

The
2024 Utah Dental Convention
presents

NITROUS OXIDE
AND
ORAL SEDATION
ON THE
DENTAL PATIENT

Larry J. Sangrik, D.D.S.
-- Instructor --
Salt Palace Convention Center
Salt Lake City, Utah
Friday, February 2, 2024

CE Credits

3 hrs.

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NITROUS OXIDE & ORAL SEDATION
ON THE
DENTAL PATIENT

LARRY J. SANGRIK, D.D.S.
INSTRUCTOR

1

Program Overview...
Nitrous Oxide & Oral Sedation

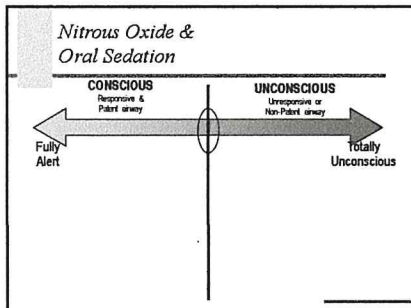
- > Understanding the Spectrum of Anesthesia
- > Why Sedate Dental Patients
- > Review the N₂O Constant-Flow Technique
- > Develop Protocols for N₂O/Oral Sedation
- > Benzodiazepine Pharmacology Made Simple
- > Proper Monitoring Techniques
- > Complications & Solutions
- > Recordkeeping

2

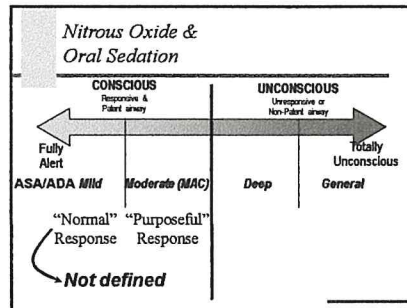
Program Overview...
Nitrous Oxide & Oral Sedation

> Understanding the Spectrum of Anesthesia

3



4



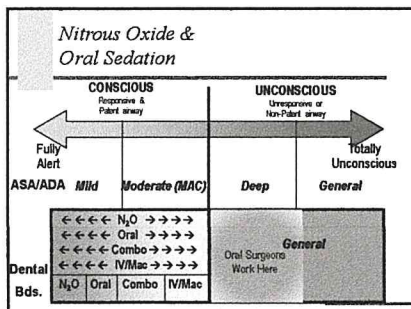
5

Nitrous Oxide & Oral Sedation

Dental boards only regulate *procedures*...
... not the *results*.

Boards develop *permits* and “force” them into various levels of anesthesia

6



7

Program Overview...
Nitrous Oxide & Oral Sedation

- > Understanding the Spectrum of Anesthesia
- > Why Sedate Dental Patients

8

Why Sedate Patient?
To Control...

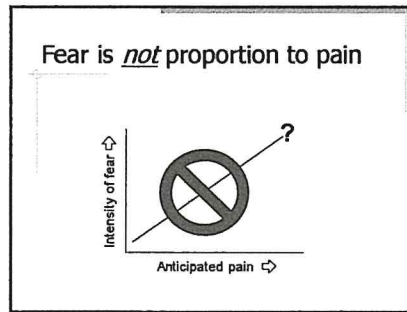
1) Pain These are
2) Fear **NOT**
 the same thing!

9

Why Sedate Patient?
To Control...

~~1) Pain~~ In General Dentistry
2) Fear Is the Main Reason *FEAR*

10



11

4 Types of Dental Fear
(Milgram & Getz, Univ. of Washington, Dental Fear Clinic)

Specific Fear → 1) Physical or procedural
2) Abstract

12

4 Types of Dental Fear
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Loss of Control → Desire to control the environment

13

4 Types of Dental Fear
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Specific Fear → 1) Physical or procedural
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Loss of Control → Desire to control the environment

General Anxiety Disorder → Most common problem
Neuro-chemical disorder

14

4 Types of Dental Fear
(Milgram & Getz, Univ. of Washington, Dental Fear Clinic)

Specific Fear → 1) Physical or procedural
2) Abstract

Loss of Control → Desire to control the environment

General Anxiety Disorder → Most common problem
Neuro-chemical disorder

Catastrophe → Rational vs. irrational

15

When to choose N₂O/O₂

Specific Fear →

Loss of Control →

General Anxiety Disorder →

Catastrophe →

16

When to choose N₂O/O₂

Specific Fear → ✓✓✓✓ Gen'l worked well except fear of unknown

17

When to choose N₂O/O₂

Specific Fear → ✓✓✓✓ Gen'l worked well except fear of unknown

Loss of Control → ⚪ Poor choice ☆

18

When to choose N₂O/O₂

| | | |
|--------------------------|------|--|
| Specific Fear | ✓✓✓✓ | Gen'l worked well except fear of unknown |
| Loss of Control | ⊗ | Poor choice |
| General Anxiety Disorder | ✓✓✓✓ | Excellent choice |

19

When to choose N₂O/O₂

| | | |
|--------------------------|------|--|
| Specific Fear | ✓✓✓✓ | Gen'l worked well except fear of unknown |
| Loss of Control | ⊗ | Poor choice |
| General Anxiety Disorder | ✓✓✓✓ | Excellent choice |
| Catastrophe | ? | Difficult to predict |

20

Program Overview...

