2 punciones si se usa anestesia (11%), por considerar que produce el mismo dolor con anestesia (8%) y por acertar en la primera punción (7%). En cuanto a los motivos de los alumnos de enfermería, el principal fue, al igual que entre los profesionales, el desconocimiento (53%), seguido de la falta de uso por éstos (24%). La mayoría de los encuestados (63%) querría que a ellos sí se les aplicase anestesia en la punción arterial.

CONCLUSIONES: El uso de la anestesia local es muy escaso. Los conocimientos sobre la realización de la gasometría arterial no son óptimos y deben mejorar tanto entre los profesionales como entre los estudiantes de enfermería. Sin embargo, es de destacar que la mayoría de los entrevistados prefería que a ellos se les realizara la punción arterial con anestesia local. Estos datos deben tenerse en cuenta en el proceso formativo de los profesionales de enfermería sobre la punción arterial.

Palabras clave: *Enfermería. Gasometría arterial. Dolor. Punción arterial. Anestesia.*

Introduction

The Spanish Society of Pulmonology and Thoracic Surgery (SEPAR) recommends insisting on the use of local anesthesia for performing arterial puncture as it prevents pain and reduces both anxiety and hyperventilation.[1] According to a Spanish survey published in 1994, however, local anesthesia is very rarely used in this procedure.[2] In other countries, too, local anesthesia is seldom used in arterial puncture, despite recommendations.[3,4]

Our perception was that the use of local anesthesia in arterial puncture for blood gas analysis continues to be rare in the practice of Spanish nurses—the people who most often perform this procedure.[2] After finding that local anesthetic was so seldom used, Hudson et al[4] proposed studying nurses' attitudes and perceptions regarding this procedure as a prior step to developing training programs.

We therefore designed a questionnaire for nurses and final-year undergraduate nursing students in order to evaluate their attitudes toward and possible prejudices against the use of local anesthetic and their level of knowledge of the technique, in order to determine whether there might be associations with a greater or lesser use of anesthesia.

Material and Methods

Study Population

The survey was carried out on the following 2 clearly-defined groups so that the results could be subsequently compared: *a)* nurses from medical and surgical wards and emergency, recovery, and intensive care units; and *b)* final-year undergraduate nursing students in hospital training.

Questionnaire

The questionnaire was drafted using simple, precise language, with short statements, and with no vague or ambiguous terms. The use of negative questions was avoided. The anonymous, self-administered questionnaire (Appendix) consisted of 15 questions, almost all of which were multiple-choice questions, and only 14 of which could be answered given that the answer to one of them1 item cuedreferred respondents to answer only one1 of the subsequent 2 questions. Answering question 2 in the negative excluded respondents from the study. The questions were grouped into 2 large blocs: theoretical knowledge (questions 4, 5, 10, and 11) and use of local anesthesia (questions 6-10 and 12-14), and a final opinion question (question 15). At the beginning of the questionnaire, respondents were asked to supply their personal details and to indicate the number of years they had been working as nurses and the department in which they worked. After the questionnaire had been drafted, it was distributed to the departments mentioned above during the morning and afternoon shifts on 7 days during November and December 2006 and January 2007.

The same questionnaire was distributed on a single day, during the morning shift, to nursing students in hospital training in that training module. The questionnaire was issued on the day the students had a seminar with the associate professor of clinical practice of the Department of Nursing of the University of Alicante.

Statistical Analysis

The differences obtained were analyzed using the *z* test for comparing proportions and the Mann-Whitney *U* test. Statistical significance was set at a value of *P* less than .05.

Results

All the nurses located during the shifts in which the aforementioned departments were visited (131 nurses, 65% of nursing staff) responded to the survey (99 women [76%], 32 men [24%]); 17 of the 19 third-year nursing students (all women) also responded to the survey. Two students were excluded because they gave negative answers to the exclusion question (number 2) and 1 student was excluded for leaving several questions unanswered. The nurses from the respiratory medicine department (n=11, 7 women, 4 men) were separated from the total group of nurses in order to obtain the results for this department.

In relation to technical knowledge of blood gas analysis, 67 nurses (51%) and 15 students (88%) understood the purpose of Allen's test (*P*<.01). Allen's test was regularly performed by 9 nurses (7%) and 3 students (18%); the difference was not significant. Twenty nurses (15%) and 3 students (18%) were aware of the SEPAR recommendations (no significant difference), and 36 nurses (28%) and 3 students (18%) knew the amount of time the sample could remain at room temperature (no significant difference). Nurses who used local anesthesia prior to arterial puncture had a higher mean technical knowledge of the procedure (based on 4 questions): a mean score of 2.14 correct answers compared to 0.8 correct answers for those who did not use local anesthesia (*P*<.01).

