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A safe and valuable asset to your dental practice

Janet Pickles¹ provides a review of relative analgesia, or inhalation sedation, for the new decade.

Relative analgesia – or inhalation sedation (IHS), as it is now more commonly referred to – is a very useful tool in the dental team's toolbox. However, it is frequently perceived as 'too much of a bother' or 'too expensive'. Both of these statements are oversimplification and the option should not be dismissed on these grounds alone.

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IHS is a safe and valuable asset to most dental practices with an incredible safety record, if the correct equipment is utilised.

Of all the techniques of conscious sedation, undoubtedly inhalation sedation is the one which has the greatest in-built flexibility and by far the widest application to age groups and conditions.

The particular concept of relative analgesia dates from 1940 when Harry Langa and other enthusiasts began to use low concentrations of nitrous oxide allied to semi-hypnotic suggestions for their dental patients. They discovered that when fear, anxiety and apprehensions are eliminated, and the patient is given a changed mental focus, a number of valuable effects follow. One of the

most dramatic of these is a raising of the pain threshold, so that minor discomfort is no longer magnified and exaggerated by fear.¹

Once it has been established that relative analgesia can be an asset to the dental practice, then great care must be taken to ensure the equipment complies with all the latest specifications and requirements. This does not necessarily have to be expensive. Great leaps forward in provision of titrated flowmeters and scavenging sundries have been made in recent years and a comprehensive range of equipment is available to suit all requirements.

As a general guide, the following components are required:

1. Dedicated sedation flowmeter- analogue or digital type
2. Medical gas supply – piped or stand alone
3. Scavenging – this is divided into two sections: breathing system and method of active draw.

None of the above has to be particularly difficult or expensive as is the general perception. Quite often, OEM [Original Equipment Manufacturer] reconditioned equipment is available, bringing the cost down significantly and representing excellent value. However, a cautionary note – in recent times, units that have been condemned and unsupportable due to age and condition are finding their way into medical equipment auctions or even eBay – definitely a *caveat emptor* situation.

Sedation flowmeter types currently available

Matrix MDM – Analogue model
Matrix DMDM – Digital model
Porter MXR – Analogue model
Accutron Ultra PC – Analogue model
Accutron Digital Ultra – Digital model
Accutron Newport – Analogue model

All these flowmeters can either be used with a pipeline on a suitable mounting bracket or mounted on a mobile 4 cylinder stand – the latter is a mobile or 'standalone' system, capable of being used in more than one surgery.

Although the analogue flowmeter models, particularly the Matrix MDM, have been the most popular since the 1960s, there is no denying the rise of the digital models, particularly the Accutron Digital Ultra. Demand for this model has been significant of late and could overtake the MDM over the next few years.

Medical gas systems

A piped system generally comprises a remote cylinder storage area, with gases piped in

degreased copper to medical gas terminals or outlets as they are commonly referred to. The flowmeters are connected to these outlets by hoses fitted with BS probes. When the probe is engaged, the self-sealing valve opens, allowing the flow of gas through the hoses to the flowmeter.

The mobile 4-cylinder stand is designed to take 4 E size cylinders: two oxygen and two nitrous oxide. The oxygen cylinder contains 680 gaseous litres of oxygen and the nitrous oxide 1,800 gaseous litres. This effectively means that the oxygen cylinders will have to be changed far more frequently than the nitrous oxide. It is also useful to employ the use of 'full' and 'in-use' labels on the cylinders for identification as each sedation session should commence with an in-use and full cylinder of each gas. Only one cylinder of gas type should be open at any time.

Scavenging

This topic is perhaps the most involved and the area most difficult to manage successfully, however a few basic rules apply:

1. The breathing system must be 'active' – not passive. The generally accepted definition of an active breathing system is 'An air flow rate at the nasal mask of 40-45 L/Min'.² These systems have thicker walled, smaller bore tubing to withstand the required draw. Just for reference purposes, passive breathing systems employ larger tubing – specifically 22 mm clear corrugated – and are used with a single nasal mask type. This type is now obsolete for dental requirements and should not be used.

Active breathing systems can be used with a variety of mask types, the most common of which is the double mask type – scented or unscented. However, the choice of nasal masks in the twenty-first century is quite robust, allowing personal preference of mask type to be employed. Whilst the Porter brown autoclavable double mask is still

Miniscav™

the most popular, other types such as the Accutron Clearview and Porter Silhouette are gaining ground.