Nitrous Oxide & Oral Sedation

- > Understanding the Spectrum of Anesthesia
- > Why Sedate Dental Patients
- > Review the N₂O Constant-Flow Technique

21

Understanding the Flowmeter: Constant Liter-flow technique

Goals:

- 1) Adjust "**brain**" (*left knob*) to patient's **sedation level**. Then...
- 2) Re-adjust "**lungs**" (*right knob*) to patient's **tidal volume**

22

Understanding the Flowmeter: Constant Liter-flow technique

- 1) Inflate reservoir with O₂
- 2) Estimate tidal volume, start O₂ & place nasal hood
- 3) Introduce desired N₂O percentage (e.g. 20% to start)
- 4) Reduce total gases to patient's tidal volume
- 5) Assess patient's response
- 6) Repeat steps 2-4, as needed

23

Step 1: Inflate reservoir with oxygen

24

Step 2: Estimate tidal volume, start O₂ & place nasal hood

- 1) Estimate tidal volume (e.g. 5 L/M)
- 2) Turn total gas knob to 5
- 3) Place nasal hood

25

Step 3: Start N₂O (e.g. 20%)

- 1) Liters N₂O will be at 1%
- 2) Total gas will be 6% (5 + 1%)

26

Step 4: Reduce total gases back to 5 L/M

- 1) Turn the total gas knob down to a total of 5 L/M
- 2) O₂ will be at 4
- 3) N₂O will be 1

27

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

1) Let's assume 20% was not enough sedation
2) Increase N₂O to 30%

28

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

1) Turn N₂O knob to 30%
2) N₂O will now be at 1.7
3) Total gas will now be 5.7 (1.7 + 4.0)

29

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

1) Turn the total gas knob down to a total of 5 L/M
2) O₂ will be 3.5
3) N₂O will now be at 1.5

30

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

1) Let's assume 30% was not enough sedation
2) Increase N₂O to 40%

31

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

1) Turn N₂O knob to 40%
2) What is L/M of N₂O? *Hint: Don't calculate it. Just look at the notation balls!*
3) What is L/M of total gas?

32

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

1) Turn N₂O knob to 40%
2) N₂O will now be at 2.3
3) Total gas will now be 5.8 (2.3 + 3.5)

33

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

1) Turn the total gas knob down to a total of 5 L/M
2) What is the new O₂ L/M?
3) What is the new N₂O L/M?

34

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

1) O₂ = 3 L/M
2) N₂O = 2 L/M
3) 3 + 2 = 5 L/M (total)

35

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

YOUR TURN

36

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

YOUR TURN
We need to increase the level of sedation to 50%.
Q: What is the first thing we do?

37

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

YOUR TURN
A: Turn the left knob to 50%.
Q: Where do we now expect to find the 2 flotation balls?

38

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

YOUR TURN
A: The N₂O ball raises to 3 L/M. The O₂ ball remains at 3 L/M.

39

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

YOUR TURN
A: The N₂O ball raises to 3 L/M. The O₂ ball remains at 3 L/M.
Q: What is the total gas output now?

40

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

YOUR TURN
A: The N₂O ball raises to 3 L/M. The O₂ ball remains at 3 L/M.
Q: What is the total gas output now?
A: 6 L/M (3 + 3)

41

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

YOUR TURN
Q: How do we decrease back to a tidal volume of 5 L/M?

42

Steps 5 & 6:
Assess the patient's response / Repeat steps 2 - 4

YOUR TURN
Q: How do we decrease back to a tidal volume of 5 L/M?
A: Turn the total gas knob clockwise to reduce the total gas consumption to 5 (2½ + 2½)

43

Our next challenge...

Q How do we slowly decrease the N₂O concentration at the end of the appointment?

▲ Reverse the process *in order*

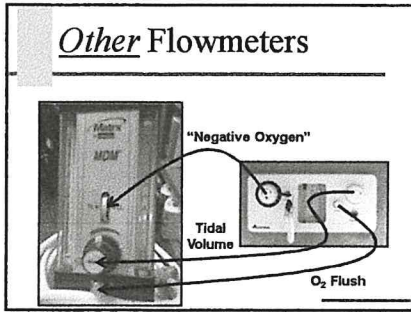
- ◆ Decrease the percentage N₂O (left knob)
- ◆ Increase the total gas volume (right knob) to maintain adequate tidal volume

44

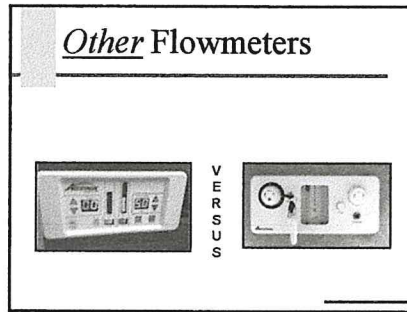
(manual) N₂O unit

YOUR TURN
Q: How do we decrease back to a tidal volume of 5 L/M?

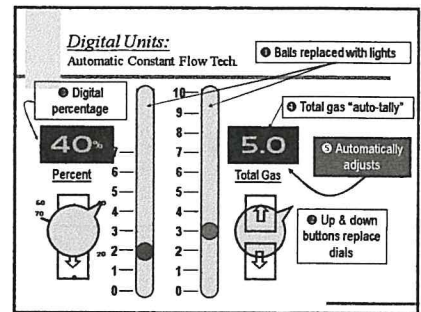
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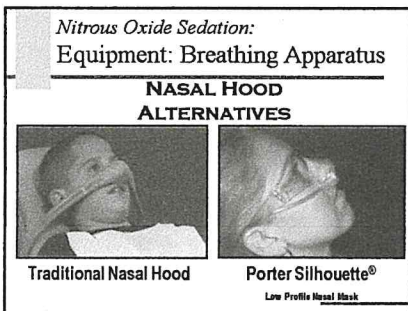
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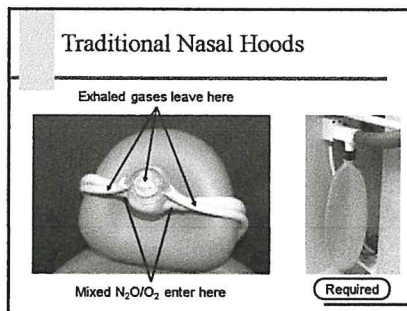
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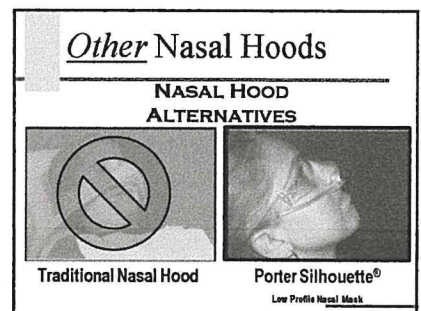
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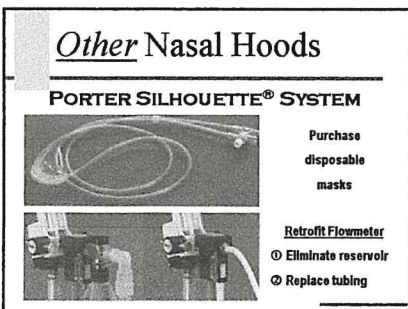
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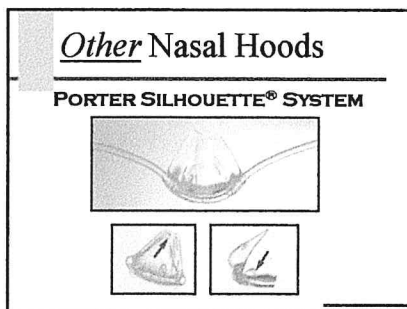
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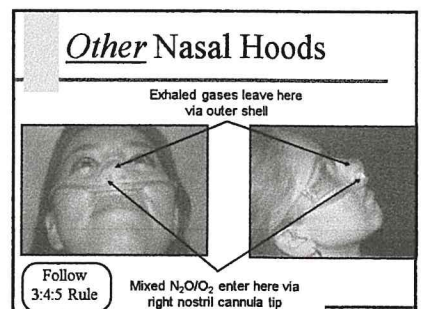
51



