London Ambulance Service
NHS Trust

NHS

A snapshot clinical audit examining the management of Sickle Cell Crisis

Final Report

August 2004

Authors:

Ben Harold
Clinical Audit Co-ordinator – Team Leaders

Gurkamal Virdi
Clinical Audit Co-ordinator - Central

Dr Rachael Donohoe
Clinical Effectiveness Manager

Correspondence to:

Clinical Audit & Research Unit, A & E Development
London Ambulance Service NHS Trust
8-20 Pocock Street, London, SE1 0BW

Executive Summary

Introduction

The London Ambulance Service NHS Trust (LAS) serves a large ethnically diverse population. It is well evidenced that certain illnesses are more prevalent among some ethnic groups than others. One of these illnesses is Sickle Cell Disease. Patients usually contact the LAS when they experience a Sickle Cell Crisis, characterised by severe pain caused by faulty red blood cells blocking blood vessels creating a lack of oxygen (known as 'sickling'). LAS treatment guidelines are aimed at reducing both the patient's level of pain and the damage resulting from the 'sickling' process. This clinical audit measured compliance to these guidelines and examined the response category allocated to the call.

Methods

Patient Report Form and Central Ambulance Control data were collected and analysed for the first 100 patients who called the LAS in September 2003 reporting a Sickle Cell Crisis.

Results

- 43% of patients did not have their level of pain assessed.
- Over a third of eligible patients did not receive any pain relief.
- Only one patient received IV analgesia and this was administered by an immediate care doctor who arrived on scene to assist an Emergency Medical Technician crew.
- When oxygen was administered alone (i.e. not as a supplement via entonox administration), over a third of patients received the correct high flow concentration.
- Only 1 out of 29 (3%) eligible patients received IV fluid administration.
- There was no documentation of the use of the carry chair and/or trolley bed in 40 cases.
- 60 patients were transported to their specialist centre.
- 42% of cases received the lowest category of response (GREEN), which resulted in these patients, on average, waiting longer before receiving emergency care.

Recommendations

1. Crews must be encouraged to carry out a pain assessment for patients experiencing Sickle Cell Crisis and administer pain relief accordingly.
2. Crews must be reminded to administer a high concentration of oxygen to sickle cell patients.
3. Paramedics must be encouraged to use their extended skills and administer IV analgesia when entonox is ineffective and initiate IV fluid therapy where appropriate.
4. Staff must be reminded of the need for full and accurate documentation of the care given to patients and any exceptions to treatment. Efforts need to be made to document crew status, conveyance methods and the patient's specialist centre.
5. The possibility of including a LAS-dictated protocol that assigns a more appropriate response category for patients experiencing a Sickle Cell Crisis should be explored.
6. A re-audit should be undertaken when sufficient time has passed to allow for the above recommendations to take effect.

Introduction

Background

The London Ambulance Service NHS Trust (LAS) serves a large ethnically diverse population. It is well evidenced that certain illnesses are more prevalent among some ethnic groups than others. One of these illnesses is Sickle Cell Disease; it can affect people with an ethnic background from Africa, the West Indies, India, the Mediterranean and the Middle East. Patients with Sickle Cell Disease usually contact the LAS when they experience a Sickle Cell Crisis. Between April 2003 and March 2004, the LAS attended 2209 patients experiencing symptoms related to Sickle Cell Disease.

Sickle Cell Crisis occurs when red blood cells containing faulty haemoglobin become deformed due to a lack of oxygen. This is known as 'sickling'. These cells become rigid and clump together causing the circulating blood to increase in viscosity (thickness) and the capillaries to become blocked. This results in a lack of oxygen reaching the body's tissues (termed as tissue hypoxia). Patients experience severe pain and if the lack of oxygen is not corrected this can lead to the affected tissue being damaged and tissue death may occur.

