

# An audit of the patient's experience of arterial blood gas testing

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Arterial puncture is the most common method used to obtain a sample for the measurement of arterial blood gases (ABGs) and is essential to guide the prescription of long-term oxygen therapy (LTOT) in patients with chronic hypoxic lung disease. However, this procedure is often reported by patients as a painful and unpleasant experience, which to date has not been explored.

This audit specifically examines the subjective views of a small group of patients ( $n = 41$ ) who are receiving LTOT who have experienced repeated ABGs. Results demonstrated that 49 % ( $n = 20$ ) were poorly informed regarding what the procedure involved, almost half the patients 49 % ( $n = 20$ ) recalled pain levels of 5 and above on a visual analogue scale and 66 % ( $n = 27$ ) were totally unaware that the test could make a considerable difference to their treatment.

While highlighting the deficits in current practice locally, this audit concludes that the respiratory nurse specialist is in an ideal position to implement changes to improve the patient's experience of chronic disease management.

National and international guidelines recommend accurate and reliable measurement of arterial blood gases (ABGs) that must comply with specific criteria for the prescription of long-term oxygen therapy (LTOT) (**TABLE 1**) [1, 2, 3, 4].

Traditionally, medical staff perform direct arterial puncture from the radial or femoral artery, which remains the most common form of sampling [5].

Patients often report varying degrees of pain and discomfort endured during this procedure; however, there is limited research into the patient's perception of this procedure, although Dar *et al* [6], when comparing arterial puncture with capillary sampling, identified that arterial puncture was more painful.

- $pO_2(a) < 7.3$  kPa with or without hypercapnia and an FEV1 of  $< 1.5$  litres; or
- $pO_2(a)$  between 7.3 kPa and 8 kPa if there is evidence of pulmonary hypertension, peripheral oedema suggesting congestive heart failure or polycythaemia
- Assessment of patients for long-term oxygen therapy should comprise the measurement of arterial blood gases on two occasions not less than 3 weeks apart who are receiving optimum medical management and whose chronic obstructive pulmonary disease is stable

TABLE 1: Criteria for the prescription of long-term oxygen therapy

As an alternative method, arterialized capillary blood can be taken from the earlobe and this technique has proven to be less invasive and more acceptable to the patient, provided it is performed by experienced staff [7].

However, while some studies have shown that this type of sampling correlates well with arterial sampling and is an acceptable alternative [6, 7], Eaton *et al* [8] argue that despite rigorous attention to procedure, it is insufficiently accurate in the prescription of LTOT.

While this debate continues, guidelines state that patients on LTOT will be required to have repeat ABG sampling to assess clinical status and monitor oxygen prescription [1, 2, 3, 4]. Further submission to a test that has previously been an unpleasant experience may contribute to high levels of apprehension and further distress for these patients [7, 8].

### Aim of the audit

Previous studies have focused on technique, technical difficulties and accuracy of ABG testing, while few have explored the patient's perspective. To this end, the aims of this audit were:

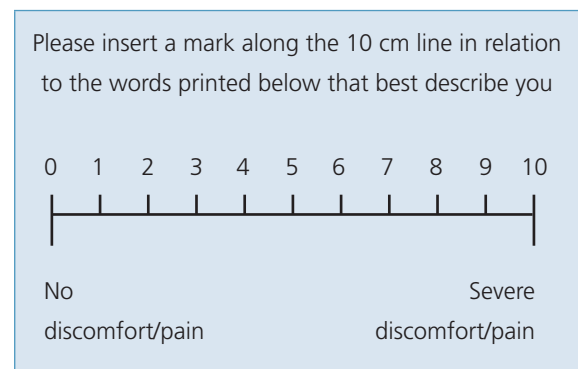
- To investigate the patient's experience of ABG testing in a cohort of local patients with severe hypoxic lung disease who are on LTOT
- To examine the patient's level of understanding of the ABG test regarding the implications to his/her treatment
- To examine the patient's levels of concern regarding his/her new oxygen prescription
- To highlight areas of practice that require further staff training in order to improve the patient's experience at local level

### Method

An audit was carried out over a 3-month period using a short postal questionnaire, which was structured and provided opportunity for open comment. It was sent to the homes of 66 patients who were on LTOT and were receiving domiciliary follow up from the respiratory nurse specialist.

