Conscious Sedation in Dentistry

Conscious Sedation: A minimally depressed level of consciousness that retains the patient's ability to independently and continuously maintain an airway and respond or appropriately to physical stimulation verbal command. This is why sedation dentistry exists; it deals with the type and amount of sedation patients need to ensure their dental visits are as painless as possible. Some sedatives relax the patient; others numb all feeling altogether.

Dental Conscious sedation is recommended for:
1. long procedures on uncooperative children
2. young patients with behavioral difficulties
3. medical conditions that cause involuntary movements, such as Parkinson's or cerebral palsy
4. patients with "dental phobia"?patients who become panic-stricken and, in some cases, ill at the thought of entering a dental office.

DEGREE OF SEDATION
- Minimal Sedation
- Moderate
- Deep
- General Anesthesia

MINIMAL SEDATION
(Anxiolysis) is a drug-induced state which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected

MODERATE SEDATION
It is a drug-induced depression of consciousness during which patients respond purposefully** to verbal commands, either alone or accompanied by light tactile stimulation. Nor interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained

DEEP SEDATION/ANALGESIA
a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully** following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway,
and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

**GENERAL ANESTHESIA (GA)**

a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Cardiovascular function may be impaired.

**TYPES OF SEDATION BY ROUTE OF ADMINISTRATION**

- **Inhalation sedation** (Relative analgesia or N2O-O2 sedation)
- **I.V. sedation**
- **Oral sedation**
- **I.M. sedation**
- **Rectal sedation**
- **Others** (nasal, sublingual)

**Onset of Action**

- **Inhalation**: 2-3 minutes
- **Oral**: 30 min.
- **I.M.**: 10-15 min.
- **I.V.**: 1 min

**Peak Clinical Effect**

- **Inhalation**: 3-5 min.
- **Oral**: 60 min.
- **I.M.**: 30 min.
- **I.V.**: 1-10 min.

**Titration**

Ability to administer small increments of a drug to achieve a desired clinical effect

- **Inhalation**: Titration possible
- **Oral**: Titration not possible
- **I.M.**: Titration not possible
- **I.V.**: Titration possible

**Recovery**

Need for an escort (somebody accompany) to leave office

- **Inhalation**: Recovery almost always complete, may be discharged alone
- **Oral**: Recovery not complete even after 2-3 hrs.
- **I.M.**: Recovery not complete, need escort
- **I.V.**: Recovery not complete, need escort
· **Oral sedatives.** For patients with severe dental anxiety, dentists can recommend a pill that will make them severely drowsy for the duration of the treatment. The patient should take the pill about an hour before the appointment. Driving is not possible, so the patient must arrange to have a friend, relative or caregiver accompany them to the dental appointment.

**Oral, Rectal & IM Sedation in Dentistry**

**Oral Sedation**

*Advantages*
- Universal acceptance
- Ease of administration
- Low cost
- Decreased incidence & severity of adverse reactions
- No needles, syringes, equipment required
- No specialized training

*Disadvantages*
- Reliance on patient compliance
- Prolonged latent period
- Erratic and incomplete absorption of drugs from the GI tract
- Inability to titrate
- Inability to readily lighten or deepen the level of sedation
- Prolonged duration of action

**Rectal sedation**

*Advantages*
- Rapid onset of action
- Decreased incidence of side effects
- Ease of administration
- Low cost

*Disadvantages*
- Inconvenience to the administrator
- Inability to titrate
- Possible intestinal irritation
- Prolonged recovery

**Rectal sedation**

*Complications*
- Rectal mucosal irritation
- Initiation of bowel movement
- Risk of over sedation
Intramuscular sedation

• Indications
  – Adult when other more controlable routes are unavailable
    – The disruptive pediatric patient or handicapped
      adult or child when other routes have proved ineffective
    – The disruptive pediatric patient or handicapped adult or child prior to IV sedation or GA

Intramuscular sedation

• Advantages
  – Rapid onset of action 10-15 minutes
  – Peak action within 30 minutes
  – More reliable than rectal or oral sedation
  – Patient cooperation is not required

• Disadvantages
  – Inability to titrate
  – Inability to reverse the drug action
  – Prolonged duration of drug effect
  – Risk of injury from injection

IV Sedation

Advantages

■ Rapid onset of action
■ Easily titrated
■ Rapid recovery
■ Minimal side effects
■ Emergency IV access available

Disadvantages

■ Venipuncture is necessary
■ More monitoring necessary
■ Prolonged recovery
■ Most agents cannot be reversed by antagonistic agents

Inhalation Sedation

• Nitrous oxide. Also called "laughing gas." Nitrous oxide, often used in conjunction with a local anesthetic, is inhaled through a mask clamped over the nose. It relaxes the patient, leading him or her to a state of giddiness. The patient remains awake for the procedure, but is extremely calm. Nitrous oxide raises the patient's pain threshold, so the anesthesia injection is easier to bear.
Advantages
- Onset of action rapid < IV methods
- Rapid peak clinical effect < IV methods
- Depth of anesthesia altered rapidly
- Duration at discretion of administrator
- Titration possible
- Rapid and complete recovery
- No injection required
- Safe and no adverse systemic effects
- Can be used in place of local anesthesia in certain procedures

Disadvantages
- Equipment cost is high
- Occupied considerable space indental office
- Not a potent sedation agent
- Cooperation required
- Potential problems with chronic exposure??