52



53




54

Other Nasal Hoods

PORTER SILHOUETTE® SYSTEM

- 1) Superior anterior access




ADVANTAGES

55

Other Nasal Hoods

PORTER SILHOUETTE® SYSTEM

- 1) Superior anterior access
- 2) Superior scavenging



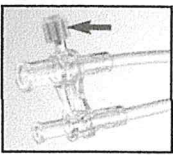
ADVANTAGES

56

Other Nasal Hoods

PORTER SILHOUETTE® SYSTEM

- 1) Superior anterior access
- 2) Superior scavenging
- 3) Capnography compatible



ADVANTAGES

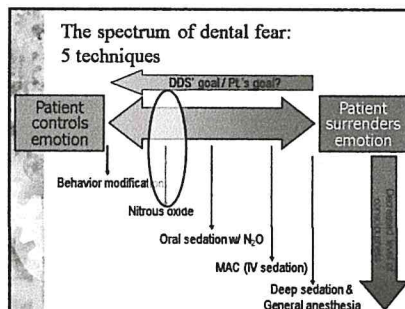
57

Program Overview...

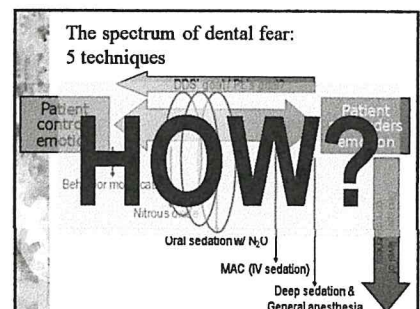
Nitrous Oxide & Oral Sedation

- Understanding the Spectrum of Anesthesia
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58



59



60

How???

- Add a short-acting benzodiazepine
- Triazolam (*Halcion*®)

61

OVERVIEW:

ORAL SEDATION WITH N₂O

- 1) Develop modifications to the standard N₂O protocol

62

Considerations

What's different from N₂O alone?

- 1) Patient Selection
- 2) Patient Education
- 3) Evening prior to appointment
- 4) Upon arrival at the office
- 5) Onset of nitrous oxide
- 6) Dental treatment
- 7) Post-op and dismissal

63

Step 1:
PATIENT SELECTION

1. Psychological Considerations

- What are the patient's 1° and 2° dental fears?
- What is the patient's DISC® profile?
- How intense is their level of fear?
- Does the patient have a pre-established expectation of sedation? Can it be made consistent with this technique?

64

Step 1:
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1. Psychological Considerations

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} SAME

65

Step 1:
PATIENT SELECTION

2. Physiological Considerations

66

Step 1:
PATIENT SELECTION

2. Physiological Considerations

- ASA classification I or II

67

Step 1:
PATIENT SELECTION

American Society of Anesthesiology

Classification System

- I. Normal health
- II. 1 or 2 chronic, well-controlled problems (e.g. diabetes, HBP)
- III. Multiple problems or uncontrolled problem (e.g. angina)
- IV. Critically ill (e.g. myocardial infarction)
- V. Impending death

WARNING!

68

Step 1:
PATIENT SELECTION

2. Physiological Considerations

- ASA classification I or II
- Known contraindication to BNZ
 - > Pregnancy
 - > Allergic reactions
 - > Glaucoma (narrow angle only) ★
 - > Epilepsy / convulsions
 - > Marijuana use

69

Step 1:
PATIENT SELECTION

2. Physiological Considerations

- ASA classification I or II
- Known contraindication to BNZ
- Past history of failure with N₂O
 - > Not an absolute contraindication
 - > Addition of BNZ may result in success

70

Step 1:
PATIENT SELECTION

2. Physiological Considerations

- ASA classification I or II
- Known contraindication to BNZ
- Past history of failure with N₂O
- Asthma, COPD, sleep apnea or other respiratory condition
 - > BNZ will ↓ ventilation
 - > COPD: O₂ will ↓ respiratory drive

71

Step 2:
PATIENT EDUCATION

- With N₂O only, education was minimal
- With BNZ & N₂O, education is
 - More extensive
 - More important

72

Step 2:
PATIENT EDUCATION

REVIEW, REVIEW, REVIEW

- 1) Review *orally* with patient in advance.
- 2) Review via *written instructions* for patient to take home.
- 3) Review via *phone* on day prior to appointment.

By the Dentist

- Establish anticipated effects of sedation

73

Step 2:
PATIENT EDUCATION

Although our description is similar, the effects are more intense

Anticipated Effects

- You will be awake but very tired
- You will be calm, restful & peaceful
- You will be able to hear CRITICAL
- You will be able to open your mouth
- You will be able to communicate
- You will be in control of yourself & us

74

Step 2:
PATIENT EDUCATION

REVIEW, REVIEW, REVIEW

- 1) Review *orally* with patient in advance.
- 2) Review via *written instructions* for patient to take home.
- 3) Review via *phone* on day prior to appointment.

