

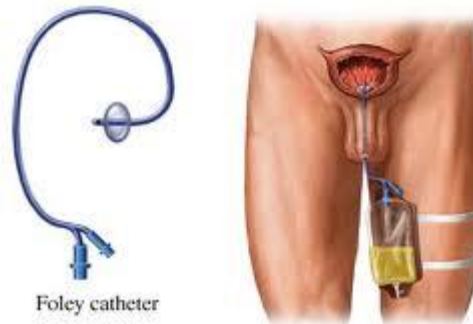
UNIT 3

OTHER MEDICAL SUPPLIES

Catheters

Catheters

- tubes that can be inserted into a body cavity, duct or vessel
- Thin, flexible tubes
- allow drainage, injection of fluids or access by surgical instruments
- process of inserting a catheter is catheterization
- silicone rubber, latex, and thermoplastic elastomers



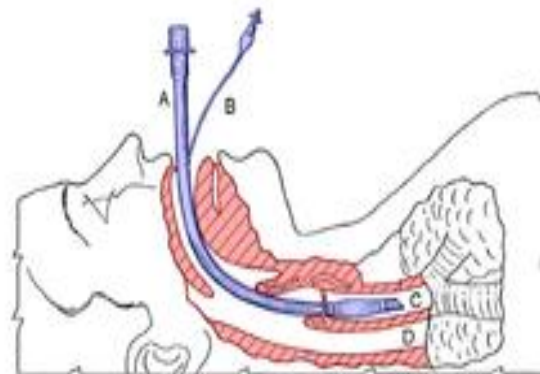
Catheters...

- Placement of a catheter into a particular part of the body may allow:
 - Draining urine from the urinary bladder as in urinary catheterization
 - Drainage of fluid collections, e.g. in abdominal abscess
 - Administration of intravenous fluids, medication or parenteral nutrition



Endotracheal (Breathing) tubes

- Catheter that is inserted into the **trachea** through the mouth or nose in order to maintain an open air passage or to **deliver oxygen** or to permit the **suctioning** of mucus
- To provide direct & unimpeded airway to and from lungs
- Used in general anesthesia, emergency, intensive care
- Made from special non-toxic, clear, thermo-sensitive siliconized PVC material
- Smooth tip aids atraumatic intubations

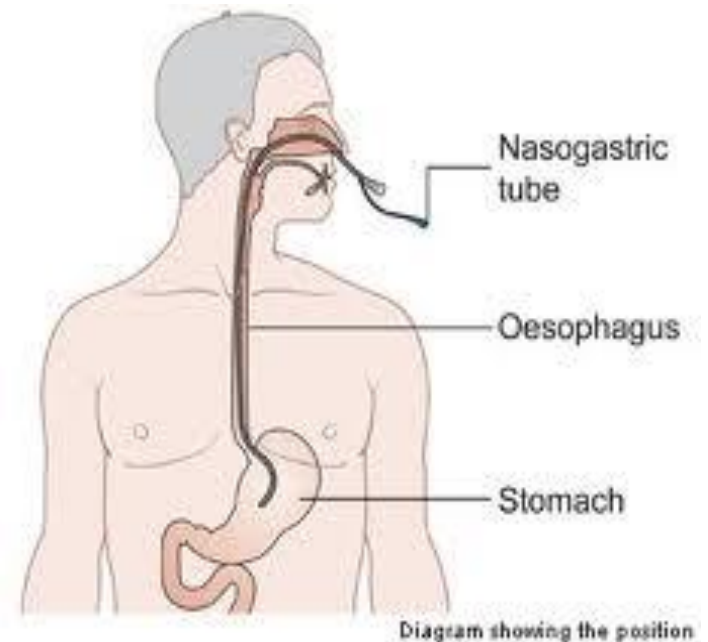


Nasogastric tube (NG tube)

- Clear plastic tube that passes through the patient's nose and throat and ends in the patient's stomach
- Allows for direct “*tube feeding*” to maintain the *nutritional status* or
- Removal of stomach acids
- *Main use of NG tube is for feeding and for administering drugs and other oral agents*

NG tube...