2. Method of Active Draw is also vital. Whilst there are options to consider, they do not always apply in all circumstances.
 - Anaesthetic Gas Scavenging System (AGSS) can usually only be found in larger hospital or health centre settings. Where available, this can be used, accessing the terminal directly by means of an AGS Adapter – to which the breathing system vacuum termination is engaged. Something to note is that no airbrake must be in-line. An airbrake literally 'breaks' the air flow rate changing the draw to no more than 0.5 L/min instead of the required

40-45 L/min. In addition, something else to bear in mind is that an AGS terminal will give a draw in the region of 80-130 L/min and therefore the breathing system must be fitted with a 'flow limiter', allowing adjustment of flow downwards to the required level

- Chairside suction is sometimes used. However, there are certain circumstances to consider. Only the High Volume Port is suitable for dental scavenging – the low volume port will not give a strong enough draw on the breathing system, allowing waste gases to seep from the mask edge as the patient exhales. As most dental chairs only have one of each, this can be an issue. Some chair manufacturers now offer the option of dual HVE ports

Digital ultra wall mount

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Porter brown breathing system

requirements for these are a frequently asked question. Larger cylinders – F and above are flat bottomed and must be stored upright, secured by chains or correctly sized brackets.

E size cylinders can be stored either laid flat or upright in brackets.

In an ideal situation, cylinders should be separated – or at least identified – into three sections: full, empty or faulty. Quite often there is no space available to achieve this, but it is still important that cylinders are correctly identified as to status.

‘Cylinders should be separated into three sections: full, empty or faulty...’

■ A standalone system such as a Miniscav™.

This has the advantage of only requiring a small fixed exit vent in an external wall, meaning a single unit can be used in multiple surgeries – especially useful in conjunction with a standalone flowmeter system. The Miniscav™ can be easily stored away when not in use.

Other vital areas to consider are infection control, medical gas storage requirements and monitoring of nitrous oxide exposure. None of these need to be difficult or particularly expensive to achieve.

Infection control

Most modern breathing systems are either autoclavable or mostly disposable. There are some elements in-between. When choosing a breathing system, it is important to identify which is the most important as both types carry a cost element consideration.

The double mask system tubing can be used with either the autoclavable masks or the scented disposable masks and both types are popular. A newish addition to the range is the Silhouette and Axess mask systems. These both incorporate a disposable element to a greater or lesser degree but are uniquely shaped when compared to the traditional single or double mask. Both of these types have been slow to be accepted but are gaining ground, particularly the Silhouette.

It is important to identify which type of breathing system is the most suitable for requirement, although an element of ‘mix and match’ is currently being employed. If in doubt as to suitability, seek advice before purchasing.

Medical gas storage

Both piped and standalone system will require the use of multiple cylinders. Storage

The cylinder storage facility should follow certain rules: the room should be secure, ventilated and correctly signed with medical gas identification. In addition, there should not be any electrical equipment or materials capable of supporting combustion in the same area.

Monitoring of nitrous oxide

This subject is something of a grey area. Whilst there is a distinct requirement under COSHH³ and health & safety to understand staff exposure to nitrous oxide, it is frequently ignored or misunderstood. Nitrous oxide is a substance controllable under COSHH with a permitted exposure level of 100 PPM [Parts Per Million] over an 8-Hour TWA [Time Weighted Average]. Whilst 100 PPM may sound a significant amount, it requires a good level of active scavenging to achieve this figure.

For good practice, monitoring should be conducted on all staff members using IHS at least once per annum, repeating if high or unusual results are achieved. This does not have to be expensive as diffusion tubes (or monitoring pens) can be used. These are worn in the breathing zone for a typical sedation session and all involved members of the dental team should be monitored during this session. It is important to complete the accompanying form correctly to allow the TWA and exposure figure to be calculated by the laboratory and a report issued.

It is intended that when HTM 02-01 is revised at some point in the future, nitrous oxide monitoring will be included, having been omitted from the 2006 version.

Conclusion

Although financial considerations cannot be ignored, the use of inhalation sedation as a valuable tool and potential practice builder in

Porter parker matrix 4cyl std

a general dental or other setting should not be dismissed lightly. However, it is important that expert advice is sought for initial requirement and ongoing purchase of equipment in order to avoid expensive mistakes. In addition, the use of an efficient scavenging system is an absolute necessity on the grounds of compliance with COSHH.

However, once established, used and maintained correctly, the equipment should offer many years of service, adding an extra dimension to the facilities on offer and further cementing the dental professional's relationship with their patient.

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