By the Dentist

- Establish anticipated effects of sedation
- Review medical history & medications for changes

75

Step 2:
PATIENT EDUCATION

REVIEW, REVIEW, REVIEW

- 1) Review *orally* with patient in advance.
- 2) Review via *written instructions* for patient to take home.
- 3) Review via *phone* on day prior to appointment.

Business Staff

- Review anticipated effects of sedation (given by DOS)
- Wear short sleeves (to accommodate BP cuff)
- NPO after midnight (to accelerate uptake)
- Review medical history & medications for changes
- Establish need for driver
- Do not wear contact lenses
- Establish fee and financial arrangements

76

Step 3:
EVENING PRIOR TO APPOINTMENT

Will the patient rest well prior to the appointment?

| | |
|--|----|
| <p>Rx Lunesta®</p> <p>1, 2 or 3 mg</p> <p><i>Disk:</i> 1 per appt.</p> <p><i>Test:</i> Take at bed on empty stomach</p> <p><i>Warning:</i> food taste</p> | OR |
|--|----|

77

Step 3:
EVENING PRIOR TO APPOINTMENT

Will the patient rest well prior to the appointment?

| | | |
|--|----|---|
| <p>Rx Lunesta®</p> <p>1, 2 or 3 mg</p> <p><i>Disk:</i> 1 per appt.</p> <p><i>Test:</i> Take at bed on empty stomach</p> <p><i>Warning:</i> food taste</p> | OR | <p>Rx Ambien CR®</p> <p>6.25 or 12.5 mg</p> <p><i>Disk:</i> 1 per appt.</p> <p><i>Test:</i> Take at bed on empty stomach</p> |
|--|----|---|

78

Step 4:
UPON ARRIVAL AT THE OFFICE

- Settle financial matters upon arrival
- Empty the bladder
- Seat patient immediately (*even if early*)
- Review medical history, take vitals, confirm NPO and driver availability
- Establish monitoring (*pulse oximetry*)
- Administer oral medication (*0.25 – 0.5 mg Halcion*)
- Position in Semi-Fowler's position
- Provide passive distraction (*e.g. soft music, TV*)
- Leave patient alone to rest for at least 1 hour
- Do not disturb when checking patient

79

Step 5:
ONSET OF NITROUS OXIDE

- Avoid startling patient – Advise patient you are beginning & apply N₂O mask

80

Step 5:
ONSET OF NITROUS OXIDE

- Avoid startling patient – Advise patient you are beginning & apply mask
- Administer 100% O₂ for 3-5 minutes

81

Step 5:
ONSET OF NITROUS OXIDE

- Avoid startling patient – Advise patient you are beginning & apply mask
- Administer 100% O₂ for 3-5 minutes
- Transition to 10% N₂O

NOT 20%

82

Step 5:
ONSET OF NITROUS OXIDE

- Avoid startling patient – Advise patient you are beginning & apply mask
- Administer 100% O₂ for 3-5 minutes
- Transition to 10% N₂O
- Carefully increase N₂O in 5-10% increments until desire effect is achieved

83

Step 5:
ONSET OF NITROUS OXIDE

- Avoid startling patient – Advise patient you are beginning & apply mask
- Administer 100% O₂ for 3-5 minutes
- Transition to 10% N₂O
- Carefully increase N₂O in 5-10% increments until desire effect is achieved
- Never exceed 50% N₂O

84

Step 6:
DENTAL TREATMENT

- Topical anesthetic
- Gentle local anesthetic administration
- Wait 3-5 minutes for onset
- Confirm effectiveness of anesthesia
- Proceed with treatment
- Periodically confirm patient's comfort
- Consider decreasing N₂O as treatment progresses

85

Step 6:
DENTAL TREATMENT

- Topical anesthetic
- Gentle local anesthetic administration
- Wait 3-5 minutes for onset
- Confirm effectiveness of anesthesia
- Proceed with treatment
- Periodically confirm patient's comfort
- Consider decreasing N₂O as treatment progresses

Minimize talking during treatment

86

Step 7:
POST-OP & DISMISSAL

Do not proceed to subsequent step until stable.

- Slowly discontinue N₂O over 5 minutes
- 100% pure O₂ for 5-10 minutes
- Room air for 10 minutes
- Post-op vital signs / Confirm patient's orientation
- Post-op instructions with patient and guardian

87

Step 7:
POST-OP & DISMISSAL

Post-op instructions (oral & written)

- Have an escort for 4-6 hours
- Have something light to eat
- Plan on sleeping 4-6 hours
- Do not drive (or operate machinery) for 24 hrs.
- Avoid making major decisions today
- Provide office & emergency phone nos.

88

Step 7:
POST-OP & DISMISSAL

Do not proceed to subsequent step until stable.

- Slowly discontinue N₂O over 10 minutes
- 100% pure O₂ for 5-10 minutes
- Room air for 10 minutes
- Post-op vital signs
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89

Step 7:
POST-OP & DISMISSAL

Do not proceed to subsequent step until stable.

- Slowly discontinue N₂O over 10 minutes
- 100% pure O₂ for 5-10 minutes
- Room air for 10 minutes
- Post-op vital signs
- Post-op instructions with patient and guardian
- Assess and confirm full orientation

90

**Step 7:
POST-OP & DISMISSAL**

Do not proceed to subsequent step until stable.

- Slowly discontinue N₂O over 10 minutes
- 100% pure O₂ for 5-10 minutes
- Room air for 10 minutes
- Post-op vital signs
- Post-op instructions with patient and guardian
- Assess and confirm full orientation
- Escort to automobile

91

**Step 7:
POST-OP & DISMISSAL**

Always check patient by phone on the evening of the appointment

92

Program Overview...
Nitrous Oxide & Oral Sedation

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- Benzodiazepine Pharmacology Made Simple

93

Pharmacology

Understanding Halcion®
Triazolam

94

Halcion

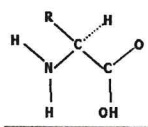
...is a benzodiazepine

95

Benzodiazepines...