It is important that patients presenting to the LAS with a Sickle Cell Crisis receive the most appropriate treatment available to reduce their level of pain and prevent further complications. Every patient experiencing a Sickle Cell Crisis should receive high concentration oxygen to reduce hypoxia, and pain relieving analgesia in the form of entonox should be considered. Paramedics can use their extended skills to administer intravenous (IV) analgesia as an additional form of pain relief and IV fluid therapy should also be initiated to re-hydrate the patient and reduce the viscosity of the blood. The carry chair and/or trolley bed should be used to convey the patient to the ambulance as this will reduce the body's requirement for oxygen. To enable better continuing care for the patient, LAS guidelines also state that unless there is a life threatening condition present the patient should be transported to the specialist centre where they are normally treated.

It is also important, when the emergency call is made, that patients are triaged to the appropriate response category. The response category determines the type of resource sent to the patient (e.g. ambulance, fast responder, emergency care practitioner) and the length of time it will take to arrive at the patient. The LAS uses the Advanced Medical Priority Dispatch System (AMPDS) to triage calls made through the emergency 999 system. Using AMPDS the Emergency Medical Dispatcher (EMD) asks a series of structured questions; the answers to which determine the seriousness of the patient's condition. AMPDS produces a code called a 'determinant' that is allocated a 'response category' based upon the identified clinical need of the patient. The LAS uses three possible response categories: 'RED' the highest response level, used when the patients condition is life threatening or potentially life threatening, 'AMBER' is allocated when the patient's condition is serious and 'GREEN'

is used when the patient's condition is neither serious or life threatening. The LAS has recently decided to send alternative responses to many calls allocated a GREEN response. This means that some patients will be referred onto different forms of care pathways other than hospital attendance. These resources are inappropriate for patients experiencing a Sickle Cell Crisis as these patients typically require hospital treatment. Furthermore, the allocation of a GREEN response category can allow the LAS to delay the dispatch of ambulance resources for up to 30 minutes for those patients that are deemed to be in a 'safe environment'; this would not be suitable for patients experiencing a Sickle Cell Crisis.

Previous work undertaken by the LAS in 2001 found that 53% of patients experiencing a Sickle Cell Crisis were allocated a GREEN response[1]. Recommendations were made to amend the AMPDS protocol so the service could set an appropriate response for Sickle Cell Crisis. However this recommendation was rejected by the National Academy of Emergency Dispatch International Standards Council and it is therefore possible that many patients may still be receiving a level of response that may be detrimental to their condition.

Objectives

This clinical audit aimed to examine the LAS's management of patients experiencing a Sickle Cell Crisis. The objectives of the audit were to:

- Examine the compliance to guidelines when administering care to patients
- Identify the current response category assigned to patients.

Methods

Design

A retrospective criterion based clinical audit was undertaken to measure adherence to protocols based on JRCALC National Clinical Guidelines, LAS Treatment Protocols and Extended Training Orders (as documented in Table 1). The audit examined the response category assigned when triaging the emergency call through AMPDS.

Data was collected for the first 100 patients who called the LAS in September 2003 reporting a Sickle Cell Crisis. The Patient Report Form (PRF) and Central Ambulance Control call receipt (AS1 or AS2) for each patient were collected and data was entered onto an Excel spreadsheet. The data was analysed using descriptive statistics.

Audit standards

Compliance to the following standards of care was measured:

Aspect of Care	Definitions & Instructions	Target	Exceptions
Pain Score (initial and final)	MED A1 (Medical Emergencies)	100 %	Patient unable to communicate and children under 10 years old*[1]
Administration of High Concentration Oxygen	MED T15 (Sickle Cell Crisis), Drugs 16 (Oxygen)	100 %	Patient refused, contraindicated, or administered Entonox
Administration of Entonox	MED T15 (Sickle Cell Crisis), Drugs 6 (Entonox)	100 %	Patient refused, contraindicated, pain score less than 5*[2] and children under 10 years old*[3]
Administration of IV analgesia	MED T15 (Sickle Cell Crisis), ETO2 (Intravenous Cannulation & Administration of Infusion Fluids), Drugs 22 (Tramadol), Drugs 14 (Nalbuphine Hydrochloride)	100 %	Emergency Medical Technician only crew, contraindicated, pain relieved by Entonox, unsuccessful IV cannulation, patient refused
Administration of IV fluids	MED T15 (Sickle Cell Crisis), ETO2 (Intravenous Cannulation & Administration of Infusion Fluids)	100 %	Emergency Medical Technician only crew, transport time to hospital <10 minutes, contraindicated, unsuccessful IV cannulation, patient refused
Use of carry chair or trolley bed	MED T15 (Sickle Cell Crisis)	100 %	Patient refused
Patient transported to specialist centre	MED T15 (Sickle Cell Crisis)	100 %	Patient had life threatening condition, patient does not have specialist centre, urgent calls and inter-hospital transfers

