SHARN INC.
ANESTHESIA

Professional Anesthesia Handbook

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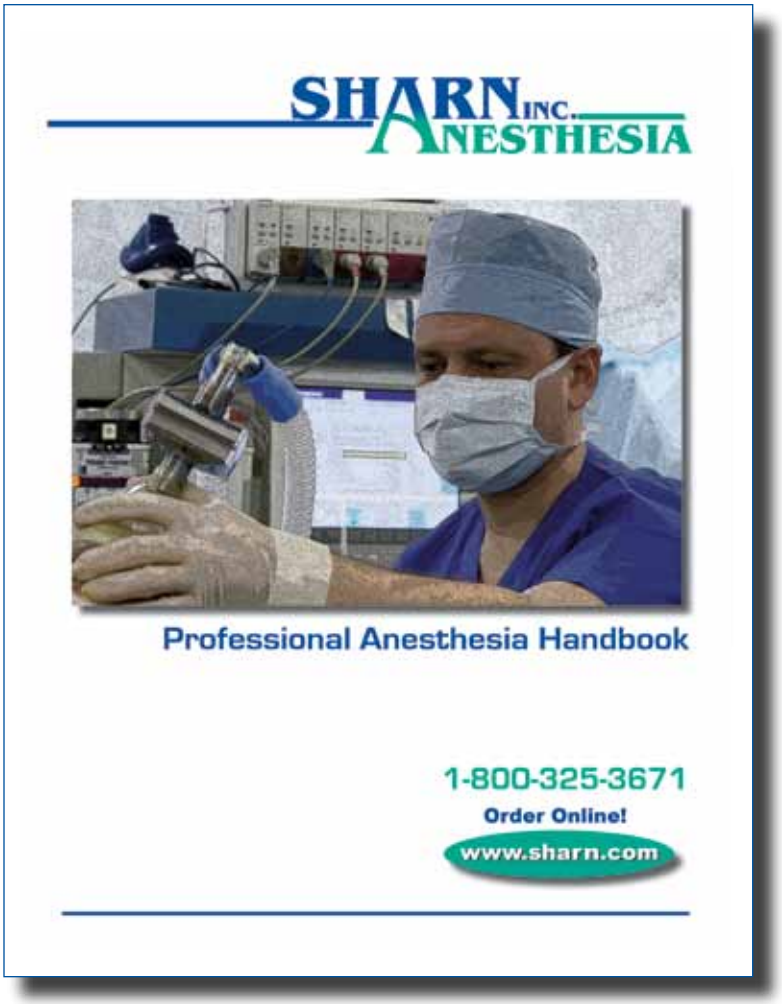


We have a full staff of Inside Sales Representatives calling on hospitals and surgery centers around the country. Because we do business with you over the phone, we are able to save you both time and money. By avoiding the expense of having a salesman in a suit calling on hospitals, we are able to pass on significant savings directly to you.

This Professional Anesthesia Handbook is yours to keep as a reference book. If there are other topics you would like to see included, drop us an e-mail at mailbox@sharn.com. We hope you will also take a look at the family of products SHARN Anesthesia has to offer.

We support the American Society of Anesthesia Technologists and Technicians.

Disclaimer

The material included in the handbook is from a variety of sources, as cited in the various sections. The information is advisory only and is not to be used to establish protocols or prescribe patient care. The information is not to be construed as official nor is it endorsed by any of the manufacturers of any of the products mentioned.

Table of Contents

1 Airway Management

Management of the Difficult Airway Practice Guidelines:

Practice guidelines are systematically developed recommendations that assist the practitioner and patient in making decisions about health care. These recommendations may be adopted, modified, or rejected according to clinical needs and constraints. Practice guidelines are not intended as standards or absolute requirements. The use of practice guidelines cannot guarantee any specific outcome. Practice guidelines are subject to revision as warranted by the evolution of medical knowledge, technology, and practice. They provide basic recommendations that are supported by analysis of the current literature and by a synthesis of expert opinion, open forum commentary, and clinical feasibility data.