- Nasogastric *aspiration* (suction) is the process of draining the stomach's contents via the tube
- NG aspiration can also be used in *poisoning* situations when a potentially *toxic* liquid has been ingested
- For preparation before surgery under anesthesia and to extract samples of gastric liquid for analysis



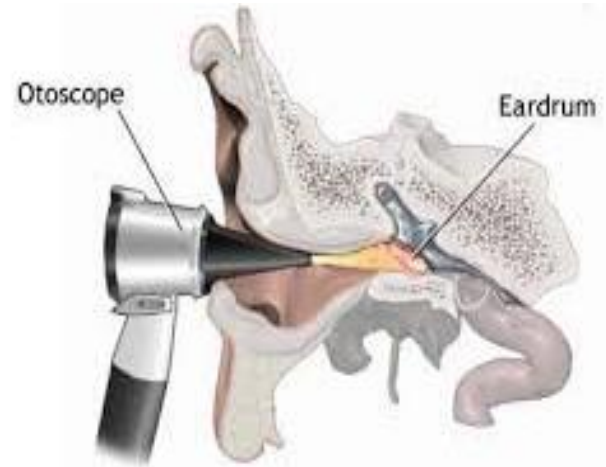
Tongue depressor

- Used to depress the tongue to allow for examination of the **mouth** and **throat**
- Common modern tongue depressors have thin **wooden** blade, smoothed and rounded at both ends
- Inexpensive and difficult to clean
 - Wooden tongue depressors are normally labeled for disposal after a single use
- Available for adults and infants



Otoscope

- used to look into the ears
- it is possible to see the outer ear and middle ear
- The head contains a *light source* and a simple low-power *magnifying lens*



Sphygmomanometer

- used to measure arterial pressure



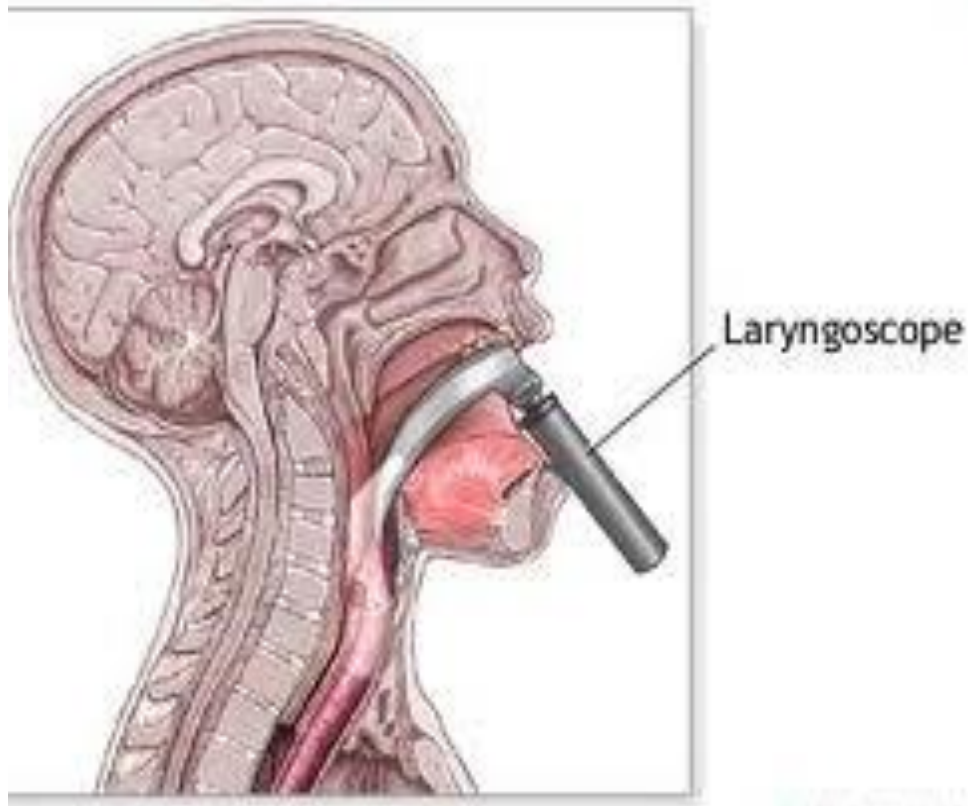
Glucometer

- for determining the approximate concentration of glucose in the blood
- key element of home blood glucose monitoring by people with diabetes mellitus



