

Implementing Nitrous Oxide in The Labor Room



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Objectives

- Discuss the history and physiology of Nitrous Oxide (N₂O) while clarify facts and myths about the use of N₂O in Labor
- Describe a standardized approach to plan and implement N₂O at your organization
- Summarize the strategies to a smooth implementation of N₂O on your L/D unit



Using SBAR for Quality Improvement

SITUATION

- What is happening at the present time?

BACKGROUND

- What circumstances are leading to the situation?

ASSESSMENT

- What is the problem?

RECOMMENDATION

- What should be done to correct the problem?



Situation

Women in the US currently have fewer options for childbirth pain management than those in other countries

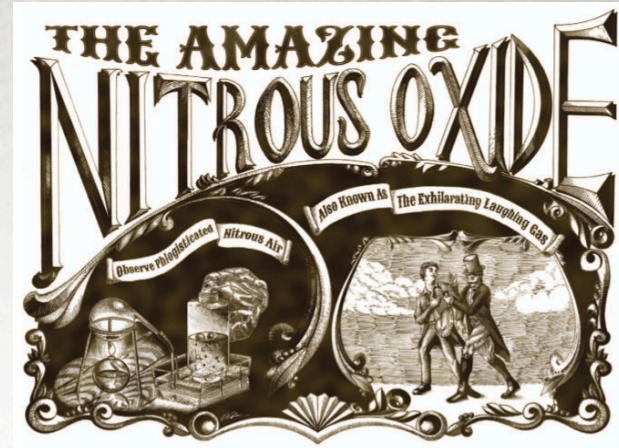
- Nitrous Oxide is widely used in other countries
 - 50-80% use Nitrous Oxide in UK, Australia, Canada, and most Eastern European countries
- Estimated that less than 40 hospitals 30 birth centers are offering Nitrous Oxide as an option for pain relief in the US in 2005- and by 2017 over 300 hospitals and 70 birth centers (Collins, 2018; Futernick 2015)
- In the Unites States an average of 60-80% of women receive regional anesthesia



Background

Nitrous Oxide has a proven track record in Labor/Delivery

- Has been used for over 150 years, and was once a world wide choice for pain control in the 60s-70s
- There was a decreased use in the US with popularity of regional anesthesia
- N₂O is a tasteless, colorless, and almost odorless gas
 - At high doses it is an anesthetic, and at lower doses it is analgesic and anxiolytic
 - It is inhaled and the only self administered analgesia
 - Can be used in all stages of labor and for other procedures such as long repairs, versions, ect



Physiology of Nitrous Oxide

N₂O is inhaled by the patient through a mask and then exhaled also into the mask

- 50%N₂O /50%O₂ blend
- The onset of action is <60 seconds
- There is little to no accumulation of Nitrous in fat/tissues
- Elimination half-life is 3-5 minutes
- There are minimal effects on baby
 - No changes in variability on EFM tracing, no changes in APGAR, occurrence of meconium
 - No need for high risk team at delivery



Assessment

Movement in the US over the last 5 years to bring nitrous oxide back as an option during labor

- Pain is very unique to individuals, as is their birth plan
- Many women get epidurals today, but there are those that don't or that end up unable to get one for medical reasons
- Unrelieved pain leads to stress response, release of catecholamine, and decrease effectiveness of uterine contractions



“There is no other circumstance where it is considered acceptable for a n individual to experience severe pain, amenable to safe interventions, while under a physicians care.” ACOG and ASA

“Experience of labor pain differs among women, and the response to pain is highly individual. Women should have access to a variety of approaches to promote comfort and reduce pain throughout labor, but women in the US have fewer options than those in many other advanced countries” ACNM



Recommendation

It was our recommendation that NGHS implement Nitrous Oxide as an options for pain relief in Labor.

- Would provide our patients with a larger array of satisfactory options for pain relief
- Richardson et al (2016) surveyed 6400 women-
 - 80% of women choose neuraxial analgesia
 - 18% choose Nitrous Oxide-
 - Of those that chose 60% went on to deliver with Nitrous alone, and 40% switched to neuraxial analgesia
- Nitrous Oxide alone: variability in scoring analgesia effectiveness as low, medium of high.
 - only 50% reported high ANALGESIA EFFECTIVENESS
- Nitrous Oxide alone: more likely to report high SATISFACTION than the compare group



Patient Satisfaction

This study demonstrates that effectiveness of analgesia is not the only factor of Patient Satisfaction

- Some patients with neuraxial analgesia score high ANALGESIA EFFECTIVENESS and low and medium SATISFACTION
- Some patients Nitrous alone score low and medium ANALGESIA EFFECTIVENESS and high SATISFACTION
 - Only 7% of mothers that used Nitrous Oxide alone scored their SATISFACTION less than an 8 (out 10).



Implementation

Here are a few key points to successful implementation

- Develop a team that has the right people at the table
- How to educator the patient
 - Who is a candidate- what are the contraindications
- Safety Concerns to address
- Policy and Protocol development for clarity and staff knowledge



Multidisciplinary Team:

Who do you need at the table?