For these guidelines a difficult airway is defined as the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with face mask ventilation of the upper airway, difficulty with tracheal intubation, or both.

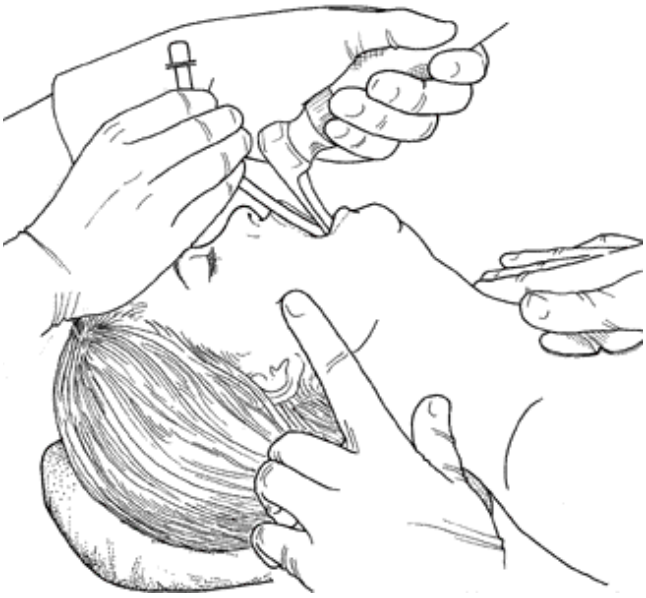
Recommendations:
At least one portable storage unit that contains specialized equipment for difficult airway management should be readily available.

Suggested Contents of the Portable Storage Unit for Difficult Airway Management

1. Rigid laryngoscope blades of alternate design and size from those routinely used; this may include a rigid fiberoptic laryngoscope
2. Tracheal tubes of assorted sizes
3. Tracheal tube guides. Examples include (but are not limited to) semirigid stylets, ventilating tube changer, light wands, and forceps designed to manipulate the distal portion of the tracheal tube
4. Laryngeal mask airways of assorted sizes
5. Flexible fiberoptic intubation equipment
6. Retrograde intubation equipment
7. At least one device suitable for emergency noninvasive airway ventilation. Examples include (but are not limited to) an esophageal tracheal Combitube (Kendall-Sheridan Catheter Corp., Argyle, NY), a hollow jet ventilation stylet, and a transtracheal jet ventilator
8. Equipment suitable for emergency invasive airway access (e.g., cricothyrotomy)
9. An exhaled CO2 detector

The items listed in this table represent suggestions. The contents of the portable storage unit should be customized to meet the specific needs, preferences, and skills of the practitioner and healthcare facility.

After successfully managing a difficult airway



The anesthesiologist should inform the patient (or responsible person) of the airway difficulty that was encountered. The intent of this communication is to provide the patient (or responsible person) with a role in guiding and facilitating the delivery of future care. The information conveyed may include (but is not limited to) the presence of a difficult airway, the apparent reasons for difficulty, how the intubation was accomplished, and the implications for future care. Notification systems, such as a written report or letter to the patient, a written report in the medical chart, communication with the patient's surgeon or primary caregiver, a notification bracelet or equivalent identification device, or chart flags, may be considered.

The anesthesiologist should evaluate and follow up with the patient for potential complications of difficult airway management. These complications include (but are not limited to) edema, bleeding, tracheal and esophageal perforation, pneumothorax, and aspiration. The patient should be advised of the potential clinical signs and symptoms associated with life-threatening complications of difficult airway management. These signs and symptoms include (but are not limited to) sore throat, pain or swelling of the face and neck, chest pain, subcutaneous emphysema, and difficulty swallowing.

Preplanned strategies can be linked together to form airway management algorithms.