Mode of action

- ✓ Enhances GABA
 - ✓ Gamma-aminobutyric acid
 - ✓ Non-protein amino acid
 - ✓ Neurotransmitter in brain



Over 500 in nature
20 make human proteins

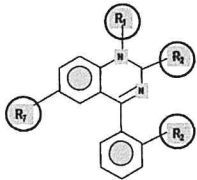
96

Benzodiazepines...

| Mode of action | Primary effects |
|---|---|
| <ul style="list-style-type: none"> ✓ Enhances GABA ✓ Gamma-aminobutyric acid ✓ Non-protein amino acid ✓ Neurotransmitter in brain | <ul style="list-style-type: none"> ✓ Sedative ✓ Hypnotic (sleep-inducing) ✓ Anxiolytic ✓ Anticonvulsant ✓ Muscle relaxant ✓ Amnesic |

97

BNZ Basic Molecule

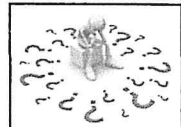


Changes at these sites determines the exact behavior of the medication

98

Benzodiazepines...
...so many choices

- 5 classes
- 38 major varieties
- Marketed under 108 brand names



99

| BNZ Choices | | | | |
|-------------|-------|--------------------|----------------------------|------------------------|
| Generic | Brand | Time to Peak (hrs) | Elimination Half-life (hr) | Equivalent Oral Dosage |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

100

| BNZ Choices | | | | |
|-------------|--------|--------------------|----------------------------|------------------------|
| Generic | Brand | Time to Peak (hrs) | Elimination Half-life (hr) | Equivalent Oral Dosage |
| Midazolam | Versed | ½ - 1 | 3 1.8 - 6 | 7.5mg |
| | | | | |
| | | | | |
| | | | | |

101

| BNZ Choices | | | | |
|-------------|---------|--------------------|----------------------------|--------------------------------|
| Generic | Brand | Time to Peak (hrs) | Elimination Half-life (hr) | Equivalent Oral Dosage |
| Midazolam | Versed | ½ - 1 | 3 1.8 - 6 | 7.5mg |
| Triazolam | Halcion | ½ - 2 | 2 | 0.25mg 0.5 0.5mg |
| | | | | |
| | | | | |

102

| BNZ Choices | | | | |
|-------------|---------|--------------------|----------------------------|--------------------------------|
| Generic | Brand | Time to Peak (hrs) | Elimination Half-life (hr) | Equivalent Oral Dosage |
| Midazolam | Versed | ½ - 1 | 3 1.8 - 6 | 7.5mg |
| Triazolam | Halcion | ½ - 2 | 2 | 0.25mg 0.5 0.5mg |
| Diazepam | Valium | 1 - 1½ | 20 - 100 Met: 36 - 200 | 10 mg |
| | | | | |

103

| BNZ Choices | | | | |
|-------------|---------|--------------------|----------------------------|--------------------------------|
| Generic | Brand | Time to Peak (hrs) | Elimination Half-life (hr) | Equivalent Oral Dosage |
| Midazolam | Versed | ½ - 1 | 3 1.8 - 6 | 7.5mg |
| Triazolam | Halcion | ½ - 2 | 2 | 0.25mg 0.5 0.5mg |
| Diazepam | Valium | 1 - 1½ ? | 20 - 100 Met: 36 - 200 | 10 mg |
| Lorazepam | Ativan | 2 - 4 | 10 - 20 | 1 mg |

104

| BNZ Choices | | | | |
|-------------|---------|--------------------|----------------------------|--------------------------------|
| Generic | Brand | Time to Peak (hrs) | Elimination Half-life (hr) | Equivalent Oral Dosage |
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105

| BNZ Choices | | | | |
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106

| BNZ Choices | | | | |
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107

Halcion...
...indications for use

- ✓ Acute insomnia (esp. jet lag)
- ✓ Adjunct to medical procedures

108

Halcion...
...in dentistry

- Hypnotic (*induces sleep*)
- Anxiolytic (*reduces anxiety*)
- Sedative (*reduces response to excitement*)
- Antograde amnesia (*unable to remember*)

109

Halcion...
...in dentistry

- Anticonvulsant (*excess local anesthetic*)
- Muscle relaxant (*restful appointment*)

110

Halcion...
...metabolism

- ✓ Active
 - ✓ Oral: 44%
 - ✓ Sublingual: 53%
- ✓ Broken down in liver
- ✓ Excreted in urine

20% Boost!

111

Halcion...
...interactions

Medications/foods that prohibit the breakdown of Halcion cause unusually prolonged effects of the medication.

- ✓ Ketoconazole & Itraconazole (*antifungals, incl. candies*)
- ✓ Isoiazid (*raz*)
- ✓ Nefazodone (*rarely use antidepressant*)
- ✓ HIV protease inhibitors
- ✓ Diltiazem: (*Angina, Ca channel blocker*)
- ✓ Erythromycin & Troleandomycin
- ✓ Oral contraceptives
- ✓ Grapefruit juice

112

Halcion...
...contraindications & considerations

- ✓ Pregnancy
- ✓ Nursing (*passes into milk*)
- ★ Glaucoma (*acute narrow angle*)
- ✓ Elderly (*prolonged breakdown*)
- ✓ Alcohol (*severely enhanced effects*)
- ✓ Pediatric safety not established

113

Halcion
...oversedation

- Respiratory depression
- Respiratory depression
- Respiratory depression
- Respiratory depression
- Respiratory depression
- Respiratory depression
- Respiratory depression
- Respiratory depression
- Respiratory depression
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114

Program Overview...
Nitrous Oxide & Oral Sedation

- Understanding the Spectrum of Anesthesia
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- Review the N₂O Constant-Flow Technique
- Develop Protocols for N₂O/Oral Sedation
- Benzodiazepine Pharmacology Made Simple
- Proper Monitoring Techniques