The questionnaire consisted of questions that enquired about informed consent, the procedure and complications, explanation and implications of the results and, finally, how their experience could have been improved.

Patients were also asked to quantify retrospectively the level of discomfort they had experienced using a visual analogue scale (VAS) (FIGURE 1).



### Results

Out of the 66 patients, 41 returned the completed questionnaire, providing a 62 % response rate. To obtain this response rate patients who failed to return the questionnaire were telephoned by the respiratory nurse specialist and the form was completed over the phone.

Patients were asked where their ABG gas testing took place within the hospital. While the majority of LTOT assessments were performed in the medical day unit (56 %, n = 23), ABG tests were also performed in the accident and emergency department (2 %, n = 1), wards (22 %, n = 9), in more than one location (20 %, n = 8), and 7 % (n = 3) of tests were performed in a different hospital.

### Informed consent

Patients were asked if they had been given an explanation by the medical staff as to why they needed the test. Fifty-one per cent (n = 21) had been given a verbal explanation, which related to the patient's low oxygen levels.

However, in another question, 49 % (n = 20) claimed that before the test medical staff had not explained what the test involved. Of those who had been given an explanation, only 15 % (n = 6) were told that the procedure differed from a usual blood test and an arterial sample was required.

### The procedure and complications

Local anaesthetic was given to only 5 % (n = 2) of patients, while 10 % (n = 4) could not remember.

In the majority of patients (76 %, n = 31) a radial puncture was performed, while the remaining 24 %

had a femoral puncture or reported to have had test from more than one site. The number of attempts to obtain a sample varied (**FIGURE 2**) and 34 % (n = 14) of patients endured more than three attempts.

Pain experienced during the test showed that almost half the patients (49 %, n = 20) recalled levels of 5 and above on the VAS scale (**FIGURE 3**). One patient described increasing pain with each attempt.

Although a retrospective estimate may be less accurate than recordings carried out immediately after a test, it is interesting to note that in this study the experience had made a considerable impact on the patient's memory as with time one would expect the memory to fade but most patients had still remembered their experience.

Additionally, **TABLE 2** shows unprompted comments offered by patients about the doctor's ability in performing ABG sampling, as in all cases it was a doctor that performed the procedure.

Complications of pain and bruising to the area were reported by 49 % (n = 20), which suggests that insufficient pressure was applied to the site after the test. Scott [9] recommends that pressure should be applied on the puncture site for at least 5 minutes.