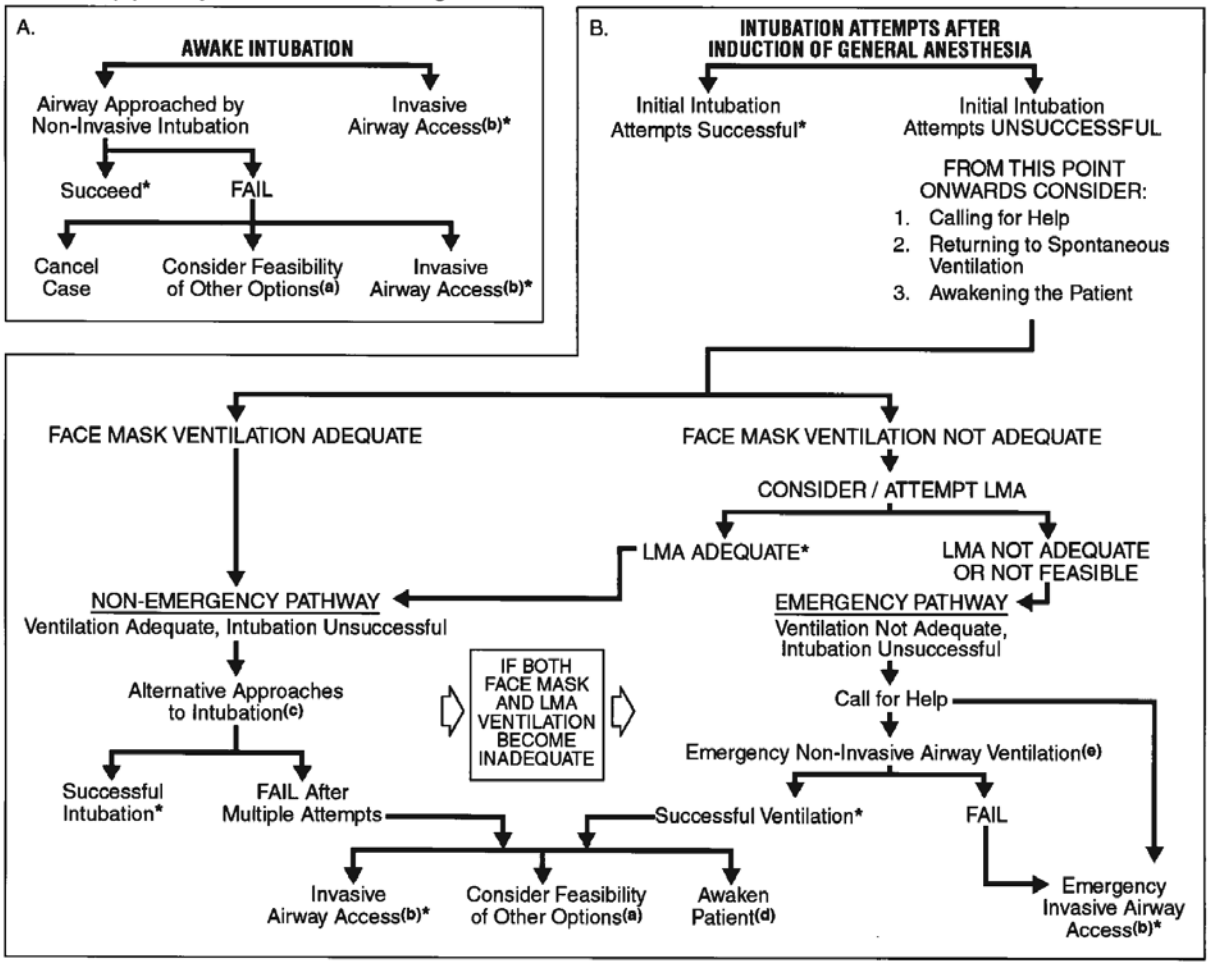
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

DIFFICULT AIRWAY ALGORITHM

1. Assess the likelihood and clinical impact of basic management problems:
   - A. Difficult Ventilation
   - B. Difficult Intubation
   - C. Difficulty with Patient Cooperation or Consent
   - D. Difficult Tracheostomy
2. Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway managemen
3. Consider the relative merits and feasibility of basic management choices:

A.	Awake Intubation	vs.	Intubation Attempts After Induction of General Anesthesia
B.	Non-Invasive Technique for Initial Approach to Intubation	vs.	Invasive Technique for Initial Approach to Intubation
C.	Preservation of Spontaneous Ventilation	vs.	Ablation of Spontaneous Ventilation

4. Develop primary and alternative strategies:



*** Confirm ventilation, tracheal intubation, or LMA placement with exhaled CO_2**

a. Other options include (but are not limited to): surgery utilizing face mask or LMA anesthesia, local anesthesia infiltration or regional nerve blockade. Pursuit of these options usually implies that mask ventilation will not be problematic. Therefore, these options may be of limited value if this step in the algorithm has been reached via the Emergency Pathway.

b. Invasive airway access includes surgical or percutaneous tracheostomy or cricothyrotomy.

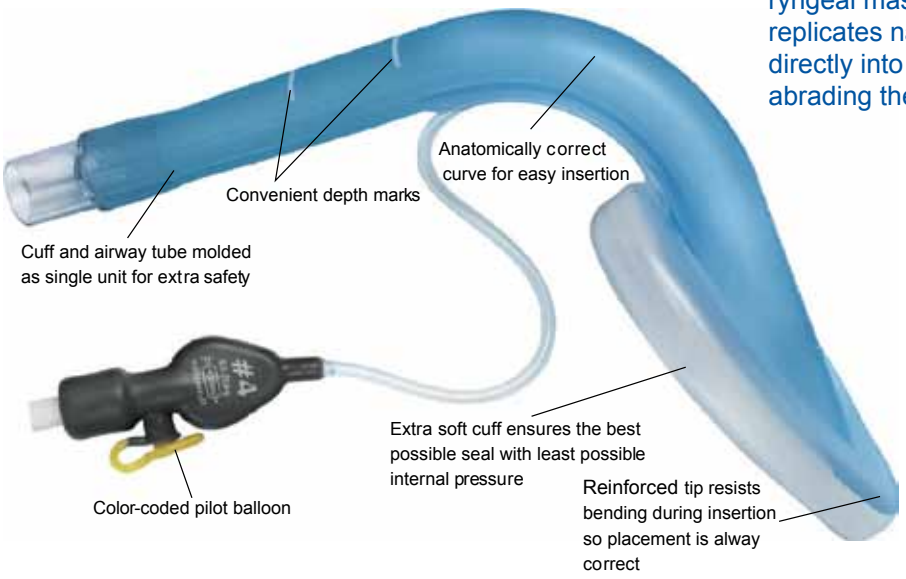
c. Alternative non-invasive approaches to difficult intubation include (but are not limited to): use of different laryngoscope blades, LMA as an intubation conduit (with or without fiberoptic guidance), fiberoptic intubation, intubating stylet or tube changer, light wand, retrograde intubation, and blind oral or nasal intubation.

d. Consider re-preparation of the patient for awake intubation or canceling surgery.

e. Options for emergency non-invasive airway ventilation include (but are not limited to): rigid bronchoscope, esophageal-tracheal combitube ventilation, or transtracheal jet ventilation.

Reusable Laryngeal Mask

Ambu AURA 40™ Reusable Laryngeal Masks



The Ambu® Aura40™ is the world's first reusable laryngeal mask to feature a built-in curve that carefully replicates natural human anatomy. This curve is molded directly into the tube so correct insertion is easy without abrading the upper airway.

Order #	Size
LMR-326-100	1
LMR-326-150	1.5
LMR-326-200	2
LMR-326-250	2.5
LMR-326-300	3
LMR-326-400	4
LMR-326-500	5
LMR-326-600	6

Latex Free and MRI Compatible

Ambu Aura 40™ Standard Reusable Laryngeal Masks

Order #	Size
LMR-340-100	Size 1
LMR-340-150	Size 1.5
LMR-340-200	Size 2
LMR-340-250	Size 2.5
LMR-340-300	Size 3
LMR-340-400	Size 4
LMR-340-500	Size 5
LMR-340-600	Size 6

- Standard shape tube version
- Reusable silicone—ease of use and cleaning
- Fully Autoclavable at 135˚ C for 40 uses
- Clearly marked guidelines for easy insertion, cuff inflation volume and patient weight on tube
- Latex Free and MRI Compatible