Only 7 nurses (5%) regularly used local anesthesia prior to arterial puncture: 3 of the 11 nurses in the respiratory medicine department and 4 of the 120 nurses in the other departments (*P*<.001). There was no link between the use of anesthesia and years of nursing experience or number of arterial punctures performed per month. Anesthesia was not used by any of the nursing students. Topical creams were used by 2 nurses. Table 1 shows the reasons given for not using anesthesia.

Of those surveyed, 34 nurses (26%) and 7 students (41%) stated that they were aware of other nurses who used local anesthesia prior to arterial puncture. Table 2 shows the reasons why respondents believed other nurses used local anesthesia.

Of the 131 nurses surveyed, 83 (63%) indicated a desire to receive anesthesia should they have to undergo arterial puncture; 14 (82%) of the nursing students indicated the same desire. Of these 83 nurses, only 7 (8%) used anesthesia; 3 of them worked in the respiratory medicine department.

Discussion

Arterial puncture is a painful and unpleasant experience for many patients.[5] Although local anesthesia could be used, it rarely is in clinical practice.[2-4] According to the results of our survey, very few nurses routinely use local anesthesia in this procedure; this is generally due to a lack

TABLE 1
Reasons for Not Using Local Anesthesia in Arterial Puncture

Reasons	Nurses[a] (n=120)	Nursing Students (n=17)	Respiratory Medicine Nurses (n=11)
Lack of knowledge	65 (54)	9 (53)	6 (55)
Because it would involve making 2 punctures are required	15 (12)	0	1 (9)
Because I only make 1 puncture	10 (8)	1 (6)	0
Because it causes the same amount of pain	10 (8)	1 (6)	1 (9)
There are no protocols in the department	9 (7)	0	0
Because extraction is performed in the brachial artery	2 (2)	0	0
Because I forget	1 (1)	0	0
Due to time considerations	1 (1)	0	0
Because the patient does not experience intense pain	1 (1)	0	0
It is only used in respiratory medicine	–	1 (6)	–
It is not used by nurses	–	4 (24)	–
There is no anesthetic in the department	–	1 (6)	–

Data are expressed as number (%).
[a]Excluding those from the respiratory medicine department

TABLE 2
Reasons Why Respondents Believe Other Professionals Use Local Anesthesia Prior to Arterial Puncture

Reasons	Nurses[a] (n=120)	Nursing Students (n=17)	Respiratory Medicine Nurses (n=11)
Inexperience	1 (1)	2 (12)	2 (18)
To reduce patient pain/anxiety	22 (18)	5 (29)	3 (27)
To prevent hyperventilation	2 (2)	0	3 (27)
Do not know reason for using anesthesia	(1) 1	0	0

Data are expressed as number (%).
[a]Excluding those from the respiratory medicine department.

of knowledge of how to perform the technique and a lack of appropriate protocols in the departments. Our findings on the use of anesthesia are similar to those obtained in a broad survey carried out by Giner et al,[2] showing that this type of anesthesia was practically never used outside of respiratory medicine departments. In our hospital, however, knowledge of the SEPAR recommendations and of the length of time samples can be stored before analysis is considerably worse (knowledge of 67% in the survey by Giner et al and 15% in ours).

Published recommendations on the use of local anesthesia are inconsistent. The SEPAR protocol[1] indicates the need for anesthesia (though only a relatively small percentage of nurses are aware of this recommendation), whereas the protocol distributed by the health authority

in our autonomous community[6] does not include a recommendation to use anesthesia. There are also mistaken beliefs regarding the use of anesthesia, including the supposed pain it causes, the idea that the examination may require more time, or that it is not necessary when the artery is catheterized on the first attempt. None of the nursing students surveyed routinely used anesthesia. The survey results for this group show the influence insufficiently well informed nurses can have during hospital training periods.

Rejecting the use of anesthesia is not exclusive to Spain or to nurses.[3,4] A survey carried out in the United Kingdom of doctors who performed arterial punctures showed that 84% never used anesthesia as they believed that it made performing the arterial puncture more difficult and that applying the anesthesia was painful.[3] Controlled double-blind studies, however, have shown that this is not the case.[3,7] The anesthesia puncture is not perceived as painful by the patient and the use of anesthesia is not associated with greater difficulty in catheterizing the artery or with increased local problems; nor does it prolong the examination time. It does, however, significantly reduce the pain caused by the arterial puncture.[3,7] Although it could be argued that the use of anesthesia would be less useful among professionals with extensive experience, this argument was disproved by Giner et al,[7] who showed that anesthesia was also associated with less pain when used by highly experienced nurses in a lung function laboratory.

