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Contents lists available at ScienceDirect

Journal of Acute Disease

journal homepage: www.jadweb.orgShort communication <http://dx.doi.org/10.1016/j.joad.2016.03.013>

More needles less pain: The use of local anaesthesia during emergency arterial sampling

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ARTICLE INFO

Article history:

Received 14 Feb 2016

Received in revised form 1 Mar 2016

Accepted 8 Mar 2016

Available online 2 Apr 2016

Keywords:

Arterial blood gas sampling

Pain reduction

Local anesthetic

British Thoracic Society guidelines

Needle size

ABSTRACT

Objective: To explore the attitudes toward the use of local anesthetic (LA) in arterial blood gas sampling and the awareness and adherence to British Thoracic Society guidelines.

Methods: An anonymous eight-item survey was distributed among medical professionals in two teaching and two district general hospitals.

Results: In total 153 medical professionals were surveyed. Sixty-five percent have never had any training in administering LA. Most thought that arterial blood gas sampling was either “quite painful” (61%) or “extremely painful” (20%). However, 58% believed that patients should only “sometimes” be offered LA. Over half of the respondents (56%) never used LA before arterial blood gas sampling and 34% only used it “sometimes”. The majority (53%) stated that they would “sometimes” use LA in the future and 23% said that they would never use it.

Conclusions: Our results demonstrated that British Thoracic Society guidelines are not followed across the four hospitals. Despite the acknowledgment of arterial sampling being a painful procedure and the belief that patients should be offered LA at least “sometimes”, over half of the respondents never use it. Addressing the above-mentioned issues by introducing local guidelines and teaching sessions, as well as making LA more available, will help make this practice routine.

1. Introduction

Arterial blood gas (ABG) sampling is performed frequently in UK hospitals and allows healthcare professionals to quickly obtain information on the blood oxygen and carbon dioxide levels, as well as the acid base balance. The sample is commonly obtained from the radial artery. It is well established both that the procedure causes significant pain and that this pain can be markedly reduced by the use of subcutaneous local anaesthetic (LA)^[1]. Furthermore, contrary to popular belief, the use of LA does not make the procedure more difficult^[2,3]. Consequently, the British Thoracic Society recommends the routine use of LA for obtaining ABG samples except in emergencies, or in

unconscious or anaesthetised patients^[4]. Despite this, the use of LA before ABG sampling is not universal. The aim of this study was to quantify the awareness and prevalence of the use of LA in ABG sampling, and explore the reasons for lack of adherence to the guidelines and barriers to their wider implementation.

2. Materials and methods

An anonymous eight-item survey was distributed among medical professionals in two teaching hospitals and two district general hospitals in London, UK. Specialties, which were thought to perform ABG sampling most frequently, and various training grades were surveyed. The questions explored the attitudes towards the use of LA during ABG sampling and quantified the prevalence of the practice. Respondents who had not been previously aware of the British Thoracic Society guidelines were informed about them and asked if they would subsequently change their practice. The data were analysed in Microsoft Excel 2010 (Microsoft Inc., Redmond WA, USA).

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The study was performed according to the University College London (London, UK) ethical committee guidelines.

Peer review under responsibility of Hainan Medical College. The journal implements double-blind peer review practiced by specially invited international editorial board members.

3. Results

In total, 153 medical professionals were surveyed. Of these, 31% were from intensive care, 21% from emergency medicine, 16% from respiratory medicine, 14% from acute medicine and 18% from “other” specialties involved in the hospital “on-call” rota (Figure 1). The majority of the respondents were foundation year 1 and 2 doctors (39%), and specialty trainees (22%). The rest included core trainees (15%), specialist nursing staff (14%) and consultants (10%).

Over 80% performed more than five ABG samples per month. Sixty-five percent have never had any training in administering LA. Most thought that ABG sampling was either “quite painful” (61%) or “extremely painful” (20%) (Figure 2). However, the majority (58%) believed that patients should only “sometimes” be offered LA. Only 21% thought that LA should be “usually” given and 14% believed that it must “always” be used (Figure 3).

Despite the above expressed attitudes, over half of the respondents (56%) never used LA before ABG sampling and 34% only used it “sometimes” (Figure 4). The main reasons given for this were: pain of LA, unavailability of LA, lack of training and disbelief of benefit. The majority (59%) stated that they would “sometimes” use LA in the future and 23% said that they would never use it, even though they were notified of the latest British Thoracic Society guidelines (Figure 5).

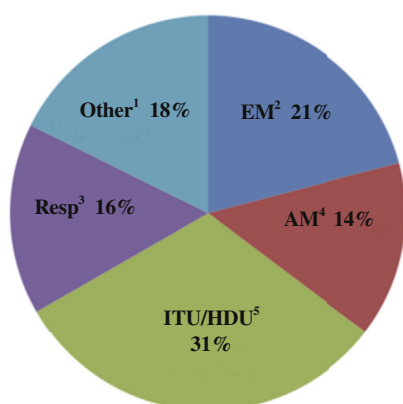


Figure 1. Specialties surveyed.