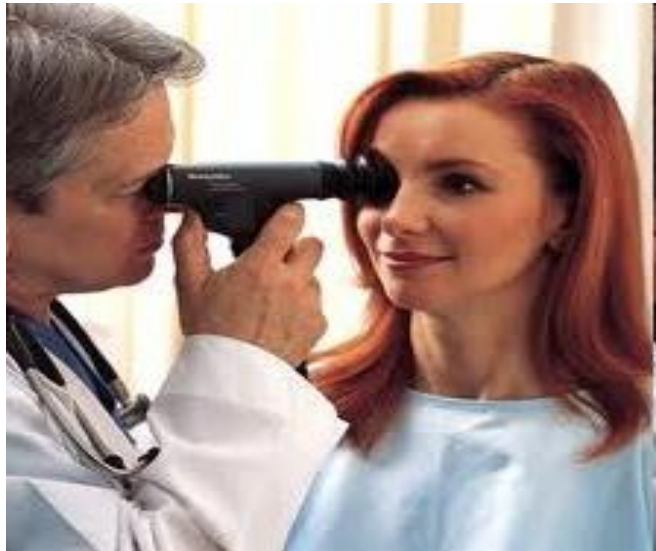
Laryngoscope

- used to obtain a view of the vocal folds and the glottis



Opthalmoscope

- Allows to see inside the fundus of the eye and
- It is crucial in determining the health in the retina and the vitreous humor



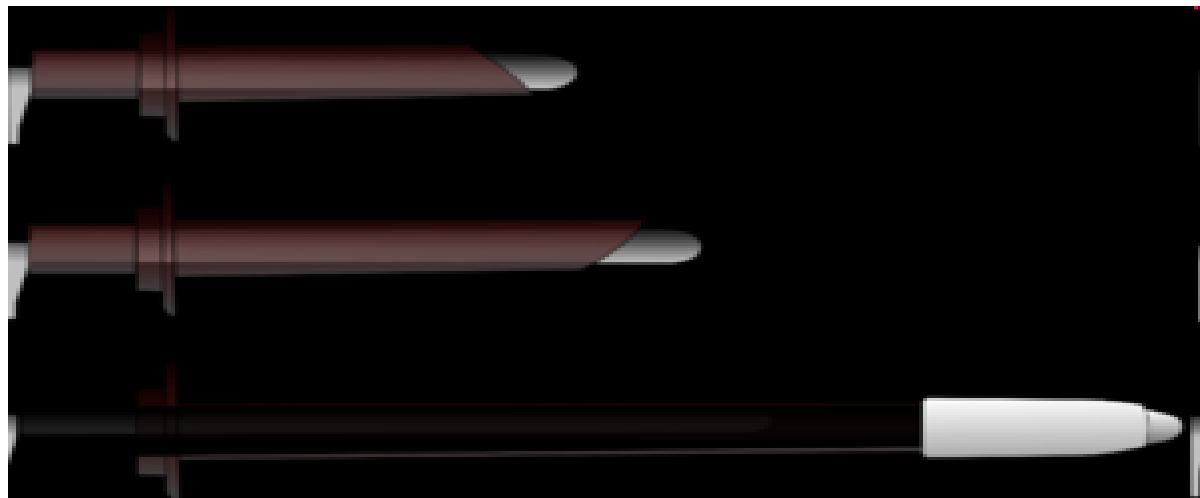
Thermometer

- **Medical thermometers** are used for measuring human body temperature,
- **under the tongue**
- **under the armpit**
- **into the rectum**



Proctoscope

- a short, straight, rigid, hollow metal tube, and usually has a small light bulb mounted at the end
- used to examine the anal cavity, rectum or sigmoid colon
- Hemorrhoids, colorectal cancer



Stethoscope

- acoustic medical device for listening to the internal sounds of the body
- often used to listen to lung and heart sounds
- In combination with sphygmomanometer, commonly used for measurements of blood pressure



Endoscope

- Used for direct visual observation of hollow organs (e.g., colonoscopy)



Pulse oximeter

- Non-invasive method allowing the monitoring of the saturation of a patient's hemoglobin.
- Light emitted from device
- An oxygen level of greater than 95% is generally considered to be a normal oxygen level.
- In addition to oxygen level, pulse rate is also displayed



Medical Gases



Introduction

❑ **Medicinal gas:** is any gas which is intended for administration to a patient in anesthesia, therapy, or diagnosis.