Table 1 – The audit standards

*1 LAS crews currently assess a patient's level of pain using the Numerical Rating Scale. This scale asks patients to rate their level of pain on a scale from 0 (patient has no pain) to 10 (patient experiencing severe pain or the 'worst pain ever'). Children may not be able to comprehend how to use the score.

*2 The Entonox guidelines indicate its use in cases of moderate to severe pain. For the purpose of the audit this is defined as a pain score greater than 5.

*3 Entonox is a self administered drug and children may not be able to understand the instructions to use the entonox equipment. They may also be unable to achieve the required depth of breathing required to activate the equipment.

Results

Patient demographics

Of the 100 patients in the sample the majority (n=89) were under 40 years of age. The mean age was 25 years with a range of 2 to 61 years. 62% of patients were female and 38% were male.

Pain scoring and analgesia administration

Figure 1 shows that two pain scores were documented in 41% of cases, with a further 10% of cases having only one pain score recorded. Exceptions for not assessing pain were documented in 6% of cases. Therefore, 43% of patients did not have a pain score documented and no exceptions were given to justify this.

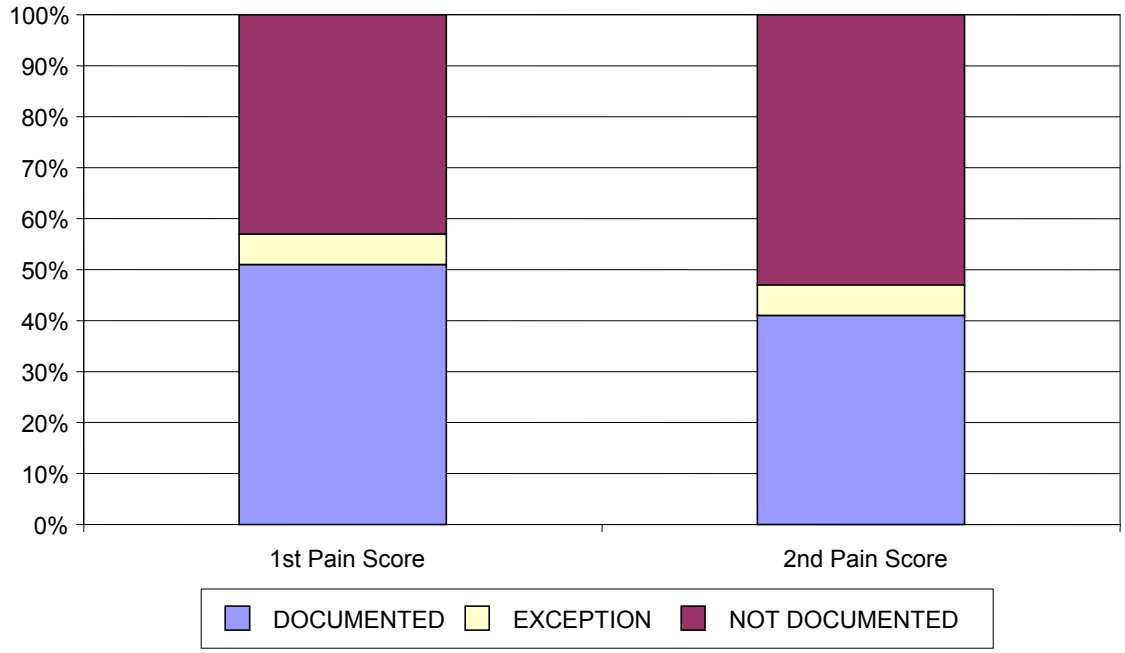

Figure 1 – Documentation of patients' pain scores