1: Other specialties involved in the hospital on-call rota; 2: Emergency medicine; 3: Respiratory medicine; 4: Acute Medical Unit; 5: Intensive Treatment Unit/High Dependency Unit.

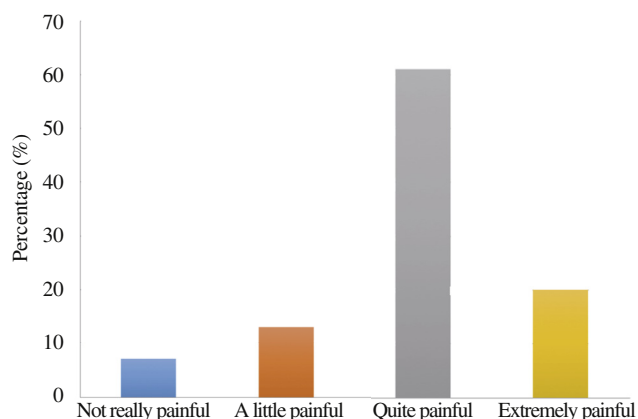


Figure 2. A graph demonstrating the perception of arterial sampling pain levels among healthcare professionals.

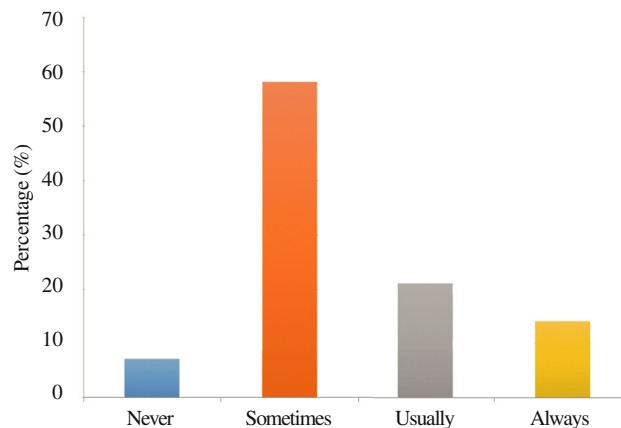


Figure 3. A graph demonstrating the opinion on whether patients should be offered LA during arterial sampling.

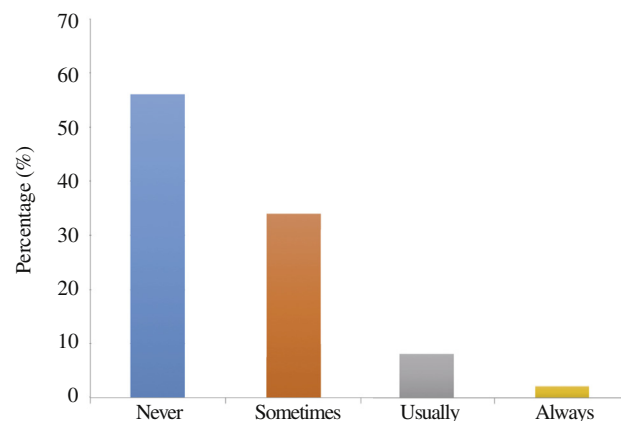


Figure 4. A graph demonstrating the use of LA during arterial sampling.

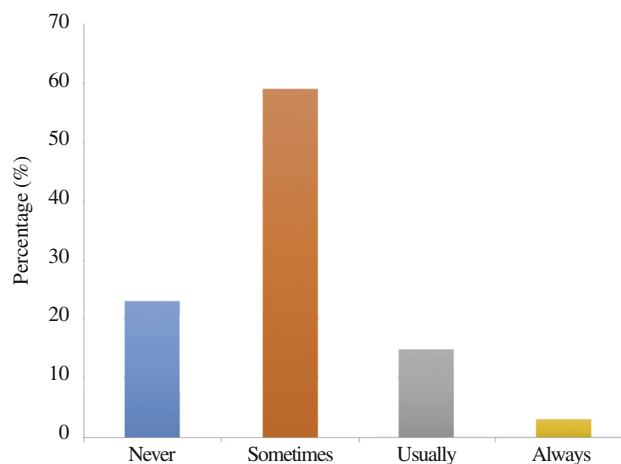


Figure 5. A graph demonstrating the willingness of healthcare professionals to use LA during arterial sampling in the future.

When the comparison between different specialties was done, Intensive Treatment Unit/High Dependency Unit healthcare professionals (60%) were more likely to use LA (“sometimes”, “usually” and “always”) than those in acute medicine (51%), respiratory medicine (42%), other specialties (34%) and emergency medicine (25%). However, no statistical analysis was carried out due to small sample size to see if these findings are significant.