115

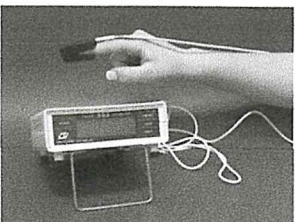
Let's invent a machine...
...to measure respiration

- ✓✓✓✓ 1) Reliable
- ✓✓✓✓✓ 2) Non-invasive
- ✓✓✓✓✓ 3) Not intimidating to patient
- ✓✓✓✓✓ 4) Easy to operate
- ✓✓✓✓✓ 5) Continuous operation
- ✓✓✓ 6) Inexpensive

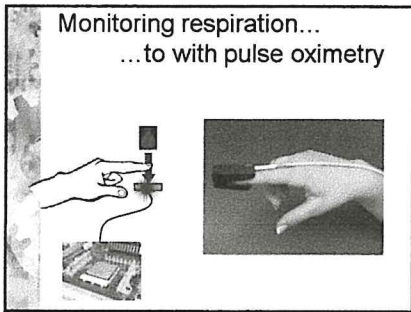
Does such a machine exist? Consider the Pulse Oximeter

116

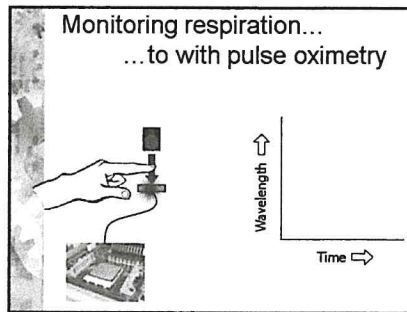
Monitoring respiration...
...to with pulse oximetry



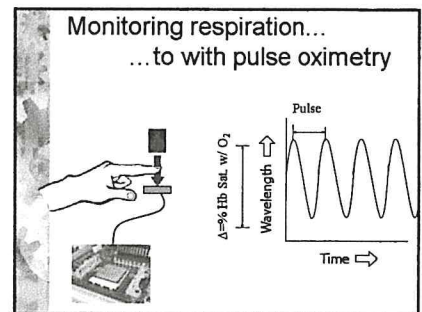
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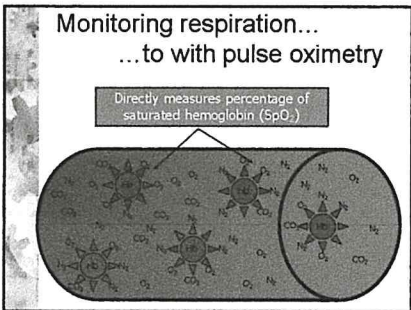
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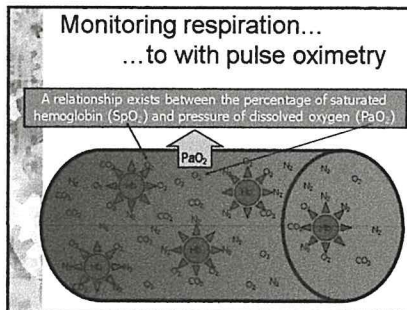
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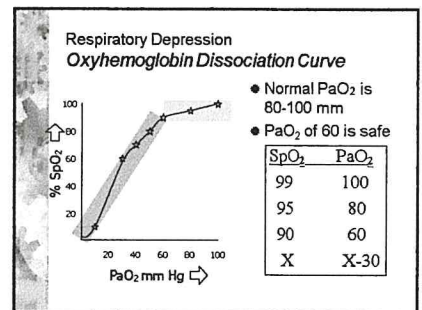
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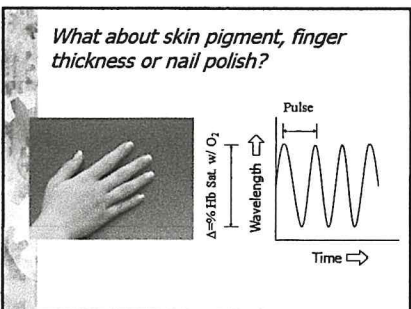
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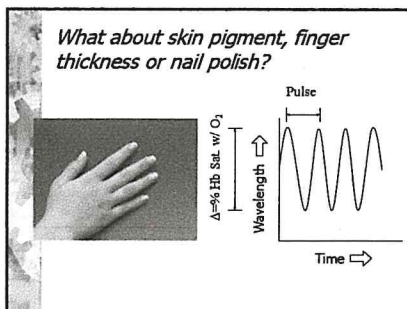
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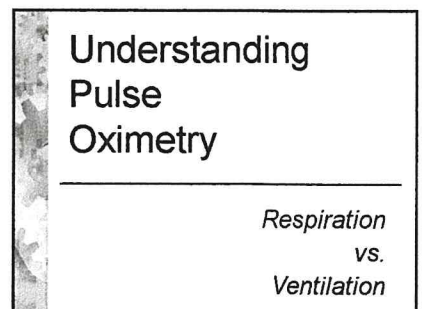
123



124



125



126

3 Components of Respiration

- **Ventilation:** the ability to physically move gases through the airway tree and replace the gases in the alveoli
- **Gas Transport:** the ability to deliver useful oxygen to the cells and return carbon dioxide to the lungs
- **Gas Exchange:** the ability to move gas through a membrane at either the alveoli or systemic cell

127

The Good News:

- During oral sedation with N_2O , even during emergency situations, gas transport and exchange usually remain unchanged. Therefore, ventilation is the major concern.

128

Under normal conditions

- DDS must watch for decreased ventilation (movement of air) caused by BNZ
- A decrease in respiration (oxygenation of the tissues measured on the oximeter) implies a decrease in ventilation

129

Remember...

- 1) During the oral sedation with N_2O , even during emergency situations, gas exchange and transport remain unchanged.
- 2) Therefore, ventilation is the major concern.