Pain relief should have been delivered to every patient unless there was a valid exception. Exceptions were documented for not administering pain relief in 15 cases. 53 patients received pain relieving analgesia in the form of entonox. For the remaining 32 patients (38% of eligible patients) there was no documentation of pain relief being administered.

The effect of entonox in alleviating pain was examined by looking at the differences in the initial pain score and the pain score following administration of entonox. Of the 53 cases where entonox was administered, two pain scores were recorded in only 22 cases. Figure 2 illustrates the effect that the administration of entonox had on the 22 patients' pain scores. Each point on the graph represents a

case (or multiple cases where indicated). The patients' first pain score is indicated on the 'x' axis and their second is on the 'y' axis. In 17 cases (77%) pain scores remained constant (shown as pain scores that remain on the diagonal line). For the remaining 5 patients (23%) the pain score decreased, ranging from 1 to 6 points on the Numerical Rating Scale.

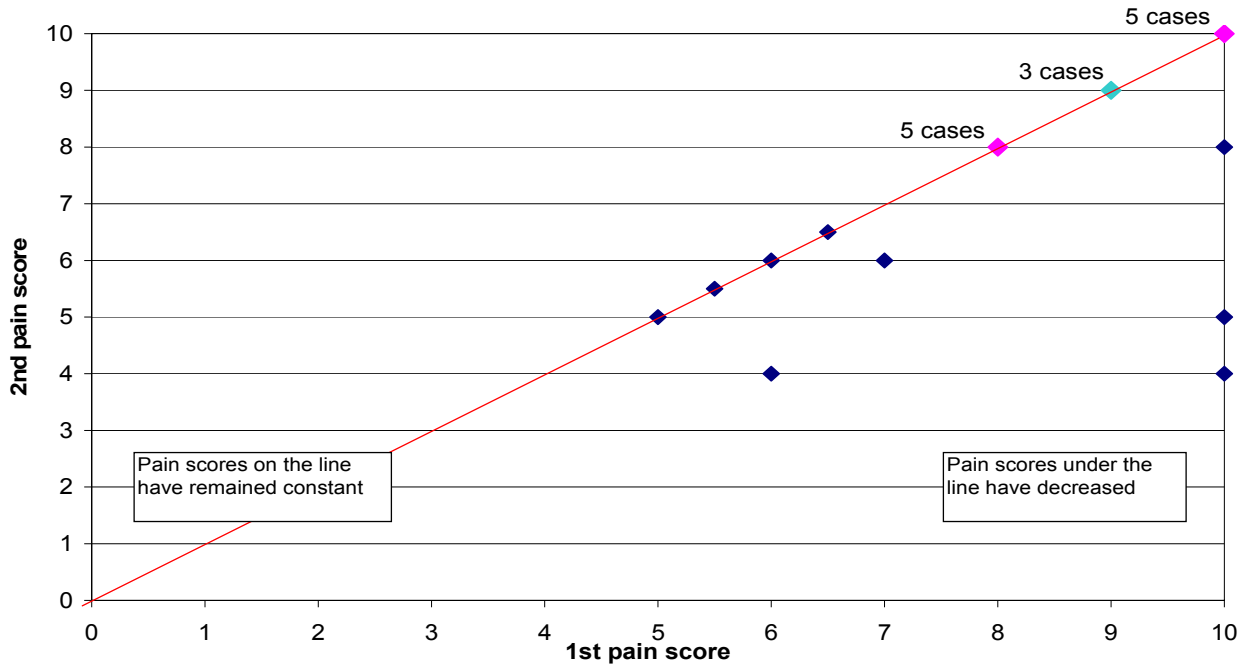

Figure 2 – Changes in pain scores when entonox had been administered

There were 20 cases where the pain scores indicated that entonox was not effective (i.e. the second pain score remained at 5 or above). Of these 20 cases, 14 documented paramedic presence. In instances where entonox is not effective in alleviating pain the LAS recommends that paramedic staff members administer IV analgesia. However, there was no documentation that any of the 14 patients received IV analgesia from a paramedic.