Purpose of Nitrous Oxide Sedation
- Reduces fear, apprehension, or anxiety
- Raises pain reaction threshold
- Reduces fatigue
- Controls gagging

Pharmacology, Anatomy & Physiology of N20

N2O Pharmacology
Preparation
N2O (Nitrogen monoxide) prepared by heating Ammonium Nitrate Crystals at 240 degree cent

Pharmacology
1- N2O – only small quantities carried by the bloodstream
2- Alveolar conc. will rise rapidly
3- Alveolar gas tension will rise rapidly
4- N2O is given up to tissues and venous blood returns to the lungs with a decreased gas tension
5- 2 & 3 again
6- Rich cerebral blood supply – tension of N2O in brain also rises rapidly
7- Nonirritating, sweet smelling, colorless gas

Chemical Properties
- Quickly absorbed from the alveoli of the lungs and physically dissolved in the blood
- Eliminated unchanged from the body
• Gas is rapidly excreted from the lungs when the concentration gradient is reversed

**ANATOMY OF THE RESPIRATORY SYSTEM**

- Parts of Resp. System
  1. Transportation group: (outside to inside) also called anatomic dead zone
  2. Exchange group: Between Blood and Air (exchange portion of the lung)

**Four Plateaus of Analgesia (sensation of N2o sedation)**

- Parenthesis - tingling of hands, feet
- Vasomotor - warm sensations
- Drift - euphoria, pupils centrally fixed, sensation of floating
- Dream - eyes closed but will open in response to questions, difficulty in speaking, jaw sags open

**ASA Classifications**

- ASA I - A normal healthy patient. (ASA = American Society of Anesthesiologists)
- ASA II - A patient with mild systemic disease.
- ASA III - A patient with severe systemic disease.
- ASA IV - A patient with severe systemic disease that is a constant threat to life.
- ASA V - A moribund patient who is not expected to survive without the operation.
- ASA VI - A declared brain-dead patient whose organs are being removed for donor purposes.

**INHALATION SEDATION ARMAMENTARIUM (device)**

**Equipment**

- Numerous types of inhalation sedation(I.S.) machine available.
- Fail-safe mechanism-provide 20% O2 minimum.
- Audible or visual alarm if O2 interruption occurs.
- Flush lever to give high O2 concentration.
- Pin-indexed yoke system.

- Gas cylinders color coded, White or Green-oxygen, Blue-nitrous oxide.

**TYPES OF I.S. UNITS:**

1. INTERMITTANT (demand flow) gases delivered according to the pt. resp. demands and requirements
2. CONTINOUS FLOW : cont. flow of gases (more accurate and safe).
TYPES OF CONTINUOUS FLOW N2O/O2 EQUIPMENTS
1- Portable  2- Wall mounted with mobile head.

COMPONENTS OF THE CONTINUOUS FLOW UNIT
1- compressed-gas cylinders
   & pressure gauge
2- reducing valve (regulator)
3- flow meter
4- reservoir bag
5- conducting tubing
6- nasal hood, fullface mask or nasal cannula

Important consideration when handling cylinders
stored in vertical position

*Use no grease, oil or any lubricant to cylinder valve, gauge, regulator as it might cause explosion

*storage heat should be stable

*Cylinders valve opened slowly and closed tightly when not in use
*Cylinders should be cracked before attachment to the machine

GASES PHYSICAL STATUSE

N2o cylinders:
Present in both liquid and gaseous states in a full cylinder. 30% liquid Gas Pressure. In cylinders 750 psi. in both E&G cyl. Because of presence of liquid the guage record full until approx. 85% of gas is gone.

REGULATORS (reducing valve)
Location:
- portable unit: between cylinder & flow meter
  - central storage: placed on the cylinder itself.
REGULATOR FUNCTION
To decrease the high pressure coming from cylinders (750-2200psi) to safe pressure for both patient & sed. Unit regardless of the gas pressure in cylinders.

MANIFOLDS
* To join multiple compressed – gas cyl. to gather.

FLOWMETERS. (FM)
* Gases carried from regulator via low pressure tube to the flow meter which permit the operator to administer a precise vol. of either gases
* FM measure actual quantity of gases in motion

EMG.AIR INTAKE VALVE
* LOCATED ON THE BAG –T above RESERVOIR BAG to provide patient with atmospheric air on EMG situation Automatically when S. U is not working & R. B. is deflated

FUNCTIONS OF RES. BAG
* Gas Reservoir to be used when needed
* As monitoring device (inflate & deflate)
* To provide O2 during ventilation esp. during G.A.