The Obvious: L&D Nursing

- OBGYN Physicians Champion-
- Certified Nurse Midwife (CNM)
- Anesthesia Champion – choose wisely
- Pharmacy Medical Staff Leadership
- Nursing Leadership
- Companies selling Nitrous Oxide Systems



Multidisciplinary Team:

Who do you need at the table?



The Not So Obvious:

- Bio-Medical Engineering
- Supply/Equipment Management
- Medical Gas Supplier-Central Supply
- Occupational Health/Patient Safety
- Prepared Childbirth Educators
- IT/EMR



What Do We Tell the Patients?

How to use the equipment

- Only the patient can hold the mask!
- Make sure there is a tight seal in the mask
- Explain inhale/exhale into mask for scavenge system
- Effects are 45-60 sec after inhalation- best if patient begins inhaling 30 sec before contractions



Options for other pain management

- Will need to wait at least 30 min after last use of N2O to get IV medication/epidural
- Will need to wait at least 2 hours after last dose of IV medication to use N2O



What Do We Tell the Patients?

Contraindications

- Recent use of drugs or alcohol
- Increased pressure in a space
 - increased intraocular pressure, intracranial pressure, recent middle ear surgery
- Potential space where gas can accumulate
 - recently brain, ear or eye surgery
- Vitamin B12 deficiency:
 - Gastric bypass, Celiac disease or Chrones
 - Can lead to repression of methionine synthase production, which can lead to a megaloblastic anemia



Take a Look at What is Available

Key Points to Nitrous Oxide Delivery Systems

- Portable system that holds either one or two N₂O tanks
- Demand valve is needed in order to deliver the 50% N₂O/50%O₂ gas
- One way control valve that only releases gas when the patient INHALES
- Scavenge system removes the EXHALED and is attached to suction
- Dial Display of N₂O concentration



Addressing Safety Concerns



Anesthesiology
V 41, No 4, Oct 1974

Birth Defects among Children of Nurse-anesthetists

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Judy L. Endres, B.S.,‡ Keith Lieding, M.D.§

A survey of 621 female nurse-anesthetists in Michigan was performed to determine the incidence of birth defects among the offspring of this group. Two separate mailings and telephone interviews resulted in a response rate of 84.5 per cent. Of children whose mothers worked during pregnancy, 16.4 per cent had birth defects, while only 5.7 per cent of children whose mothers did not work during

who studied the incidence of congenital malformations in 5,530 pregnancies in the general population. The incidence of neoplasms was compared with age-adjusted data from the Connecticut Tumor Registry.⁸

Methods

Who Manages Nitrous Oxide?

There are many different models that have been implemented at different organizations

- Anesthesia, Respiratory, Providers/RN's
- Centers for Medicare/Medicaid Services (CMS) and American Society of Anesthesiologists (ASA) agree that the 50% concentration delivery of inhaled nitrous oxide would be categorized as minimal sedation and therefore does not require oversight by Anesthesiologist.



Epidural	Nitrous Oxide
Dense pain relief	Variable pain reduction
Superior pain reduction compared to N2O	Pain is reduced but still present with inhaled nitrous oxide
No sedative effect	Significant anxiolysis
Invasive	Noninvasive
Serious side effects uncommon	No serious side effects or risks when used in labor
Laboring woman is bed bound	Woman has freedom to move about
Must have IV access and possible urinary catheter	Does not require IV access or urinary catheter
Can be converted to anesthesia	Not possible to use for cesarean, if needed for cesarean anesthesia



Realistic Expectations


Nitrous Oxide does NOT:

- N2O is NOT meant to replace epidurals -it is about **ADDING** patient choice **NOT SUBTRACTING**.
 - Think of patients who **CANT** get an epidural
- N2O does NOT take all the pain away
- N2O does not impact the progression of labor or intensity or frequency of contractions.

Nitrous Oxide DOES:

- N2O DOES give an alternate option of pain relief that allows for continued freedom of movement during labor.



A woman with dark hair tied back, wearing a white lace top, is smiling and holding a baby. The baby is wearing a blue dress and a white headband. The background is a soft-focus green outdoor setting.

Sara Payne welcomed baby girl Karis into the world with the help of nitrous oxide.

Mother-to-be Sara Payne crafted her birth plan beautifully, with natural child birth and no pain medicine at the top of the list.

"But, after hours of painful contractions, the 'au naturel' birth plan no longer seemed so appealing," Sara says.

Sara, like many expectant mothers, struggled with the decision of using pain medication during the delivery — wanting to make the best choice for herself and the health of her new baby.

"As the pain got worse, I started to rethink my birth plan and my options for pain relief," Sara says.

Laboring Through the Pain

Nitrous oxide provides mothers a new pain relief option during labor

Northeast Georgia Medical Center (NGMC) is the first hospital in Georgia to offer nitrous oxide (N_2O) as a type of pain relief for laboring mothers.

evolve





- Clear processes
 - storage and differentiating Full/Empty tanks
 - cleaning and storing of demand valve
- Competencies
- Policy/Protocols



Clear Processes



Competencies

- Read CE article and answered questions
- Skills checklist with return demonstration
- Added to annual Unit skills



**Time for
Questions**



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