

## Risks of exposure to Entonox to nursing and midwifery staff

There have been several reports in the [media](#) highlighting the risks of occupational exposure of nursing and midwifery staff to Entonox.

This update summarises the risks of working with Entonox, the duty employers have to protect staff, and actions which can be taken by safety representatives.

### What is it?

[Entonox](#) is the trade name for the mixture of 50% Oxygen and 50% Nitrous Oxide, also known as 'gas and air' or 'laughing gas'. It is an inert, colourless gas that is non-flammable, but supports combustion. Entonox is administered via a compressed gas cylinder, or via piped apparatus.

### What is it used for?

Entonox is used exclusively for the relief of pain including:

- acute trauma
- short-term relief in dental work
- short-term relief for procedures inevitably involving pain, such as wound and burn dressing, wound debridement and suturing
- normal labour
- acute surgical or medical conditions in which the pain is relieved, only to return on cessation of the analgesia so allowing an unfettered assessment to be made.

Entonox is administered through a facemask or mouthpiece. When a patient inhales, the demand valve is operated and closes down when the patient ceases to inhale. Entonox is mainly self-administered.

### Where is it used?

Entonox is normally used in a hospital setting, but midwives may transport cylinders to patient's homes for use in home births.

### What are the risks to nursing staff?

Nursing and midwifery staff may inhale Entonox vapours from working with a patient who is using it to manage pain e.g. in a labour suite and where the room/ area is poorly ventilated.

Adverse health effects from exposure may include:

- decreased mental performance, audio-visual ability, and manual dexterity
- addiction from repeated administration or exposure to nitrous oxide
- megaloblastic anaemia and neurological toxic effects (myelopathy) due to [inactivation of vitamin B12](#)

- prolonged exposure may result in bowel distension, middle ear damage and rupture of ear drums
- agranulocytosis
- [reduced fertility](#) where they have been repeatedly exposed to levels of nitrous oxide above the specified occupational exposure limits in inadequately ventilated rooms.

## Employer Duties

Employers have a duty to protect nursing staff from exposure to hazardous substances. They should assess the risk of staff being exposed to the hazardous substance and if they cannot prevent exposure, should control it by applying the principles of [good control practice](#).

[Workplace exposure limits](#) (WEL) are set in order to help protect the health of workers. WELs are concentrations of hazardous substances in the air, averaged over a specified period of time, referred to as a time-weighted average (TWA). Entonox has a long-term workplace exposure limit (WEL) in [EH40](#) of 100 parts per million (ppm). Employers must ensure that nursing and midwifery staff are not exposed to levels exceeding this.

Control is adequate when the risk of harm is 'as low as is reasonably practicable'. This means:

- all [control measures](#) are in good working order.
- exposures are below the WEL, where one exists.

Thorough ventilation or scavenging of waste gases should reduce operating theatre and equivalent treatment room levels of ambient nitrous oxide to a level below 100 ppm. Ventilation and scavenger units must be maintained and subject to inspection and testing to ensure they remain effective and in good working order.

Employers should monitor the controls put in place to ensure they are effective and exposure to Entonox is below the WEL by undertaking air sampling, which measures the substance in the air that a worker breathes in.

Employers should ensure that pregnancy risk assessments take account of individuals who may be exposed to Entonox and adequate controls are put in place to minimise exposure.

## Other considerations:

Nursing and midwifery staff who work in the community may be required to transport Entonox in their cars. In these cases the cylinder is likely to form part of a "ready to use" set which includes a regulator, hose and mask. As such it is regarded as exempt from ADR ([Carriage of Dangerous Goods](#)) by virtue of paragraph 1.1.3.1(b). There is a simple condition:

"...measures have been taken to prevent any leakage of contents in normal conditions of carriage"

This should mean ensuring that the cylinder valve is properly closed and that the equipment is carried securely in the vehicle. Usually the equipment is carried in purpose-made bags or cases and this would be regarded as satisfactory.

## Safety Representatives Actions

Employers must carry out a risk assessment and provide suitable training to nursing and midwifery staff on the storage, use and handling of pressurised gas cylinders.

RCN safety representatives should ask the employer to provide assurance of how they are effectively managing and monitoring staff exposure to Entonox, to ensure exposure is kept as low as reasonably practicable and is below the workplace exposure limit. NHS England has produced [guidance on minimising time weighted exposure to nitrous oxide](#) and outlines more detail on control measures. Controls should also take into consideration minimising exposure in community settings e.g. home births.

RCN safety representatives should work with other members of staff side, to ensure that employers are protecting nursing and midwifery staff.

If members are concerned about Entonox, ask for the item to be put on the agenda of the next Health and Safety Committee and seek assurances from your employer that they are meeting their legal duties to protect staff and others from exposure to hazardous substances.

RCN safety representatives should signpost members who feel that Entonox exposure in the workplace has adversely affected their health to [RCN Direct](#) (for potential personal injury claim).

If RCN safety representatives require further information or support, please contact the Employer Relations Dept – Health Safety & Wellbeing Team [hswteam@rcn.org.uk](mailto:hswteam@rcn.org.uk)

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