4. Discussion

Our results demonstrated that British Thoracic Society guidelines were not being followed across the four hospitals.

Although the guidelines were produced in 2008^[4], the majority of the respondents have not yet received appropriate training. Knowledge of the guidelines does not alter respondent's attitudes towards the use of LA.

The pain experienced during ABG sampling occurs as a result of high innervation levels of the sampled artery and is worsened on repeated attempts. In our survey, the majority of the respondents acknowledged that ABG sampling was a painful procedure, which is well supported in the literature. In one group of patients ABG sampling produced slight to moderate pain^[2], whilst a study of intensive care patients showed ABG sampling was one of the main factors that caused distress in patients and was placed into a higher discomfort category compared to other types of procedures experienced whilst on Intensive Treatment Unit^[5]. Furthermore, the pain associated with ABG sampling could be responsible for delayed hospital presentation in patients with chronic respiratory conditions such as asthma^[6,7].

Even though ABG sampling is seen as a painful procedure, the majority of the respondents believe that patients should only “sometimes” be offered LA and most never actually use it. Common reasons given for this is the false belief that LA contributes to the overall pain of the procedure or that LA offers no benefit in terms of pain reduction. Studies have shown that 70%–84% of junior doctors never use LA prior to ABG sampling, thinking it does not reduce overall pain levels. The belief is that it may increase total pain with two needles instead of one, and that it may prolong the procedure itself^[3,8]. Interestingly, over 90% of respondents have not had an ABG sample taken from themselves, but were they to need one, 44% would like LA^[8].

It has been clearly demonstrated that the use of LA significantly reduces pain levels in ABG sampling. A well-conducted placebo controlled trial showed that LA is associated with a greater than 50% reduction in pain^[2]. Not surprisingly, the pain associated with LA infiltration is associated with needle size and using large bore needles to administer the LA can be as painful as taking the ABG sample without LA^[9]. However, buffering of the LA with sodium bicarbonate has been shown to decrease the pain associated with the injection of the anaesthetic itself, something that could be applied in clinical practice^[10,11]. Interestingly, recently a small study with 41 participants has shown that the use of local anaesthesia did not reduce the pain associated arterial sampling. However, due to the small study sample, it is difficult to establish the validity of their conclusion^[12].

Several alternatives to the LA injection have been proposed, in order to reduce the pain associated with the injection itself. However, the use of topical LAs in the forms of creams and gels has been shown to be ineffective in reducing the pain of ABG sampling^[13–15]. Similarly, rapid cooling of the puncture site with agents such as ethyl chloride has not been shown to reduce the pain associated with arterial sampling^[9]. This could be explained by the fact that the pain of ABG sampling results from the puncture of deeper structures rather than the skin. However, a recent study of cryoanalgesia with ice packs has demonstrated a reduction in the pain levels associated with arterial sampling and it was also well tolerated by the patients^[16]. Another

alternative that has been proposed is a 2% lidocaine jet injection, which has been shown to significantly reduce the pain associated with the procedure and increase the success rate of ABG sampling^[17].

Another reason frequently given for not using LA in ABG sampling is that it lengthens and increases the difficulty of the procedure itself^[1,3,13]. However, if readily available the use of LA prolonged the procedure by less than a minute. Similarly, the infiltration of the LA had no effect on the ABG sampling success rate, and actually the pain associated with not using the LA decreased the success rate of obtaining the sample on the first attempt^[2]. In practice, for drug safety reasons LA may not be readily available and the time and effort required to obtain it may act as a deterrent. The general ‘lack of belief’ in its value undoubtedly diminishes the effort to remedy this.

In our survey, Intensive Treatment Unit/High Dependency Unit healthcare professionals were more likely to use LA prior to arterial sampling (60%). This is in keeping with a study of 178 physicians that found approximately 60% of doctors involved in providing anaesthesia use LA in ABG sampling compared to less than 3% of other health care providers^[18].

Given that this study only looked at LA in ABG sampling, the question as to the necessity of sampling has not been addressed, and given the pain associated with the procedure there are good arguments for limiting the procedure.

Despite the acknowledgment of arterial sampling being a painful procedure and the belief that patients should be offered LA at least “sometimes”, the majority of the respondents never use it. The main reasons given are difficulty in accessing LA, lack of training and the false belief that there is no benefit in using it. An organised approach is required to make the practice routine and reduce the unnecessary patient suffering associated with the procedure. Implementation and promotion of local guidelines will guide healthcare professionals on when to use LA. Organising local training sessions will address the misconceptions about the practice and provide the required training, which is currently inadequate. It is also important to make LA more available. A potential solution could be to create an arterial sampling pack kit, which will come with a pre-packed small amount of LA.

Conflict of interest statement

The authors report no conflict of interest.

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