

# Inhaled Nitrous Oxide for Labor Analgesia

Sarah A. Starr, MD\*, Curtis L. Baysinger, MD

## KEYWORDS

- Nitrous oxide for labor • Labor analgesia • Entonox • Labor pain
- Inhalational analgesia • Systemic labor analgesia

## KEY POINTS

- Nitrous oxide for labor is commonly used worldwide, with good safety for mother and infant.
- Inhaled nitrous oxide provides mild to moderate pain relief and anxiolysis for women in labor.
- The use of nitrous oxide as a sole agent at concentrations less than 50% is considered minimal sedation and does not require the continuous presence of an anesthesia provider.
- Maternal side effects occur frequently but are mild.
- Clinical success is highly dependent on adequate patient instruction.

## INTRODUCTION

Inhaled nitrous oxide is the most commonly used labor analgesic in many countries. It is used for greater than 50% of births in Finland, Norway, England, Australia, and New Zealand; 70% of births in Sweden; and 60% of births in the United Kingdom.<sup>1-3</sup> Despite its established role in relief of labor pain in other countries, use of nitrous oxide for labor has been uncommon in the United States. Barriers to use in the United States include a lack of suitable equipment and provider unfamiliarity with the technique. A major obstacle to US use of nitrous oxide was recently lifted when Porter Instruments, a division of Parker-Hannifin (Hatfield, PA, USA), began sales and shipping of a new Nitronox™ machine in 2013.<sup>4</sup> This product is being marketed to hospitals, medical centers, and birth facilities for use in labor (**Fig. 1**).

---

Funding Sources: None.

Conflicts of Interest: None.

Division of Obstetric Anesthesia, Department of Anesthesiology, Vanderbilt University Medical Center, 4202 VUH, Nashville, TN 37232, USA

\* Corresponding author.

E-mail address: [sarah.a.starr@vanderbilt.edu](mailto:sarah.a.starr@vanderbilt.edu)

Anesthesiology Clin 31 (2013) 623–634

<http://dx.doi.org/10.1016/j.anclin.2013.04.001>

[anesthesiology.theclinics.com](http://anesthesiology.theclinics.com)

1932-2275/13/\$ – see front matter © 2013 Elsevier Inc. All rights reserved.



**Fig. 1.** Patient being administered nitrous oxide during labor.

The infrequent use of nitrous oxide for labor in the United States makes the development of standards difficult. In many countries, it is administered by midwives without anesthesia oversight.<sup>5</sup> Recent efforts to expand the use of nitrous oxide in the United States have emerged primarily from advocacy within the midwifery profession.<sup>6</sup> In the United States, it is administered by anesthesiologists in at least 3 academic settings and by either anesthesiologists or midwives in at least 1 other (Judith Bishop, personal communication, 2011).

Nitrous oxide is a tasteless and odorless gas at standard atmospheric pressure. It is a weak anesthetic with a minimum alveolar concentration (MAC) of 111%; it is frequently used in conjunction with other agents as part of a multiagent anesthetic technique.<sup>4</sup> Nitrous oxide is offered by up to 50% of US dentists for sedation, where it is inhaled continuously via a nasal mask at concentrations ranging from 30% to 70%.<sup>7</sup> In dentistry, it is typically used without pulse oximetry or other hemodynamic monitoring.<sup>7</sup>

Nitrous oxide is administered through the lungs by inhalation, and metabolism is negligible, with little accumulation in fat and other tissues. Onset and duration are both dose dependent, and excretion occurs via the pulmonary system as the agent is exhaled. The mechanism of action is complex and not well understood. Analgesia may result from central nervous system potassium channel inhibition<sup>8</sup> as well as release of endogenous opioids.<sup>9</sup> This process does not seem to involve  $\mu$  receptor stimulation,<sup>10</sup> but may involve  $\kappa$  receptor activation.<sup>11</sup> Anxiolysis is mediated by  $\gamma$ -aminobutyric acid receptors, and *N*-methyl-D-aspartate (NMDA) inhibition is likely the mechanism for the weak dissociative effect of nitrous oxide.<sup>8,12,13</sup>

Nitrous oxide is self-administered and delivered through a face mask or mouthpiece. It is mixed with oxygen in a 50:50 ratio and is typically breathed intermittently, timed to uterine contractions. A rapid onset and offset are caused by its low solubility in blood; this rapid onset allows the patient to titrate the dose to the level of perceived pain. When discontinued, the effects of nitrous oxide disappear within a

Download English Version:

<https://daneshyari.com/en/article/2744518>

Download Persian Version:

<https://daneshyari.com/article/2744518>

[Daneshyari.com](https://daneshyari.com)