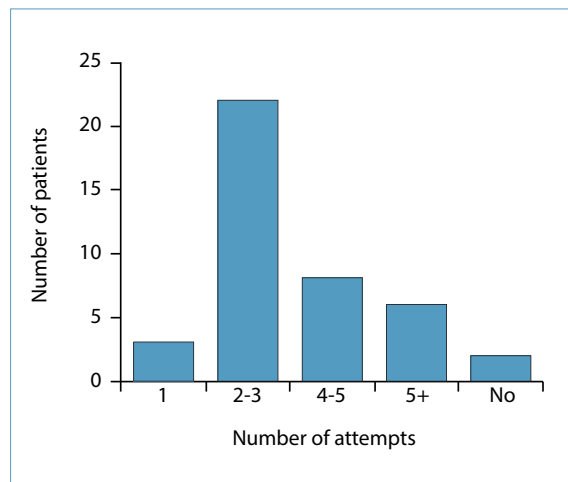


FIGURE 2: How many attempts were made to take the blood sample

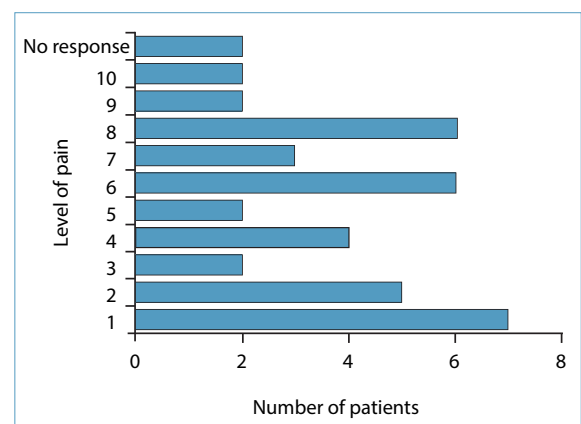


FIGURE 3: Levels of discomfort/pain during the test

- 'The doctor experienced great difficulty getting blood from me and eventually gave up'
- 'It usually takes one attempt to get a sample but one doctor made 6 or 7 attempts and gave up in the end because I threatened him with an early grave!'
- 'On two occasions I had the same doctor who was positive and confident. She found the artery on the first attempt. On another visit I had another doctor who took 3 attempts and was very nervous'
- 'My doctor had never used the type of needle supplied, and her attempt ended in panic when blood spurted everywhere and I fainted'
- 'Make sure whoever conducts the test is given sufficient training'

TABLE 2: Patients' comments about the doctor's ability to perform arterial blood gas test

## Explanation and outcome of test results

While 51 % (n = 21) of patients said they would have liked the results of their test before they went home, 49 % (n = 20) did not receive the results of their test by the doctor on the same day. The majority of patients (66 %, n = 27) were totally unaware that the ABG test could make a considerable difference to their treatment and **FIGURE 4** shows varying levels of concern of all patients regarding their new prescription for oxygen.

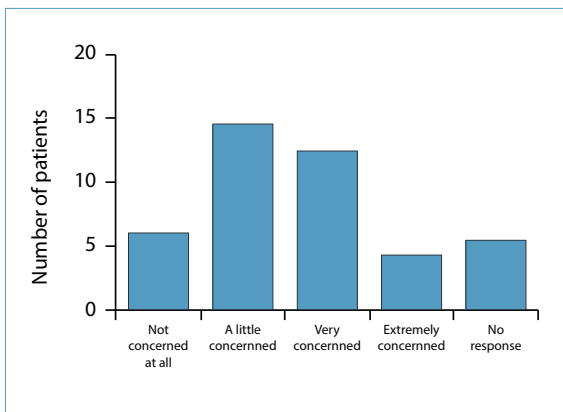


FIGURE 4: How did you feel when you were told about your new oxygen treatment

As the ABG is being performed to decide if the patient requires LTOT, it would follow that there is a need for an explanation regarding home oxygen therapy, which according to the Royal College of Physicians [2], should include installation of oxygen concentrator and need for oxygen to be used for 15 hours per day. Examples of patients' comments regarding their feelings when commencing oxygen therapy are shown in **TABLE 3**.

- 'I was more concerned about the inconvenience than the effect'
- 'I was shocked when the concentrator arrived'
- 'I was not prepared for such restriction'
- 'I was pleased as the test showed I needed less oxygen'
- 'I believed it was being done for my own good and accepted that it was necessary'

TABLE 3: Patients' comments regarding their feelings when commencing oxygen therapy

Only 24 % (n = 10) of patients tested were given a contact telephone number for additional information or support.

## Improving the patient experience

Patients were asked open-ended questions about how they felt about each aspect of their experience and how it could be improved. From their comments issues fell into two groups: more information and changes in the procedure.