Example

- ⦿ Oxygen
- ⦿ Nitrous oxide
- ⦿ Carbon dioxide

Oxygen

- ➡ O_2 ; MW = 32
- ➡ Colorless, odorless, tasteless
- ➡ Slightly heavier than air (Density of 1.29 g/L)
- ➡ Nonflammable but supports combustion

Oxygen, Cont'd

Uses

- Suspected or documented hypoxia (cardio-pulmonary disease)
- Surgical trauma and chest wounds
- Shock, severe hemorrhage and coronary occlusion(MI)
- Post operatively to manage the patient's condition
- Carbon monoxide poisoning
- Life support for artificially ventilated patients
- Management of sudden cardiac and respiratory arrest

Oxygen, Cont'd

Hazards

- ➡ Ventilatory depression (in COPD patients)
- ➡ Absorption atelectasis
- ➡ ROP (Excessive blood O_2 ➡ retinal vasoconstriction and necrosis)
- ➡ Oxygen toxicity (lungs & CNS, PO_2 and exposure time)
- ➡ Fire hazard

Oxygen Delivery Devices

- ❖ the oxygen delivery devices can be divided into two major groups: low-flow and high flow oxygen systems

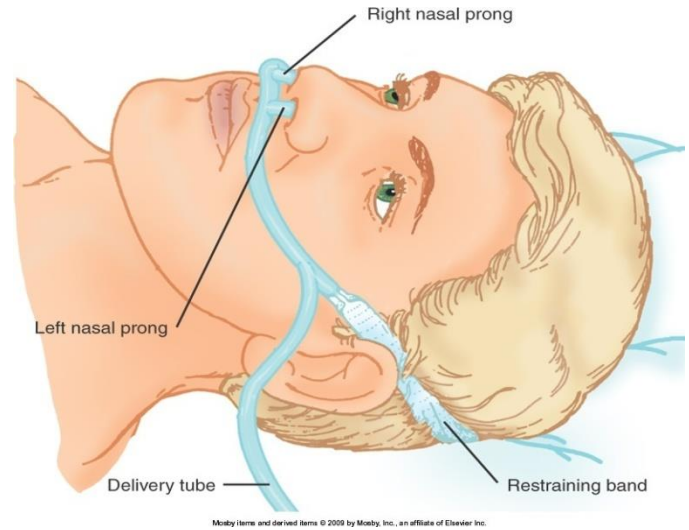
A) Low flow devices

- O₂ flow ***does not*** fully meet patient's inspiratory demand
- are used when consistency of the fraction of inspired oxygen (FiO₂) delivery is not crucial.
- provide supplemental oxygen at a rate that is less than the peak inspiratory flow rate.
 - Needs additional mixing with **room** air
- Flow can vary with:
 - Patient's respiratory rate and pattern (depth)
 - Flow of gas from the equipment
 - Equipment reservoir

Oxygen Delivery Devices...

