

## Nitrous Oxide for Laboring Women

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### Clinical Question:

In laboring women, is the use of nitrous oxide more safe and effective in reducing pain intensity than an epidural?

### Sources of Evidence

Jones L, Othman M, Dowswell T, Alfirevic Z, Gates S, Newburn M, Jordan S, Lavender T, Neilson JP. Pain management for women in labour: an overview of systematic reviews. *Cochrane Database of Systematic Reviews* 2012, Issue 3. Art. No.: CD009234. DOI: 10.1002/14651858.CD009234.pub2.

Klomp, T., van Poppel, M., Jones, L., Lazet, J., Di nisio, M., Lagro-Janssen, A. (2012, September 12). Inhaled analgesia for pain management in labour. *The Cochrane Library*. Doi: 10.1002/14651858.CD009351.pub2.

Likis, F. E., Andrews, J. C., Collins, M. R., Lewis, R. M., Seroogy, J. J., Starr, S. A., McPheeters, M. L. (2014). Nitrous oxide for the management of labor pain: A systematic review. *Society for Obstetric Anesthesia and Perinatology*, 118(1), 153-167. doi:10.1213/ANE.0b013e3182a7f73c

Sutton, C. D., Butwick, A. J., Riley, E. T., & Carvalho, B. (2017). Nitrous oxide for labor analgesia: Utilization and predictors of conversion to neuraxial analgesia. *Journal of Clinical Anesthesia*, 40, 40-45.

### Synthesis of Evidence

Four articles were reviewed for evidence of this report: Two systematic reviews with random control trials, one systematic review with random and nonrandomized control studies, and one retrospective descriptive study.

A systematic review with 18 randomized controlled trials were conducted by Jones et al. (2012). The SR addressed the efficiency and safety of pharmacological and non-pharmacological interventions that help manage pain during labor. The studies came to find that non-pharmacological pain management that was non-invasive seemed to be safe for mom and baby but because of the limited high quality evidence, their efficacy is unclear. The efficacy is clear when dealing with pharmacological pain management, however, they have more adverse effects. Epidural analgesia was found to provide effective pain relief but caused more harm in areas of vaginal birth such as the use of forceps, low blood pressure, motor blocks, fever, and/or urinary retention. When comparing Nitrous oxide to flurane derivatives, nitrous oxide was associated with more maternal nausea and vomiting but not as much drowsiness. Overall, labor is different for everyone and pain management should be up to the mother based on what she prefers.

A systematic review with randomized control trials was conducted by Klomp et al. (2012) that explored the efficacy and safety of inhaled analgesia as a pain relief for women in labour planning a vaginal delivery. Review authors independently assessed trial for eligibility, methodological quality and extracted data. Data was double checked for accuracy. Twenty-six studies, randomizing 2959 women, were included in this review. The types of interventions used were inhaled analgesia versus a different type of inhaled analgesia and inhaled analgesia versus placebo or no treatment. The results included the flurane derivative group reported lower intensity of pain compared with nitrous oxide and better pain relief. The inhaled group of nitrous oxide 30% to 50% reported less pain compared with control (O<sub>2</sub> 100%) or no treatment and nitrous oxide group reported less pain compared with oxide group.

Likis et al. (2014) conducted a systematic review that included pregnant women in labor intending a vaginal birth and using nitrous oxide for labor pain management, birth attendees or health care providers who may be exposed to nitrous oxide during labor, fetuses/neonates. The study included any type/design that reported outcomes on at least 20 women. Excluded from the study was: ineligible publications (letters or editorials), animals or in vitro research, and non-English articles. There was a total of fifty-eight publications in this study. As a result of the studies included, epidural provided more pain relief during labor than nitrous oxide. The method of evaluation for pain relief during labor with the use of nitrous oxide; based on the frequency of nitrous oxide administration, the nitrous oxide concentration, additional pain relief measures, and the method and person evaluation of pain relief varied in each study. Satisfaction may be a more relevant measure to determine effectiveness of nitrous oxide for pain relief during labor, as nitrous oxide is not intended to take the pain away completely.

Sutton et al. (2017) conducted a retrospective descriptive study that viewed electronic records of women using nitrous oxide for labor analgesia from September 2014 to September 2015. The sample included 146 women who used nitrous oxide at any point during labor. The study gathered demographic information, the patients initial analgesic preference from the birth plan documented at admission to the labor and delivery, relevant obstetric data (including labor stage and cervical dilation at the time of initiation of nitrous oxide, labor induction, and labor augmentation), numerical verbal pain scores (VPS, 0= no pain and 10= worse pain imaginable) prior to and just after nitrous oxide initiation, as well as all pain scores recorded by the nurse until either delivery or epidural placement. They also abstracted the duration of nitrous oxide use, rate of conversion to neuroaxial labor analgesia, and mode of delivery. It was found that most women who used nitrous oxide had a very little decrease in pain after the administration of nitrous oxide. A majority of women eventually switched to epidural analgesia after a small amount of time.

## **Conclusion**

The evidence supports epidural analgesia is more effective in pain relief than nitrous oxide. There was no significant difference in labor pain scores when comparing nitrous oxide to a placebo. Nitrous oxide utilization was limited, and many women who used nitrous oxide converted to epidural analgesia after a short time. Nitrous oxide was found to have adverse effects such as nausea, vomiting, dizziness, and drowsiness. In conclusion, epidural analgesia has been proven to provide more effective pain relief and less mild adverse effects than nitrous oxide.

## **Implications for nursing practice**

After more research has been done, we believe to use of nitrous oxide should be a choice given to laboring women as a method of pain relief. Also, more hospitals could be involved with the practice of using nitrous oxide as pain relief to assist in developing more research. Although we have found that is not as effective an epidural analgesia, it could be an option for women seeking pain relief, but not wanting the side effects of an epidural.