In one case an Emergency Medical Technician crew was assisted by an immediate care doctor who administered IV morphine to the patient.

Oxygen Therapy

Oxygen was administered to 45 patients. Exceptions for the non-administration of oxygen was documented in 40 cases, 39 of these were due to patients receiving supplemental oxygen through the administration of entonox. In the remaining 15 cases there was no record of oxygen being administered. Table 2 reports the variations in oxygen concentration delivered to the 45 patients administered oxygen alone. Only 16 patients (36%) received the appropriate concentration of high flow oxygen therapy (defined as greater than 60%).

Concentration of oxygen delivered	Frequency of cases (%)
>60%	16 (36)
40% – 60%	28 (62)
No concentration recorded	1 (2)

Table 2 – Concentration of oxygen delivered for 45 patients given oxygen

IV Fluid Administration

In situations where transport time to hospital is estimated to be greater than 10 minutes, the LAS requires paramedics to administer IV fluids to patients. In 55 cases there was a valid exception documented for not administering IV fluids, which included transport times of less than 10 minutes. Poor documentation meant that it was impossible to determine whether there was a need to administer IV fluids in 16 cases. Of the remaining 29 patients that were eligible, only one received IV fluids from a paramedic. However, this was documented incorrectly on the PRF, being recorded in the 'additional incident/ treatment details' box rather than in the 'fluid and drug administration' box.

Conveying the patient

The LAS requires staff to convey patients to the ambulance using either a carry chair or trolley bed as the effects of hypoxia in the tissues will be exacerbated if patients walk to the ambulance. In 60 cases, there was documentation of the carry chair and/or trolley bed being used to convey the patient. In the remaining 40 cases there was no documentation of the method of conveyance.

Transporting the Patient to their Specialist Centre

Figure 3 shows that 60 cases were transported to the specialist centre that they usually attend. Valid exceptions were documented in 6 cases. 14 cases were not transported to their specialist treatment centre and no documented reason was given. In a further 20 cases it was not possible to determine whether the patient was taken to their specialist treatment centre due to missing information on the Central Ambulance Control call receipts.