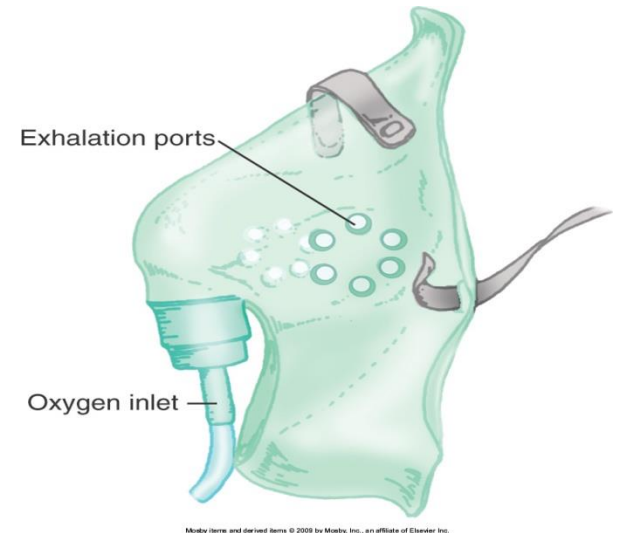
Nasal cannula

- Provide 24% - 40% oxygen with flow rates up to 6 L/min in adults



Simple oxygen masks

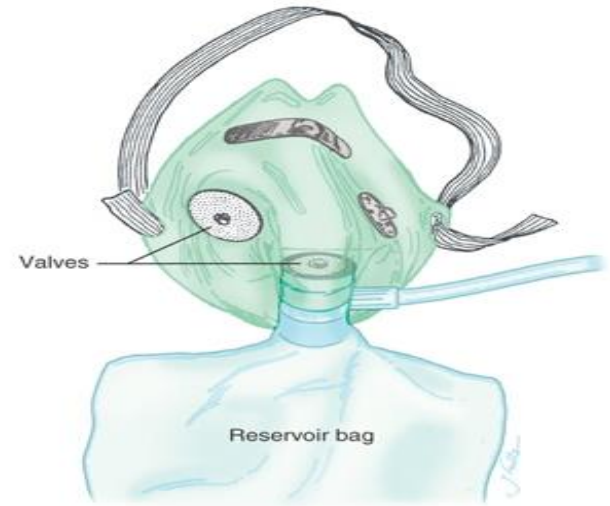
- Can provide 35% - 50% O₂, at flow rates from 5–10 L/min
- Long-term use can lead to skin irritation and pressure sores



Oxygen Delivery Devices...

Partial rebreathing mask

- A simple mask with a reservoir bag
- At a flow of 6–10 L/min the system can provide 40%–70% oxygen



Non-rebreath mask

- It has a series of **one-way** valves
- Minimum flow of 10 L/min and delivered O₂ of this system is 60%–80%.

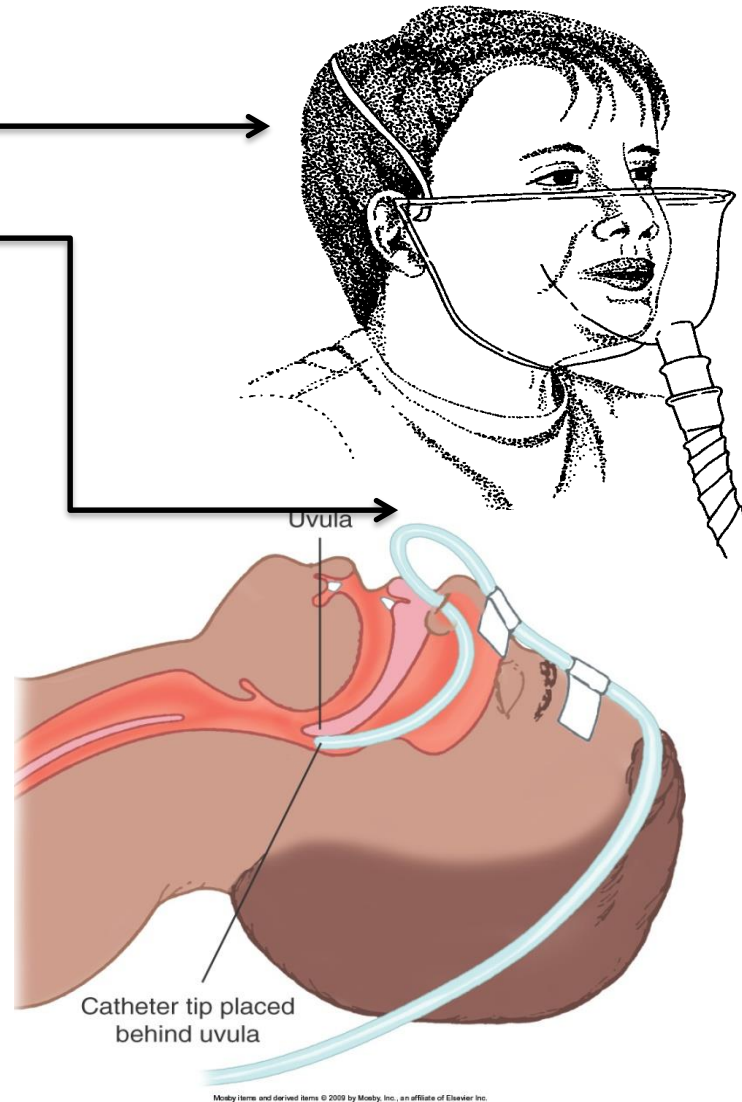
Oxygen Delivery Devices...

