

# Supporting resource 1: Nitrous oxide and nitrous oxide/oxygen mixture use and supply in the NHS

This resource can be used independently or together with the '[Nitrous oxide toolkit: Reducing waste in NHS trusts](#)'.

## What

This document describes how nitrous oxide and nitrous oxide/oxygen mixture are used across various clinical settings, including operating theatres, MRI suites, dentistry, maternity wards, emergency departments, endoscopy units and burns units. It outlines the specific clinical purposes, delivery methods and usage patterns in each setting. Additionally, it provides an overview of the different types and sizes of cylinders used to supply nitrous oxide products to the NHS from the two main suppliers, BOC-Linde and Air Liquide.

## Who

This resource is intended for individuals who want to understand where and how nitrous oxide and nitrous oxide/oxygen mixture are used in clinical settings. It is also useful for project managers, pharmacy, anaesthetics and estates and facilities colleagues working on nitrous oxide waste reduction initiatives.

## When

This guide can be used at the start of project work to build up an understanding of supply. It can also be referred to later to see the types of small cylinders available for standalone nitrous oxide supply, when switching from a medical gas pipeline supply.



## Clinical use of nitrous oxide and nitrous oxide/oxygen mixture

The table below describes key clinical settings in which nitrous oxide is used in hospitals. There may be other settings that provide forms of nitrous oxide to patients for pain relief, sedation and anaesthesia, however these are the ones most commonly found in acute hospital trusts.

Clinical setting	Gas supplied	Clinical purpose	Delivery method
Operating theatres – particularly anaesthetic rooms	Nitrous oxide	<p>Nitrous oxide is sometimes used by anaesthetists for patients undergoing surgery.</p> <p>It is used as part of a balanced technique with other inhalational or intravenous anaesthetic agents. On its own, nitrous oxide is a weak anaesthetic, but using it with stronger anaesthetics such as sevoflurane allows a significant reduction in dosage.</p> <p>In anaesthetics, nitrous oxide is most often used in the following clinical scenarios:</p> <p><b>paediatrics:</b> to help induce inhalational anaesthesia and occasionally to maintain anaesthesia.</p> <p><b>emergency C-sections:</b> in combination with other inhalation anaesthetics to reduce the total anaesthetic requirement, particularly when there is a high anaesthetic risk for the patient or baby.</p>	<p>Anaesthetic machines are designed specifically to administer precise flow of inhalational anaesthetic agents.</p> <p>Anaesthetists control the volume of nitrous oxide gas delivered to patients through choice of flow rate, concentration, and duration of use. Every anaesthetist has a unique patient case mix which may determine their choice of using nitrous oxide.</p>
MRI - anaesthetics	Nitrous oxide	<p>Nitrous oxide is occasionally used by anaesthetists for induction and maintenance of anaesthesia during MRI scans.</p> <p>MRI compatible supply systems and anaesthetic machines are required in this setting.</p>	<p>It is administered to a patient using an anaesthetic machine which generates and mixes a precise dose and flow of medical gases and inhalational anaesthetic agents for inducing and maintaining anaesthesia. Every anaesthetist has a unique patient case mix which may determine their choice of using nitrous oxide.</p>
Dentistry	Nitrous oxide	<p>In dentistry, nitrous oxide is used in variable mixtures with oxygen to provide sedation and pain relief to anxious patients, most commonly children.</p> <p>Nitrous oxide enables dentists to provide dental treatment without the need for 'stronger' sedative agents or general anaesthesia. It is valued for its ease of use by operators, acceptability by patients, wide margin of safety and rapid onset of effect as well as recovery during and after treatment.</p>	<p>Dental clinicians control the volume of nitrous oxide gas delivered to patients through choice of flow rate, concentration of nitrous oxide and duration of use. Every dental service has a unique patient case mix which may determine their choice of using nitrous oxide.</p>

Clinical setting	Gas supplied	Clinical purpose	Delivery method
Maternity	Nitrous oxide/ oxygen mixture	Nitrous oxide/oxygen mixture is often provided to patients in labour by midwives to help with pain during contractions.  It can be used on and off throughout labour until the baby is born and is safe to use with other pain relief options.	Patients self-administer this gas using a demand valve which controls how much pain relief they receive. Patients stay awake throughout, making it a safe and convenient choice for pain management.
Emergency department and services	Nitrous oxide/ oxygen mixture	Nitrous oxide/oxygen mixture is sometimes offered to patients by clinicians to control pain and reduce discomfort during procedures such as fracture reduction or wound cleaning.	
Endoscopy	Nitrous oxide/ oxygen mixture	During certain endoscopy procedures that look inside the bowel, clinicians may offer nitrous oxide/oxygen mixture to help manage procedure-related discomfort, particularly if patients do not undergo sedation.	
Burns unit	Nitrous oxide/ oxygen mixture	Nitrous oxide/oxygen mixture is sometimes provided to patients by healthcare professionals to manage pain during dressing changes, which can take up to three hours depending on the severity of the burns.	
Other clinical settings such as fracture clinics and urgent care	Nitrous oxide/ oxygen mixture	Nitrous oxide/oxygen mixture is sometimes provided to patients by healthcare professionals to manage pain during other procedures.	

## Nitrous oxide and nitrous oxide/oxygen mixture cylinders

The following tables provide information about the different types of nitrous oxide and nitrous oxide/oxygen mixture cylinders used in NHS settings.

To understand the total carbon dioxide equivalent (CO<sub>2</sub>e) attributable to each size of nitrous oxide and nitrous oxide/oxygen mixture cylinder, use the [‘Measure and calculate emissions and waste tool’](#).

### BOC-Linde nitrous oxide cylinders

Gas type	Trade name	Cylinder colour	Shelf life
Nitrous oxide	None	Shoulder: blue* Cylinder body: blue*	36 months
Nitrous oxide/oxygen mixture	Entonox®	Shoulder: blue and white Cylinder body: white	36 months

### Air Liquide nitrous oxide cylinders

Gas type	Trade name	Cylinder colour	Shelf life
Nitrous oxide	None	Shoulder: blue* Cylinder body: blue*	60 months
Nitrous oxide/oxygen mixture	Equanox®	Shoulder: blue and white Cylinder body: blue*	60 months

\*For both suppliers, a programme to convert all nitrous oxide cylinders from blue to white bodies will be completed in 2027, this will mean the cylinder will change colour to white and have ‘nitrous oxide’ written down the cylinder’s side in blue.

### Nitrous oxide cylinder sizes, types and common uses

Gas Type	BOC Cylinder Name	Total capacity (L)	Air Liquide Cylinder Name	Capacity (L)	Common Use
Nitrous oxide	D	900	D	900	Portable cylinder system
	E	1,800	E	1,800	
	F	3,600	F	3,600	
	G	9,000	G	9,000	Medical gas pipeline system
	J	18,000	J	18,000	
Nitrous oxide/oxygen mixture	EA	350			Portable cylinder system for homecare and ambulatory use
	D	500	AD	420	
	ED	700	D	500	
	F	2,000	F	2,000	Portable cylinder system
	EX	3,500	F4	2,000	
	G	5,000	G	5,000	Medical gas pipeline system
	EW	16,275			

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