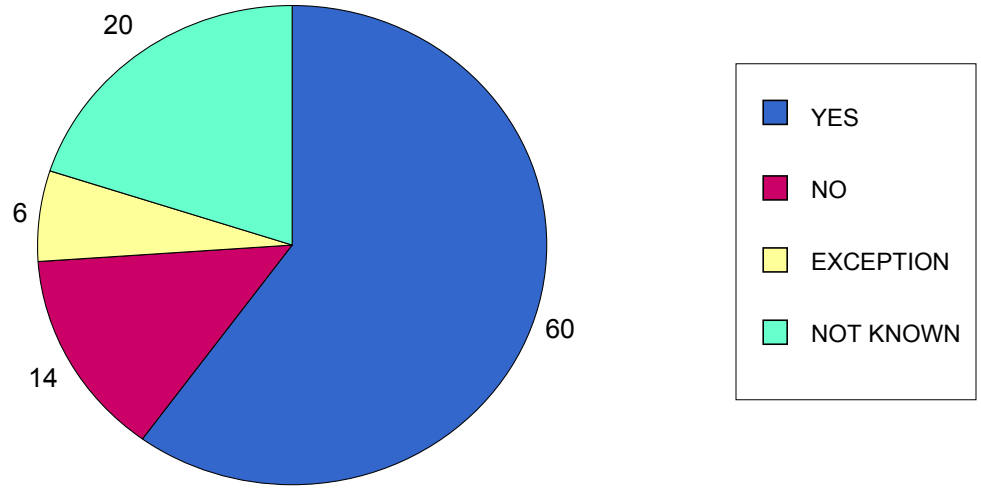

Figure 3 – Conveyance to the patient's specialist treatment centre

AMPDS Call prioritisation

In 3 cases the call was classified as a doctor's urgent with the remaining 97 being emergency calls. The 3 urgent calls and one emergency call requesting an inter-hospital transfer were not prioritised using the AMPDS system. Figure 4 displays the distribution of the response categories assigned to the 96 calls that were prioritised using AMPDS. The majority of calls were assigned a GREEN response (42%); classifying the condition as neither life threatening nor serious. A RED response, categorising the patient as having a life threatening condition, was allocated in 38% of cases. 20% of calls received an AMBER response which classifies the patient as having a serious condition.

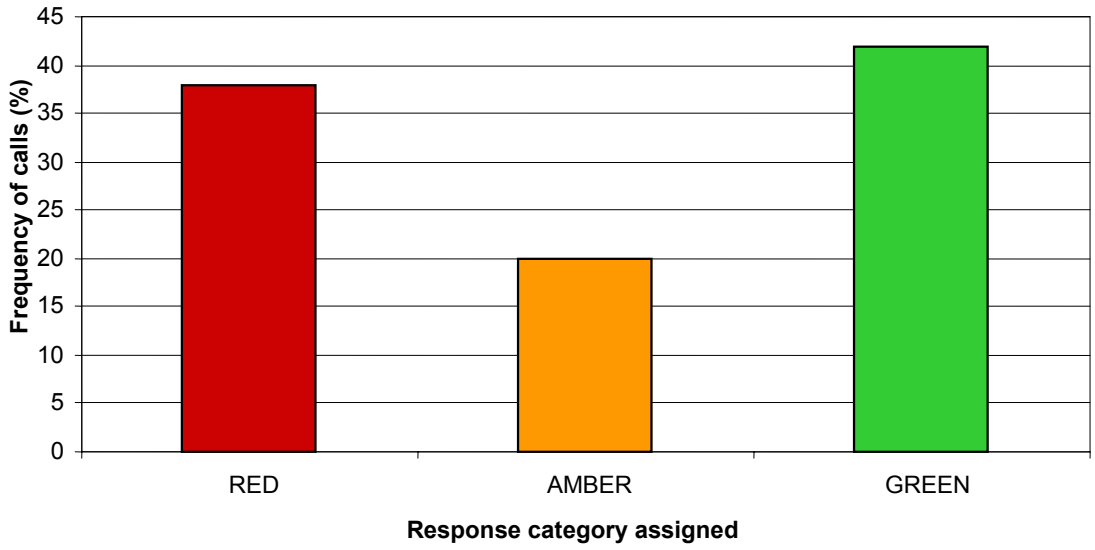

Figure 4 – The frequency of assigned response category

Response Intervals

Table 3 reports the average response times for the response categories assigned by AMPDS. It can be seen that a RED response category results in a faster response time (with a mean response time of 9 minutes), followed by AMBER and GREEN (with mean response times of 11 and 13 minutes respectively).

Response Category	Mean Response Time in minutes* (range)
RED calls	9.06 (3-34)
AMBER calls	10.51 (4-27)
GREEN calls	13.39 (3-60)
All 999 calls	11.20 (3-60)

Table 3 – Breakdown of mean response intervals for each response category

***** Ambulance response times are measured from the time the EMD obtains the location and chief medical complaint of the patient until the time the ambulance resource arrives on scene

Discussion

The findings of this clinical audit have highlighted several areas of concern regarding the care administered to patients experiencing Sickle Cell Crisis and the response categories allocated by AMPDS.