- A one-way valve at the inhalation port (**IV**) prevents expired gases from refilling the oxygen reservoir bag.
- The presence of a one-way exhalation valve (**EV**) prevents room air from being inspired during inhalation.



Oxygen Delivery Devices...

- Face tent
- Nasal catheter



Oxygen Delivery Devices...

Tracheal catheter

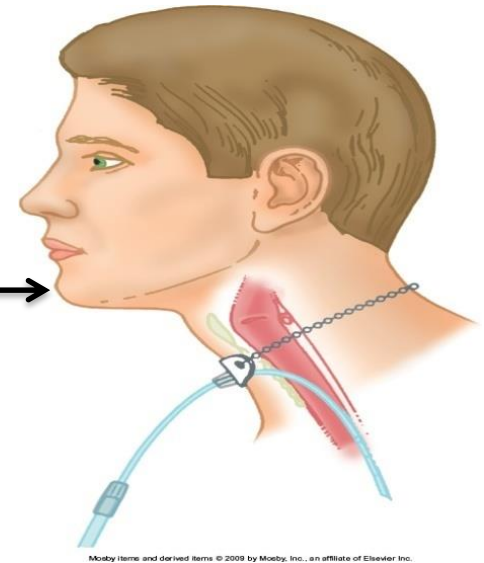
- Requires very low flows to meet needs



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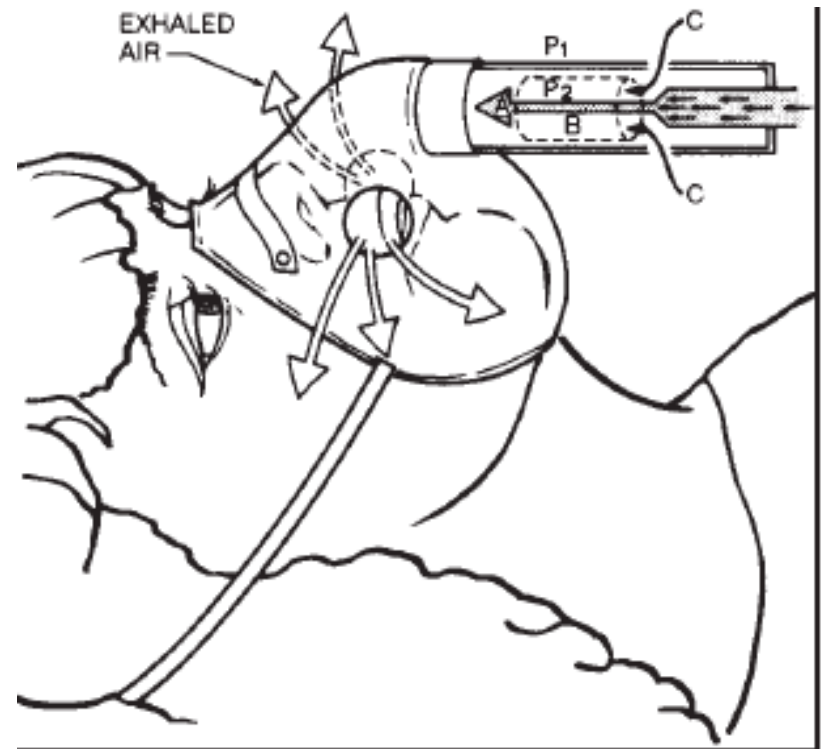
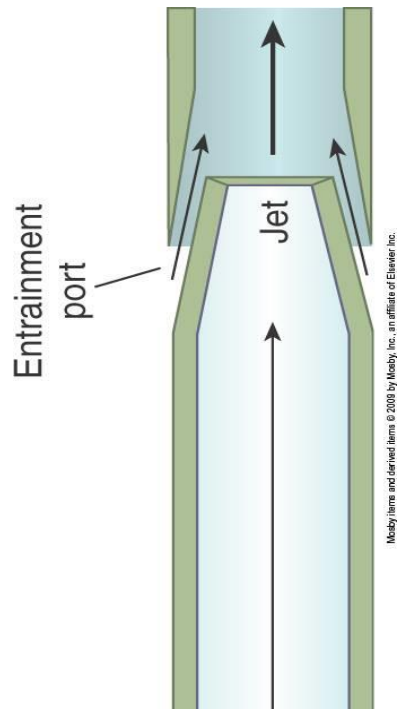
Oxygen Delivery Devices...