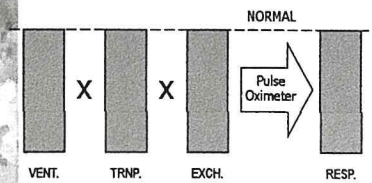


130

Q: What can distort transport and exchange?
A: Oxygen

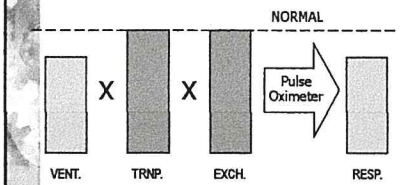
131

O₂'s effect on oximetry Normal (room air)



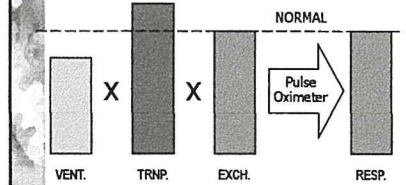
132

O₂'s effect on oximetry Decreased ventilation (room air)



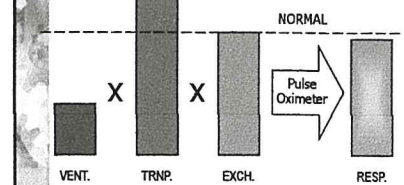
133

O₂'s effect on oximetry Decreased ventilation (add O₂)

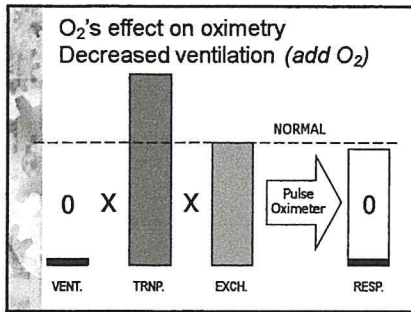


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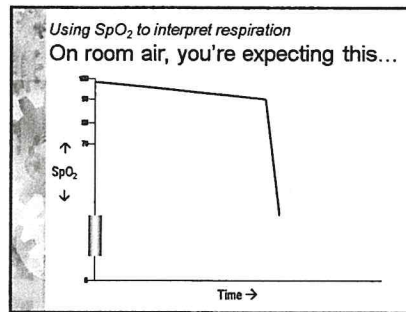
O₂'s effect on oximetry Decreased ventilation (add O₂)



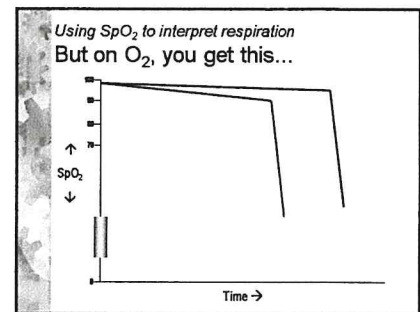
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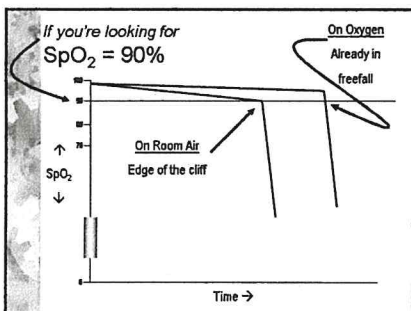
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137



138



139

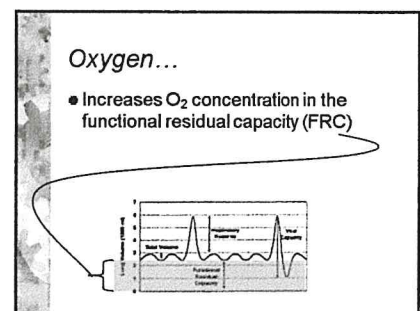
Pulse Oximetry...

- Allows SpO₂ to be easily and non-invasively measured
- Allows PaO₂ to be interpreted
- Good PaO₂ indicates adequate respiration

but...

Is there adequate ventilation?

140



141

Oxygen...

- Increases O₂ concentration in the functional residual capacity (FRC)
- Provides greater time from apnea to hypoxemia

BUT

142

Oxygen...

- Gives a false sense of security
- SpO₂ remains high despite hypoventilation
- SpO₂ can suddenly crash when transport capacity reaches max. or ventilation reaches zero

143

Consider these patients...

| Patient #1 | Patient #2 |
|---|---------------------------------|
| ✓ Age 65, male, 295 lbs. | ✓ Age 30, male, 155 lbs. |
| ✓ Retired CPA | ✓ Phys Ed. Teacher |
| ✓ 2p/d smoker for 20 yrs | ✓ Non-smoker |
| ✓ Pre-tx SpO ₂ = 94 | ✓ Pre-tx SpO ₂ = 99 |
| ✓ Admin 0.5 Halcion | ✓ Admin 0.5 Halcion |
| ✓ Wait 1 hr. Tx begins | ✓ Wait 1 hr. Add 30% |
| ✓ SpO ₂ ave 90 (range 89-92) | ✓ N ₂ O Tx begins |
| | ✓ SpO ₂ steady at 97 |

Which is patient is at greater concern?

144

When O₂ is administered, a stable SpO₂ does not guarantee successful ventilation.

145

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- > Proper Monitoring Techniques
- > **Complications & Solutions**

146

Problems & Complications

| Complications | Problems |
|---|--|
| <ul style="list-style-type: none"> □ Respiratory depression □ Excess perspiration □ Expectoration □ Behavioral issues □ Shivering □ Nausea & vomiting | <ul style="list-style-type: none"> □ Chronic exposure □ Recreational use □ Sexual phenomena |

147

Problems & Complications

| Complications | Problems |
|---|--|
| <ul style="list-style-type: none"> □ Respiratory depression ☆ □ Excess perspiration □ Expectoration □ Behavioral issues □ Shivering □ Nausea & vomiting | <ul style="list-style-type: none"> □ Chronic exposure □ Recreational use □ Sexual phenomena |

148

Respiratory Depression
Benzodiazepines

| Apnea | Obstruction |
|---|--|
| <ul style="list-style-type: none"> > Loss of the <i>desire</i> to breath > Drug induced > Less common at oral dosages | <ul style="list-style-type: none"> > Loss of the <i>ability</i> to breath > Anatomically induced > Most likely event |

149

☆ **Respiratory Depression: Treatment**

This is the big one!

