USING NITROUS OXIDE AND OXYGEN TO CONTROL PAIN IN PRIMARY CARE

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Improving pain control is an area where nurses have the clinical expertise to make a significant difference to the quality of patient care. The inhaled analgesic 50% nitrous oxide and 50% oxygen is ideal for use when undertaking short, potentially painful procedures as it is a safe and effective method of pain relief. Many patients in the community require procedures that can be extremely painful. This article describes how this analgesic has been successfully introduced throughout a PCT, through collaborative working between acute pain nurses based in the hospital setting and community nurses.

INTRODUCTION

Pain accompanies many investigations and treatments undertaken in a range of healthcare settings. The pain patients experience during these procedures may be of short duration but it can be intense and for many patients this can cause a great deal of distress (Pediani, 2003).

The self-administered analgesic 50% nitrous oxide and 50% oxygen (Entonox, Equanox or ‘gas and air’) has traditionally been used in maternity and emergency care settings. It is safe and effective and can be used in many other settings (Sealey, 2002; Lawler, 1995).

This article describes the analgesic, its clinical uses and how to safely administer it. It also describes how the hospital-based acute pain team at an NHS trust worked with the district nurse team at the local PCT to ensure continuity and consistency in its use across different healthcare settings, when it was introduced for use by district nurses when undertaking painful procedures in the community.

THE ANALGESIC

Nitrous oxide is an anaesthetic gas that acts on the brain to dull the pain receptors. When administered in high concentration it results in loss of consciousness. However, when used in combination with oxygen, it results in pain relief but consciousness is maintained (BOC, 2004). The combination of equal parts of the two gases is marketed as an analgesic under two trade names (Entonox and Equanox), and colloquially known as ‘gas and air’.

The mixture acts as a potent analgesic with properties that are comparable to strong opiates. It is widely used to provide analgesia for women during childbirth, and also provides short-term pain relief, sedation and reduced anxiety for patients who are undergoing a wide range of potentially painful procedures including:

- Wound dressing changes;
- Suture removal;
- Invasive procedures such as catheterisation.

However, nitrous oxide and oxygen must not be used as an alternative to regular analgesic administration. In addition it should only be self-administered when it is being used to relieve procedural pain of short duration.

MODE OF ACTION

The analgesic is administered by inhalation via either a face mask or a mouth piece. The flow of gas is controlled by a sensitive demand valve activated by the patient’s inspired breath (Pediani, 2003). The gas is rapidly absorbed on inhalation into the blood stream and provides analgesia within minutes. It is equally rapidly excreted from the body via the lungs once inhalation ceases. This makes it the ideal analgesic to use when undertaking short, potentially painful procedures.

As well as providing analgesia, nitrous oxide and oxygen can produce feelings of relaxation or euphoria, which means it is also useful to relieve patients’ anxiety when undergoing these procedures.

The amount of gas – that is, analgesia – obtained is controlled by patients themselves. The risk of overdose is minimal as patients’ consciousness level governs their ability to maintain the flow of gas (Pediani, 2003). Patients must therefore be able to self-administer by holding the demand valve and inhaling the gas independently as they require it. If they are unable to do this, alternative analgesia should be given.

Anticipating and controlling pain inhibits the physiological response, preventing the consequences of a stress reaction to pain that can lead to an impaired immune response (Carr and Goudas, 1999).

Improving pain control is an area of clinical practice in which nurses have the expertise required to continue treatment and raises anxiety.
to make a significant positive difference to patient care (Black, 2004). Nitrous oxide and oxygen is a safe, effective and empowering method for providing pain relief to patients experiencing procedural pain.

Its use is being encouraged and has provided benefits for patients in a variety of hospital settings, in addition to maternity and A&E. Box 1 outlines its indications while Box 2 highlights its contraindications.

**THE PRODUCT**

Cylinders containing 50% nitrous oxide and 50% oxygen are traditionally coloured blue with a blue and white collar. The newer lightweight cylinder supplied by BOC is white with a white and blue collar and has the brand name ‘Entonox’ clearly written along the cylinder.

Cylinders are available in a range of sizes: the smaller ‘D’ size is portable and often supplied in a bag. Sizes go up to the larger ‘F’ cylinders, which are commonly wheeled around hospital wards and departments on a trolley. In addition, lightweight D-size cylinders have been introduced with an in-built regulator.

The regulatory valve may be incorporated into the head of the cylinder or it may need to be clamped in place. A hose is attached to the regulatory valve and the filter and mouthpiece or mask is attached to this.

**INITIAL ASSESSMENT**

The most important aspect of administering nitrous oxide and oxygen is assessing the patient and the degree of pain likely to be caused by the procedure being undertaken and ensuring the analgesic is not contraindicated. If it is inappropriate for either the patient or the procedure, alternative analgesia should be prescribed.