## More information

A proportion of patients identified from an information-giving perspective some of the issues they would have found helpful and these included:

- Written information about the test itself (e.g. how it differs from a normal blood test)
- Personalized explanation/discussion about test
- How long the test would last

- More information before the test about the possible consequences regarding treatment
- Having someone to talk to about the oxygen treatment

### Changes in the procedure

While some patients stated they would prefer just one test and to be given an option where the blood is taken from, clinically this is unrealistic because arterial blood can only be taken from certain sites [5]. Important comments included:

- Numb the area to deaden the pain
- A more competent professional to do test
- The results sooner and an explanation of implications

### Discussion

This audit attempted to identify issues related to the patient's experience of ABG testing and clearly highlights four areas for consideration:

- Pain caused during the procedure
- Competence of practitioners performing test
- Lack of information about the test
- Concern regarding changes to treatment in the long term

The majority of patients reported that ABG testing can cause pain and distress, which is a concern.

The fact that 34 % (n = 14) of patients in this study reported an experience of pain level between 0 and 3 on the VAS scale may suggest that, given the skills, it is possible to perform arterial puncture within acceptable limits, although this may also be related to each individual's pain perception.

Dar et al [6] demonstrated that even with local anaesthetic, arterial puncture was still more painful than capillary testing, which was preferred by patients [7, 8].

While debate continues around the comparison of

biochemical data between arterial or arterialized capillary sampling and its accuracy for LTOT prescription, at a clinical level, patients who have severe lung disease will continue to require arterial punctures before commencing LTOT.

Therefore, aspects that patients perceive as causing them concern or distress, such as pain or lack of information, need to be addressed if the patient's experience is to be improved. However, pain caused during the procedure is only one aspect and it is acknowledged that this audit has its limitations, but it has highlighted issues that warrant further prospective research.

The need for competence of practitioners performing the test was clearly stated by patients who participated in this audit. The variance reported by the patients regarding the doctors' ability performing ABG sampling raises the importance of training issues to improve their skills and implement best practice at local level. Patients need to be confident in the healthcare professional they see and in the standard of care they receive (Department of Health [10]).

Competency, as well as good communication skills, increases trust between the patient and healthcare professional and encourages an active partnership in care [11]. However, a bad experience has the potential for an understandable reluctance to attend further appointments for necessary repeat ABG testing and a breakdown in the therapeutic relationship that may be detrimental to the patient's future care.

The ABG tests were performed in an acute setting where the doctor's time is often limited and information given was restricted to the physical aspects of the patient's clinical condition. None of the patients reported on information given by any other source than the doctor.

It is not possible through this audit to ascertain whether additional information given by a nurse would have been of benefit, as the level of knowledge in relation to LTOT of the nurses within the clinical areas where the test was performed was not checked.

A large percentage of patients (46 %, n = 19) were not given any information regarding the procedure itself and this may have contributed to the anxiety and pain levels experienced by the patients. It appeared that the ABG sampling was seen as a clinical procedure as there was limited association with treatment the patient may receive as a result of sampling.

The high levels of concern experienced by patients when informed after the test about their change in oxygen treatment relates to the lack of discussion before the test regarding the possible implications that this could have on their quality of life.

Patients stated that they wanted information about the practical and social issues around the oxygen treatment; however, doctors' training is focused more on diagnosis and treatment which does not equip them with the knowledge to educate chronically ill patients to manage their condition [12].

Although ABG sampling is only a small aspect of LTOT provision, from this audit it is clearly a significant aspect of the patient's experience. With the recommendation of the Royal College of Physicians' [2] report on clinical guidelines for domiciliary oxygen therapy services scheduled for 2005 [13], there is a potential for the increased use of arterial sampling for assessment.

Changes will include the prescription of concentrators and ambulatory oxygen where previously only concentrators were prescribed. This will give patients greater access to respiratory specialists, comprehensive assessment, patient follow up and improved availability of ambulatory oxygen which has the potential to improve their quality of life. With this in view, it is important that our current practices are reviewed and the patient experience improved.