We have shown that nurses' greater technical knowledge of arterial blood gas analysis or the arterial puncture technique and their working or having worked in the respiratory medicine department (3 of the 7 nurses who routinely used anesthesia worked in this department) were associated with greater use of anesthesia. Ignorance of the use of topical anesthesia and of the SEPAR recommendations indicates the need to improve training for both nursing students and nurses who perform this technique. This lack of knowledge and other factors not related to scientific knowledge have a negative influence on nursing students. It is perhaps worth mentioning that the simple fact of carrying out this survey has led the nurses in our hospital to feel greater interest in learning about and using local anesthesia in arterial punctures; this indicates that there is genuine interest in improving professional practices and designing a new way for doing so, based on this survey.

The results obtained among the nursing students indicate the need to improve theoretical training and to reinforce the training they received in respiratory medicine on the use of anesthesia, so that they are not influenced by less motivated nurses. It would have been interesting to evaluate the extent to which nursing students' attitudes changed following the survey but this was not possible as the students had already left to take up jobs elsewhere.

It is noteworthy that, although they did not use local anesthesia and, in many cases, even considered it unnecessary, most of the nurses and almost all of the students indicated a desire to receive anesthesia should they undergo arterial puncture. This contradiction probably reflects the fact that many beliefs, attitudes, and prejudices

regarding local anesthesia in arterial puncture are not the result of conscious reflection, but are due to a lack of proper training in this technique.

The use of anesthetic creams has been proposed as an alternative to local anesthesia. Two nurses in our department applied anesthetic creams routinely. Different studies have been published, however, showing that these creams (different products with different components) do not significantly reduced pain[8-10] and should therefore not be used for this purpose.

In conclusion, most of those surveyed did not use local anesthesia in arterial puncture due to a lack of proper training or because, contrary to scientific evidence, they believed its application to be painful and unnecessary. The results of this survey should be taken into consideration when implementing the recommendation to use anesthesia in this situation, in order to overcome erroneous beliefs and provide correct information. Furthermore, the fact that most of those surveyed expressed a desire to receive anesthesia should they undergo arterial puncture should be used in training programs to highlight contradictions and prejudices.

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APPENDIX
Questionnaire

Date: _____

Nurse
Student

Department: _____

Years in practice:_____

Academic Year

Sex: ☐ M　　☐ F　　Age: _____

1. Have you ever worked or received hospital training in a respiratory medicine department?
   ☐ Yes　　☐ No

2. Have you ever extracted blood for arterial blood gas analysis?
   ☐ Yes　　☐ No

3. How many extractions for arterial blood gas analysis have you performed in the last month?
   ☐ Less than 5　　☐ Between 5 and 10
   ☐ Between 10 and 15　　☐ More than 15

4. Describe the purpose of Allen's test
   _____

5. Do you routinely perform Allen's test?
   ☐ Yes　　☐ No

6. Did you know that arterial blood gas analysis is a test that is perceived as painful by the patient?
   ☐ Yes　　☐ No　　☐ Don't krow

7. Do you routinely administer local anesthesia prior to extracting blood for arterial blood gas analysis?
   ☐ Yes　　☐ No

8. If you answered yes, state the reason, name of the anesthetic, its form of presentation, and route of administration:
   _____
   _____
   _____
   _____

9. If you answered no to question 7, please indicate the reasons why you do not administer anesthesia:
   ☐ Lack of knowledge
   ☐ Because it would involve making 2 punctures
   ☐ Because I only make 1 puncture
   ☐ Because it causes the same amount of painr
   ☐ Other: _____

10. Are you aware of the SEPAR recommendations for performing blood gas analysis?
    ☐ Yes　　☐ No

11. What is the maximum length of time prior to analysis that a sample for arterial blood gas analysis may be left at room temperature?
    ☐ From 5 to 10 min.　　☐ From 10 to 15 min.
    ☐ From 15 to 20 min.　　☐ From 20 to 25 min.

12. Did you know that several scientific studies support the administration of subcutaneous local anesthesia prior to extracting blood for arterial blood gas analysis?
    ☐ Yes　　☐ No

13. Do you know of other nurses who administer subcutaneous local anesthesia prior to extracting blood for arterial blood gas analysis?
    ☐ Yes　　☐ No

14. If you answered yes, state the reason why you think they administer subcutaneous local anesthesia prior to extracting blood for arterial blood gas analysis.
    ☐ Lack of experience in performing arterial blood gas analysis
    ☐ For painless extraction
    ☐ To reduce patient anxiety
    ☐ To prevent patient hyperventilation
    ☐ Other: _____

15. If you had to undergo arterial blood gas analysis, would you like to receive subcutaneous local anesthesia beforehand?
    ☐ Yes　　☐ No

Thank you for your cooperation