**COMMUNITY USE**

Many patients on surgical wards have benefited from the use of nitrous oxide and oxygen to help control pain experienced as a result of wound care. Unfortunately, once discharged from hospital, this analgesic has not been available in the community. As a result some patients have stayed in hospital for longer so they can receive analgesia when undergoing wound care or even returned to surgical wards for their wound care, increasing ward nurses’ workload.

Community midwives have used portable Entonox equipment for home births for many years (Lawler, 1995). However, its use in the community has not developed in a similar way to hospital use. Increasing pressure to discharge patients earlier has impacted on district nurses and many patients require wound care that is painful (Evans, 2003). However, it is not in either patients’ or nurses’ best interests to carry out a painful procedure. This can result in psychological effects for patients, such as reluctance to accept further treatment and increased anxiety, which in turn increases the level of pain experienced.

The majority of district nurses’ caseloads will include older frail patients who may not tolerate oral analgesia for procedural pain. In addition, this form of analgesia has a delay in onset, not allowing for any unforeseen problems that could occur in the community (Evans, 2003). Nitrous oxide and oxygen is therefore an ideal addition to empower district nurses in providing wound care for many patients.

**INTRODUCTION TO PRIMARY CARE**

Previously, the acute pain team at Bolton Hospitals NHS Trust had provided equipment and training to enable a small number of patients to benefit from analgesia.
using nitrous oxide and oxygen after discharge from hospital. We felt the provision needed to be extended throughout the PCT.

In 2006 we obtained a grant for equipment from NAPP Pharmaceuticals, which enabled us to purchase 10 sets of equipment. The PCT also purchased equipment that ensured all the treatment rooms and district nurse teams in the locality had access to the gas and administration equipment.

Guidelines have been produced for:
- Assessing patients’ suitability for the gas;
- Storage and transport;
- Infection control.

A patient group directive was also produced to allow short-term use by nurses without a prescription.

The acute pain team provided training for community nurses, district nurses and treatment room nurses. The training included information on indications, contraindications, storage, patient assessment and ‘hands-on’ practical changing of cylinders.

A number of problems and issues had to be dealt with when introducing the gas into the community. Initially it was supplied through a prescription and supply from a local pharmacist. However, this resulted in unacceptable delays and logistical problems with storage in patients’ homes. To overcome this, a contract was arranged between BOC and the PCT, which has led to cylinders being made available at all health centres. This includes 24-hour access at one centre.

The gas is stored in designated and labelled areas within health centres. The local fire service has been informed that medical gases are stored at the centres. The majority of patients who receive procedural pain relief using nitrous oxide and oxygen do so at health centres. However, some are not able to attend and are treated at home. This caused major concerns among district nurses about carrying medical gas in their cars.

Some were reluctant to carry the cylinders and were concerned it would invalidate their insurance. There are no regulations covering the carriage of small cylinders, although a transport emergency card should be carried (Day, 2001). Enquiries made to insurance companies revealed that the nurses were covered for carrying the cylinders.

EVALUATION

The analgesic has been made available for use with patients following discharge from hospital throughout Bolton PCT. The initial reaction from community nurses was cautious but their enthusiasm and confidence have grown as they have gained experience in using the gas. They are now confident enough that they are initiating its use themselves with patients who have not been discharged from hospital.

In order to evaluate the success of the initiative a brief questionnaire was sent to district nurse team leaders. This aimed to find out what type of patients and procedures nurses were using the gas with, how effective they felt it was and whether they had encountered any complications, in particular with repeated use in the community compared with hospital use.

Results

Seven completed questionnaires were received. Six district nursing teams have used the gas to provide pain relief when undertaking a range of procedures including the following:
- Deep wound packing;
- Pilonidal sinus abscess;
- Leg ulcers;
- General wound care.

The questionnaire asked respondents to rate the effectiveness of nitrous oxide and oxygen in providing pain relief. Three rated it as extremely effective, two rated it as 75% effective and one as 62.5% effective. One respondent commented that the analgesic did not work at all for a patient who had a pilonidal sinus.

Comments

Comments from respondents included:
- ‘Very useful initially, patients have used it for approximately the seven days then oral analgesia effective from then on’;
- ‘Not enough available’;
- ‘Easy to use’.

CONCLUSION

Nitrous oxide and oxygen is an effective analgesic for the relief of procedural pain and can safely be used by nurses working in a range of settings. While it is most commonly used in hospitals, this initiative has extended its use into the community. It has also overcome some of the logistical problems of supply and addressed district nurses’ reluctance to carry and use the gas in patients’ homes. Its use is now increasing as nurses become more confident and experienced with it. We have not found any problems with repeated use but continue to monitor individual patients.

We would encourage other community nursing teams to consider using this analgesic to provide improved quality of care for patients undergoing potentially painful procedures.

REFERENCES