Despite the severity of pain often associated with Sickle Cell Crisis, it was found that in 43% of patients a pain assessment was not carried out. The LAS requires staff to carry out a pain assessment to help inform their decisions when considering the administration of pain relief. The lack of documentation of pain scoring leads to the assumption that crews did not assess the extent of pain that the patient was experiencing and use pain assessment to inform treatment. Consequently, in over a third of cases no form of pain relief was received. Also, in at least 14 cases an IV analgesic should have been administered secondary to the administration of entonox. However, despite paramedic presence and the patient's self reported pain score clearly demonstrating the ineffectiveness of entonox in reducing the patients' pain, IV analgesia was not provided. This poor management of pain in patients experiencing a Sickle Cell Crisis presents a significant concern to the Service.

In total, 84 patients received oxygen (either through oxygen alone or as a supplement via entonox administration). However in the 45 cases when oxygen was administered alone, only 16 patients (36%) received a high concentration as indicated in the guidelines. This presents a significant clinical risk as patients may be at risk of further 'sickling' unless they receive high concentration oxygen to reduce the tissue hypoxia.

Paramedics should administer IV fluids to patients where a prolonged journey to hospital is expected (defined as greater than 10 minutes). Only one patient was administered IV fluids even though it was indicated in 29 patients. This raises concern as extended transport times are possible when conveying patients to their specialist treatment centre, as opposed to the nearest hospital, and so dehydration is more likely.

The audit highlighted poor documentation as an issue. In 40 cases it was not possible to determine how the patient reached the ambulance due to a lack of documentation. Additionally, in 20 cases it could not be established if the receiving hospital was the patient's designated specialist centre due to a lack of documentary evidence from the Central Ambulance Call receipts. Poor documentation poses a medico-legal risk to the LAS as the stance held by the courts is that if care is not documented then it has not happened. It is essential that all aspects of assessment and treatment are clearly documented to provide a complete representation of pre-hospital care.

In line with the previous work conducted by the LAS in 2001, this audit showed that a significant number of patients still receive a low priority GREEN response. Fewer calls are being allocated a GREEN response (42% compared to 53% in 2001) and more calls are being allocated a RED response (38% compared to 28% in 2001). However, as a GREEN response results in patients in some instances receiving a longer response (see Table 3), the allocation of this category to patients experiencing Sickle Cell Crisis could potentially have a negative impact on the patient's condition. It is essential that the LAS continue its efforts to allocate a more appropriate response to Sickle Cell Crisis.

Conclusions

This audit has highlighted a number of potential clinical risks in the current management of Sickle Cell Crisis. A large proportion of patients are not receiving an adequate pain assessment and analgesia to alleviate pain. Oxygen is not always delivered at a high concentration which is necessary to prevent further 'sickling'. Paramedics are not using their extended skills to enhance the quality of care administered to the patient. Also, the allocation of response categories by AMPDS to patients experiencing a Sickle Cell Crisis must be explored further. Furthermore, in line with the findings of other clinical audits, this audit has observed that documentation is still an issue in the Service.

Recommendations

1. Crews must be encouraged to carry out a pain assessment for patients experiencing Sickle Cell Crisis and administer pain relief accordingly.
2. Crews must be reminded to administer a high concentration of oxygen to sickle cell patients.
3. Paramedics must be encouraged to use their extended skills and administer IV analgesia when entonox is ineffective and initiate IV fluid therapy where appropriate.
4. Staff must be reminded of the need for full and accurate documentation of the care given to patients and any exceptions to treatment. Efforts need to be made to document crew status, conveyance methods and the patient's specialist centre.
5. The possibility of including a LAS-dictated protocol that assigns a more appropriate response category for patients experiencing a Sickle Cell Crisis should be explored.
6. A re-audit should be undertaken when sufficient time has passed to allow for the above recommendations to take effect.

Acknowledgements

The authors would like to acknowledge Fionna Moore – Medical Director and David Whitmore – Senior Clinical Advisor for their help and guidance, and Julia Fay – Clinical Audit & Research Administrator for collecting and inputting the data.

References

1. Heward A (2001) A report into the triage of sickle cell crisis by medical priority dispatch. London Ambulance Service. Unpublished Report.