RUBBER GOODS
* Conducting tubes (corrugated)
* Nasal hood, face mask and nasal canula
Administration of N2O:
- Inhalation Analgesia Permits
- Portable oxygen tank
- Delivery system that delivers a maximum of 80% N2O
- Physical evaluation ("..vital signs such as pulse, blood pressure, respirations, temperature and weight.
- Oral pharyngeal airways available

Patient Selection:
- Medical history and physical exam are important
- Parental agreement consent
- Capacity of patient to be compliant and follow directions.

Technique: (Administration )
- Prior to seating patient
- Make sure equipment is set up and working properly
- Select nasal hood of proper size
- Have patient use restroom if necessary
- Make sure you have an assistant!

Preparation of Patient
Patient is in reclined position on the Dental chair.
Use TSD (tell, show, do)
Describe sensations of (N2o) in advance.

Complications/Precautions:
- Signs of Saturation
- Reminding child continuously to hold mouth open
- No response to questions
- Agitation
- Sweating
- Nausea
- Unconsciousness
“Diffusion Hypoxia” – “breathing room air”

- Alveoli filled with N2, O2, CO2, water vapor and N2O
- Large volumes of N2O diffuse into alveoli and are exhaled
- “Concentration effect” is now reversed
- More CO2 removed=lowered CO2 tension=reduced stimulus for breathing and end with respiratory depression
- Large volumes of N2O in alveoli produces a dilution of O2 present with resultant hypoxia=headache, nausea, lethargy

“REVERSAL WITH 100% OXYGEN

After we finish Tx Ventilate the patient with 100% O2 for 3 to 5 minutes to prevent diffusion hypoxia

Vomiting - due to:
* over dosage of N2o
* prolonged administration of N2o
* pre-existing GI infection, influenza
* history of motion sickness or vomiting (use anti-emetic drugs)
* impurities in the delivery system (rare)
* If vomiting occurs, turn patient to the side
* Prevent vomiting by close observation of patient

Hallucinations
If we give High Concentration of N2o(> 60%)

Reduce N2O Dosage... with lengthy administration (> 30 min.).

Elimination of N2O:
- Rapid
- Primarily through the lungs
- Small amount through skin, sweat glands, urine, and intestinal gas

Safety Issues for Dental Personnel:
* Chronic exposure (>8 hrs. per week)
* Increases in liver, kidney and neurologic diseases
* Increase in spontaneous abortion
* Increase in congenital abnormalities

Chronic Exposure to N2O
“Long-term (chronic) exposure to nitrous oxide in sufficient concentrations can produce irreversible, toxic changes, and should be a concern for dental personnel working in environments in which nitrous oxide is administered to patients.”
Chronic Exposure Disorders:
- Reproductive system
- Hematological =
- Immunological =
- Neurological =
- Liver
- Kidney

Controlling N2O in the Operatory:
- **Minimizing Risk by**
  * Good scavenging system
  * Adequate circulation of room air
  * Limiting speech and mouth breathing of patient
  * Proper size nasal hood

**Remember!** Nitrous oxide is not a substitute for traditional behavior management techniques. It should be considered an adjunct to aid in the management of the mild to moderately anxious patient who is capable of cooperating in the dental chair

**Hospital Based Dentistry**

**Four Stages of Anesthesia**
1- Analgesia
   - Patient is conscious
   - Reflexes are intact
2- Delirium
3- Surgical Anesthesia
4- Respiratory Paralysis

**patient** Unconscious in Stages 2, 3, and 4

**Candidates for Hospital Dentistry**
* Children with handicapping conditions
* Emotional or behavioral problems of any age

**Ways to Minimize Negative effect of GA on child and parents**
Involves child on operating room tour
Allow child to bring favorite doll or toy
Utilizes preinduction sedation
Allow parents to rejoin child ASAP
Thoroughly explain procedure to parent mothers of children receiving GA were more stressed Fully describe post op course

**Outpatient Care**
Dentist becomes coordinator between hospital, anesthetist and other medical staff

**Inpatient Care**
Required if patient has medical condition that requires close follow-up
If family lives outside general area
If parents or caretaker demonstrate questionable ability to comply with pre-op or post-op instructions
Steps needed to hospitalize a child patient and complete care
1 - Initial Exam
2 - Parental Consultation
3 - Consultations
4 - Preadmission
5 - One Week Before Appointment
6 - Patient Admittance
7 - Preoperative Procedures
8 - Equipment Preparation
9 - Anesthesia Induction
10 - Restorative Procedure
11 - Postoperative Procedures
12 - Discharge and Follow-up Care

**Disadvantages**
Doesn’t help with behavior management
Doesn’t teach child about dentistry
Element of risk
Need to bring own staff and supplies
Need to close office
Expensive

-Advantages of Hospital Dentistry
-No need for multiple visits
-All treatment is accomplished in 1 to 1.5 hours
Full mouth rehabilitation is done under ideal circumstances