“...and this is Ralph, your anesthesiologist.”
HISTORY

• 1772-First synthesized

• 1881-Klikovich (Poland) first studied for labor

• 1934-Minnitt (England) invented “gas and air” apparatus
CURRENT NITROUS OXIDE USE AROUND THE WORLD

• Canada 40-45%
• Finland 60%
• Sweden 65%
• UK 50-75%
• US <1%

Likis 2014
RESEARCH (LIKIS 2014)

- “Literature addressing nitrous oxide use in labor includes few studies of good or fair quality”

- “Further research is needed across all areas examined including effectiveness, satisfaction, safety and adverse events”
LACK OF STUDY STANDARDIZATION

- Differences in **concentrations**-30-80%
- Differences in **inhalation methods** (mouthpiece vs mask, continuous vs intermittent)
- **Comparison groups** using other agents (inhaled, opiates) vs no nitrous
- Use of **different pain measures**, most often retrospectively
COCHRANE REVIEW (2012)

• 26 studies (2959 women)
• 9 of the 26 studies compared nitrous with placebo or no treatment
  • Women reported less pain intensity (30-50% less) in nitrous vs placebo groups
  • More nausea, dizziness and drowsiness reported in nitrous group
NITROUS OXIDE EFFICACY

• N= 26 women in early labor, RCT, double-blind
• Compared air with 50% nitrous/50% oxygen
• Intervention used for 5 consecutive contractions
• Almost no difference in pain scores, yet...
• Majority of the nitrous group wanted to continue using it once study period over

Carstinou et al. (1994). Anesthesiology 80: 30-5
SAFETY OUTCOMES-REVIEW

- No differences in:
  - Cord blood gases
  - Apgar score
  - NICU admission
  - FHR
  - Blood loss at delivery
  - Uterine contractions or labor progress
  - Mode of delivery

- No report on bonding, breastfeeding, and long term infant outcomes

Klomp et al (2012) Cochrane Database of Systematic Reviews
## LABOR PAIN AT 2 MONTHS PP: PRIMIPS

**N=1096**

WALLENSTROM ET AL 2006

<table>
<thead>
<tr>
<th>Method of pain relief</th>
<th>Very effective %</th>
<th>Some effect %</th>
<th>No effect %</th>
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<tbody>
<tr>
<td><strong>Pharmacological</strong></td>
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<tr>
<td>Epidural block</td>
<td>83.7</td>
<td>11.5</td>
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<tr>
<td>Nitrous oxide</td>
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<td>Pethidine</td>
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<tr>
<td>Bath or shower</td>
<td>28.5</td>
<td>52.7</td>
<td>18.8</td>
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<td>Acupuncture</td>
<td>10.4</td>
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<td>Psychophrophylaxis</td>
<td>38.8</td>
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LABOR PAIN AT 2 MONTHS PP: MULTIPS
N=1386

WALLENSTROM ET AL

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<td>Epidural block</td>
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<td>Pethidine</td>
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<td>Bath or shower</td>
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<td>Acupuncture</td>
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<tr>
<td>Psychoprophylaxis</td>
<td>46.9</td>
<td>46.3</td>
<td>6.8</td>
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</table>
SIDE EFFECTS

Nausea 5-33%
Dizziness 3-35%
Dysphoria 5-10%
Drowsiness 0-24%
Hazy memory 0-37%

Chronic occupational exposure risk
PANICKED NEWBORN DIDN’T REALIZE BREATHING WOULD BE ON APGAR TEST
UNMH NITROUS OXIDE GUIDELINE

A 50/50 BLEND WITH OXYGEN - USED AS ANALGESIA
UNMH INDICATIONS FOR NITROUS USE

- Labor pain relief
- PP laceration repair
- PP IUD placement
- Balloon catheter placement
- Manual placenta removal (conscious sedation or regional anesthesia may be preferred)
- External cephalic version
- IV placement
PRECAUTIONS/CONTRAINDICATIONS

• Unable to hold face mask

• Overly sedated, intoxicated or neurologically impaired
  • (Methadone/Buprenorphine okay if not excessively sedated)

• Vitamin B12 deficiency
  • (ex: strict vegan, Crohn’s disease, or bariatric surgery)
  • (may confirm normal B12 levels prior to use)
PRECAUTIONS/CONTRAINDICATIONS

• Category III FHTs

• Hemodynamic instability/impaired oxygenation
  • Consult Anesthesia if O2 Sat<93%

• Recent head trauma (w/in 2 wks), increased intraocular pressure, pneumothorax, bowel obstruction, eye surgery, or middle ear surgery
  • (Consult anesthesiology)
NITROUS OXIDE USE WITH OTHER ANALGESICS

• Don’t give nitrous & IV narcotics concurrently
  • (Wait 1 hour after narcotics before starting nitrous)

• IV opiates OK after nitrous

• Epidural OK after nitrous
  • (inform Anesthesia)
PREPARING PATIENT

- Prenatal handout/info
- Review contraindications
- Discuss common side effects:
  - nausea, vomiting, dizziness
- Initiate Medication “Power Order”
BEFORE INITIATING -- ASSESS & DOCUMENT

• Absence of contraindications
• Vital signs
• O2 Saturation
• Mental status
• FHTs
NURSING SET UP

• Demand Valve locked in Pyxis/Med room

• Tanks in R.T. gas room

• Connects to wall oxygen & suction
IMPORTANT POINTS.....

- ONLY patient may use
- Seal mask over nose/mouth
- Inhale x 30 seconds before contraction. Full effect in 50 seconds.
- Exhale fully into the mask for scavenging
- Machine hisses
• May ambulate with help after 5 minutes if stable
• Before moving wait 60 seconds after last inhalation.
ONGOING PATIENT CARE

• RN to assess for first 15 minutes
  • confirm usage, effectiveness, and side effects
• Vital Signs -routine
• Fetal monitoring -continuous or IA
• If maternal or fetal wellbeing compromised
  • discontinue nitrous oxide, notify provider
  • perform intrauterine resuscitation interventions as needed
EQUIPMENT CARE

• Bio-Med to assess q 12 months

• Full clean/disinfect occurs after use

• Clean units -covered in plastic in med room
SAFETY

- Leaking nitrous can cause altered mental state
  - Scavenging system
  - Refer to SDS if exposure occurs
- Share concerns with Charge RN
- QA/Pt Safety Committee- ongoing review
IMPLEMENTATION @ UNMH

• Multidisciplinary Approach
• “Buy-in” from leaders in all depts.
• Literature review and other inst. policies
• Develop institutional guideline
• Reviewed and revised with QA committee
• Implemented by RN staff
• Grand rounds-training for providers
• Developed patient handouts
REFERENCES


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