B) High Flow

- Supply a given O_2 concentration at a flow **equaling** or **exceeding** the patient's peak inspiratory flow
- Use air-entrainment or blending system
- Provides precise concentrations despite patients breathing pattern → Can ensure a **fixed** FIO_2
- *All of the inspired gas the patient breathes is delivered by the oxygen device*
- Delivery systems most commonly employ **vorticity** to mix ambient air with oxygen

Oxygen Delivery Devices...

- ***Venturi masks*** (A) High-velocity jet. (B) Region of viscous shearing. (C) Room air entrainment
- Patients with chronic respiratory insufficiency who are at a risk of developing worsening hypercapnia while on oxygen supplementation are good candidates for this mask.



Compressed Air

- ➡ Is the mixture of nitrogen, oxygen, carbon dioxide & argon
- ➡ Is piped in to all modern hospitals
- ➡ Used to power pneumatically powered equipments
- ➡ In ventilators, to provide uncontaminated and controlled air flows
- ➡ As a replacement for atmospheric air
- ➡ In anesthesia as a carrier gas for volatile **anesthetic** agents

Carbon Dioxide

- ➡ Colorless and Odorless
- ➡ Does not support combustion – used in fire extinguishers
- ➡ More soluble in liquids than oxygen – easier transport in blood than oxygen
- ➡ Used to treat hiccups
- ➡ To **stimulate** respiration
- ➡ As solid carbon dioxide (dry ice) in tissue freezing techniques and for the destruction of **warts** by freezing

Helium

- ➡ Odorless, tasteless, non-flammable
- ➡ Second lightest of gases
- ➡ Combined with oxygen (heliox) to reduce work of breathing with swollen upper airways (Asthma)
- ➡ assist the flow of oxygen into the alveoli of patients with severe respiratory obstruction and to prevent **atelectasis**
- ➡ used in emergency situations where upper or lower airways are partially obstructed because its lower density reduces the resistance to breathing

Nitrous Oxide (N₂O)

- ➡ Colorless, sweetish taste and odor, nonflammable but supports combustion
- ➡ Used as an anesthesia (laughing gas)
- ➡ Always mixed with oxygen (**Entonox**) and other anesthesia agents
- ➡ When an inhalation anesthetic is required, the administration of N₂O is usually accompanied by simultaneous administration of a volatile agent such as halothane etc.

Nitrous Oxide (N₂O)...

- ➡ In the relief of severe pain, usually in emergency situations
- ➡ In short term procedures which inevitably involve pain, such as wound and burn dressing, wound debridement and suturing
- ➡ In dental work to provide short-term analgesia for tooth extraction

Nitric Oxide (NO)

- ➡ Is nonflammable but supports combustion
- ➡ Used experimentally in low concentrations (ppm) for pulmonary vasodilation → Decreases pulmonary vascular resistance
- ➡ Recently has had excellent results with premature babies
- ➡ Treatment of neonates with hypoxic respiratory failure associated with pulmonary hypertension

Nitrogen

- ➡ Used as lab gas (liquid) for freezing tissue
- ➡ Power pneumatic equipments

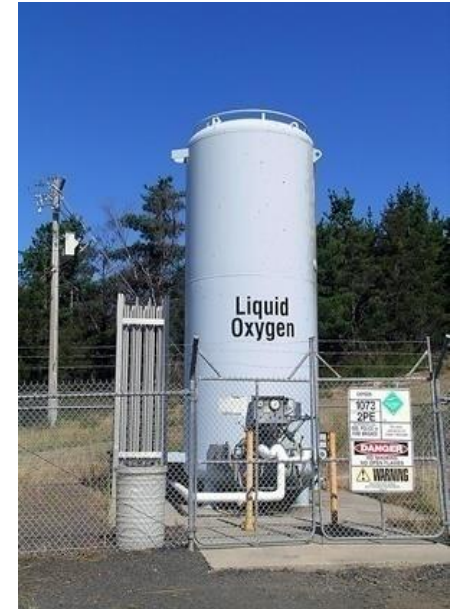
Storage and Handling of Medical gases

❑ Medical Gases are stored in one of two ways:

- Portable high-pressure cylinders
- Large bulk reservoirs

Gas Cylinders

- used to store & ship compressed or liquid medical gases
- Constructed from:
 - chrome molybdenum steel
 - High strength aluminum alloy



Cylinder Color Coding

- *Cylinders are color coded and labeled for identification of their contents*
- Code adopted by the Bureau of Standards of the U.S. Department of Commerce
- However, prior to initiating use of any gas, the contents of the cylinder must be verified by reading the label that is affixed to the tank



Cylinder Color Coding...

Gas	US	Canada
Oxygen	Green	White
Carbon Dioxide	Gray	Gray
Nitrous Oxide	Blue	Blue
Cyclopropane	Orange	Orange
Helium	Brown	Brown
Ethylene	Red	Red
CO ₂ /O ₂	Gray/Green	Gray/Green
Helium/O ₂	Brown/Green	Brown/Green
Nitrogen	Black	Black
Air	Yellow	Yellow
Nitrogen/O ₂	Black/Green	Black/Green



Cylinder Labeling

- Name and chemical symbol of the gas
- Purity of the gas
- Volume of the cylinder in liters at a temperature
- Specific hazards/precautions
- Instructions in case of exposure
- Name of manufacturer, packer,

DO NOT REMOVE THIS LABEL

OXYGEN COMPRESSED U.S.P. UN1072	
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Oxygen produced by air liquefaction process

Warning:
High pressure oxidizing gas which vigorously accelerates combustion. Handle and store with care. Do not drop. Do not use or store near heat or flame. Keep free from oil or grease. Use only with equipment designed, cleaned and rated for use with medical high pressure cylinder oxygen systems. Open valve slowly. Close valve after each use and when empty. Uninterrupted use of high concentrations of oxygen over an extended period of time without monitoring its effects may be harmful. Do not attempt to use on patients who have stopped breathing, unless used in conjunction with resuscitative equipment.

WARNING: For emergency use only when administered by properly trained personnel for oxygen deficiency and resuscitation. For all other medical applications, **Rx only.**

Filled by
HEALTH CARE SOLUTIONS
701 Chester Pike Sharon Hill, PA 19079
610-583-3500 or 800-451-1671

DO NOT REMOVE THIS LABEL

Safety Rules for Cylinder Use

Moving Cylinders

- Always leave protective valve caps in place when moving a cylinder
- Do not lift a cylinder by its cap
- Do not drop a cylinder, strike two cylinders against one another, or strike other surfaces
- Do not drag or roll cylinders; use a cart
- Use a cart whenever loading or unloading cylinders

Safety Rules for Cylinder Use...



Safety Rules for Cylinder Use...

❑ Storing Cylinders

- Comply with local and state regulations for cylinder storage as well as with those established by the National Fire Protection Association
- Post name of the gases stored
- Keep full and empty cylinders separate. Place the full cylinders in a convenient spot to minimize handling of cylinders
- Keep storage areas dry, cool, and well ventilated. Storage rooms should be fire-resistant



Safety Rules for Cylinder Use...

❑ Storing Cylinders...

- Do not store cylinders close to flammable substances such as gasoline, grease, or petroleum products
- Protect cylinders from damage. Keep cylinder valve caps on at all times
- May be stored in the open; however, shading may be necessary
- Protect cylinders from potential tampering by untrained, unauthorized individuals



Safety Rules for Cylinder Use...

❑ **Withdrawing Cylinder Contents**

- Only to be handled by experienced, trained individuals
- User must verify cylinder contents before use
- Leave protective cap in place until ready to use
- Make sure cylinder is supported and protected from falling
- Use appropriate regulator or reducing valve
- Open valves slowly. Never use a hammer or wrench to force a valve open

Safety Rules for Cylinder Use...

Withdrawing Cylinder Contents...

- Keep all connections tight to prevent leakage
- Before removing a regulator, turn off the valve and reduce the pressure
- Never use a flame to detect leaks with flammable gases
- Do not store flammable gases with oxygen. Keep all flammable anesthetic gases stored in a separate area