## Recommendations and conclusions

Patient involvement is a key element to improving the patient experience, which is at the heart of The NHS Plan [14, 16]. However, there is a distinct absence of studies regarding the patient's experience of ABG testing.

This audit aimed to explore patients' perspectives of the care they receive and to provide direction for improved care provision at local level. It provides valuable information that enables healthcare professionals to review their practice and provide more patient-centred services.

However, it represents limited, retrospective opinion at local level and while it highlights care deficits, dissemination of these recommendations cannot be generalized to other hospitals without undertaking further research. Strategies for change were identified at local level that will make a difference to this particular group of patients.

In the short term, changes involve the provision of written information about the procedure, the opportunity for the patient to discuss the possible consequences of the test on his/her future management and, where possible, a contact number for the respiratory nurse specialist and local '*Breathe Easy*' group to provide additional advice and support. This encourages patient involvement in treatment decisions [11] and may help to reduce anxieties of the unknown.

In the medium to long term, this involves the development of procedural guidelines for ABG testing and a training programme to update knowledge and skills for health professionals involved in this procedure.

Both these strategies have been implemented locally within the last year. A recent discussion with the training department has also highlighted the need to ensure that all practitioners involved in ABG sampling have received adequate training in both procedure and analysis and can demonstrate clinical competency.

This presents an ideal opportunity for advancing the skills and the development of professional practice for the respiratory nurse specialist.

Changes in service modernization also require modernizing education and training that will enable respiratory nurse specialists to attain the knowledge, skills and competencies to expand their role and unify

their approach to care in the management of patients with chronic respiratory disease.

With the increasing demands of providing high standards of care to a growing population of patients with chronic disease, it is important that respiratory nurses challenge traditional practice, improve patients' journey and meet their expectations of the NHS.

Examples of practice in the DoH and RCN [15] document Freedom to Practise: Dispelling the Myths demonstrate how nurses who have the appropriate knowledge, skills and competencies have the clinical autonomy to take responsibility for all parts of the patient's journey.

While respiratory nursing is still relatively young, in the past decade nurse specialists have shown they are capable of considerable innovations in practice that have benefited the breathless patient [16, 17, 18]. These authors demonstrate that having increased contact with patients means there is more time to address their fears and concerns, pay more attention to education and counselling, and change the focus of care to a more holistic approach for the person.

National and international organizations recommend the involvement of respiratory nurse specialists in the management of patients with chronic lung disease, although there is a lack of published work regarding the evaluation of their roles [1, 2, 3, 4].

It could be argued, however, that given the education, the respiratory nurse specialist can implement the changes that improve continuity of care and significantly improve the whole of the patient's experience [10]. There is growing evidence that nurse-led practice and service delivery is effective, valued and acceptable to patients [19, 20, 21].

Advancing clinical practice relies heavily on having the evidence to prove competency to undertake new roles. It is, therefore, important that new schemes are carefully audited for patient satisfaction as well as clinical outcomes, and that clinical competencies are regularly tested to safeguard standards of care.

Results need to be published so that the value of the respiratory nurse specialist's role can be determined, patients' needs can be monitored and service delivery can be tuned to improve the patients' experiences of health care.

## Key points

- Arterial blood gas (ABG) testing may be considered a small area of practice in respiratory care but it is significant in the patient's experience and management of care.
- In this audit patients who had had ABG testing stated that information about the procedure and discussion regarding potential changes to their treatment would have been beneficial to their experience.
- The implementation of ABG training for doctors has been identified as an important factor in improving competence and could be expanded to the respiratory nurse specialist, nurse practitioners and nurses in the critical care setting.
- Changes in oxygen provision scheduled for 2005 provide an ideal opportunity for respiratory nurse specialists to review their current practice, expand their role and improve continuity of care for patients with chronic lung disease.
- Respiratory nurse specialists have a central role in the management of patients with chronic lung disease and are ideally situated to implement changes that improve the patient's experience.

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