- Arouse patient: "Take a deep breath."
- DC N₂O / Flush with oxygen
- ABCs of BLS

Maintain the airway

150

☆ **Respiratory Depression: Treatment**

This is the big one!

- Arouse patient: "Take a deep breath."
- DC N₂O / Flush with oxygen
- ABCs of BLS
- Consider Romazicon® (flumezenil), 0.4 mg
- Activate EMS

151

☆ **Respiratory Depression: Treatment**

This is the big one!

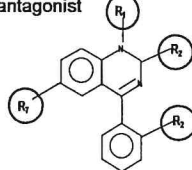
- Arouse patient: "Take a deep breath."
- DC N₂O / Flush with oxygen
- ABCs of BLS
- Consider Romazicon® (flumezenil), 0.4 mg
- Activate EMS

If patient is retained, monitor patient for extended time

152

Romazicon®: What is this stuff?

- It is a benzodiazepine (BNZ)
- It is a BNZ antagonist



153

Romazicon®:
What is this stuff?

- It is a benzodiazepine (BNZ)
- It is a BNZ antagonist
- It is routinely used to reverse conscious sedation
- It is normally administered *intravenously*
- No data exists on IM administration (*off label use*)
- It will burn and be a painful injection
- IM half-life is unknown

154

Romazicon®:
What is this stuff?

- BNZs raise seizure threshold
- Overdosing on Romazicon
 - Lowers seizure threshold
 - Increased chance of seizure

155

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- Complications & Solutions
- Recordkeeping

156

Paperwork & Records...

- 1) Records
 - ✓ Can you prove the patient *truly* gave *informed* consent?
 - ✓ Can you prove what you did (or didn't) do?
- 2) Paperwork
 - ✓ Can you reduce problems before and after the procedure?

157

Pre-treatment Instructions
Form 07X10

- Opportunity to "hype" the service and your office.
- **MOST IMPORTANTLY:** Explain what you want the patient to do.
- This is **NOT** the place to explain the procedure.

Instructions are different than consent

158

4 Components of Paperwork & Recordkeeping

1. Pre-Treatment Instructions
 - What's going to happen
 - What do you expect from the patient
2. Consent
 - Patient granting permission to proceed
3. Records
 - A journal of the event
4. Post-treatment instructions
 - What to expect
 - Managing complications

159

4 Components of Paperwork & Recordkeeping (Oral)

1. Pre-Treatment Instructions
 - What's going to happen
 - What do you expect from the patient
2. Consent
 - Patient granting permission to proceed
3. Records
 - A journal of the event
4. Post-treatment instructions
 - What to expect
 - Managing complications

Similar to N₂O

160

Pre-treatment Instructions
What do we want them to do?

| WHAT | WHY |
|----------------------------|----------------------|
| ✓ Short sleeve shirt | ✓ BP (not IV) |
| ✓ NPO ⑥ hrs. | ✓ Reduce aspiration |
| ✓ Update medical hx. | ✓ We need to know |
| ✓ Understand Rx directions | ✓ Take meds or not? |
| ★ ✓ Arrange driver | ✓ Post-op sedation |
| ✓ Remove contact lens | ✓ Dries eyes |
| | ✓ Pay us!!! |
| | ✓ We want to be paid |

161

4 Components of Paperwork & Recordkeeping (Oral)

1. Pre-Treatment Instructions
 - What's going to happen
 - What do you expect from the patient
2. Consent
 - Patient granting permission to proceed
3. Records
 - A journal of the event
4. Post-treatment instructions
 - What to expect
 - Managing complications

Sign the chart, more important

162

Informed Consent
Form 11X11

What needs to be covered

- ✓ **Purpose:** Explain what will happen
- ✓ **Permission:** What if the treatment plan changes?
- ✓ **Responsibility:** Does the patient understand what we expect of them?
- ✓ **Complications:** Things can happen
- ✓ **Questions:** Did the patient have a reasonable opportunity to ask questions?
- ✓ **Acknowledgements:** Did the patient authorize the sedation?

163

Informed Consent
Form 11X11

How to accomplish informed consent

- ✓ Give paperwork at instructions appointment
- ✓ Have them read it at home
- ✓ Bring it back with their questions written in the space provided / Answer them
- ✓ Have them sign it on the day of the procedure
- ✓ Expect them to forget the form
- ✓ Replace it

164

4 Components of Paperwork & Recordkeeping Oral

1. **Pre-Treatment Instructions**
 - What's going to happen
 - What do you expect from the patient
2. **Consent**
 - Patient granting permission to proceed
3. **Records**
 - A journal of the event More detailed
4. **Post-treatment instructions**
 - What to expect
 - Managing complications

165

Recordkeeping
N₂O vs. N₂O/Oral

- **N₂O only**
 - Beginning & end
- **N₂O/Oral**
 - Beginning, end *and events during treatment*

166

Record of the Procedure
N₂O with oral sedation

The only real difference is the record is

TIME BASED

Form 11X11

167

4 Components of Paperwork & Recordkeeping Oral

1. **Pre-Treatment Instructions**
 - What's going to happen
 - What do you expect from the patient
2. **Consent**
 - Patient granting permission to proceed
3. **Records**
 - A journal of the event V. Important
In writing
w/ guardian
4. **Post-treatment instructions**
 - What to expect
 - Managing complications

168

Post-op Instructions
Form 06X10

- ✓ Oral medication still active
- ✓ Patient may not remember what is said
- ✓ Review orally with the patient *and a responsible adult*

169

Post-op Instructions
Form 06X10

- ✓ Give us a contact number (esp if not staying at home)
- ✓ Eat something light
- ✓ Do not drive
- ✓ Avoid major decisions
- ✓ Call us if *anything* seems unusual
- ✓ Provide doctor's after-hours contact info

170

Program Overview...
Nitrous Oxide & Oral Sedation

That's all folks!

CONTACT INFORMATION

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171