"Intubating" Laryngeal Mask

The disposable Aura-i™ is latest innovation in laryngeal masks from Ambu. The Aura-i is pre-formed to follow the anatomy of the human airway with a soft rounded curve that ensures fast and easy placement and guarantees long-term performance with minimal patient trauma. The airway tube is designed to allow easy passage of an appropriately sized ET-tube. 8 sizes. Latex free

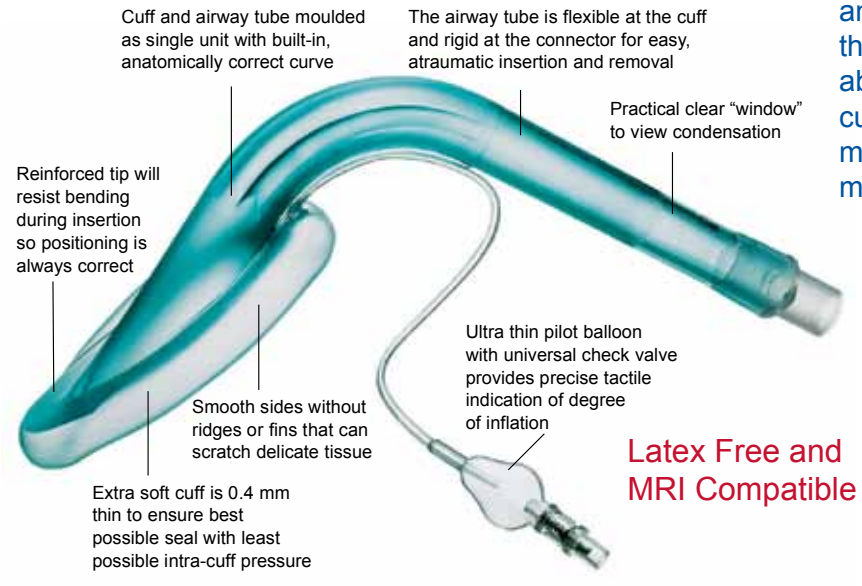
- Built-in anatomically correct curve for easy atraumatic insertion
- Intubating capability using standard ET-tubes
- Convenient depth marks for monitoring correct position
- Navigation marks for guiding Fiber/Videoscope

Full Box of 10

Order #	Size
LMI-329-100	Size 1
LMI-329-150	Size 1.5
LMI-329-200	Size 2
LMI-329-250	Size 2.5
LMI-329-300	Size 3
LMI-329-400	Size 4
LMI-329-500	Size 5
LMI-329-600	Size 6

Disposable Laryngeal Mask

Ambu AURA Once™ Disposable Laryngeal Masks



Latex Free and MRI Compatible

This Laryngeal Mask features a special curve that carefully replicates natural human anatomy. The curve is molded directly into the tube so that insertion is easy, without abrading the upper airway. Moreover, the curve ensures that the patient's head remains in a natural, supine position when the mask is in use.

Order #	Size
LM321-100	1
LM321-150	1.5
LM321-200	2
LM321-250	2.5
LM321-300	3
LM321-400	4
LM321-500	5
LM321-600	6

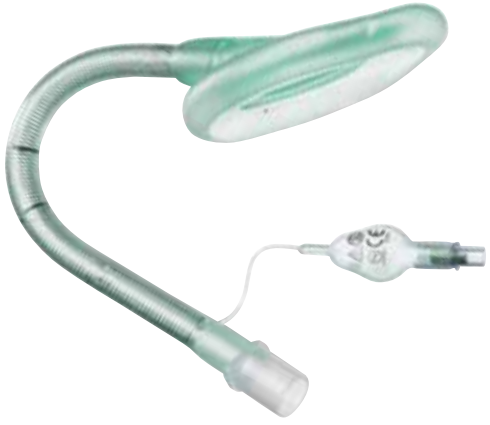
Aura Once™ Standard Disposable Laryngeal Masks

Order #	Size
LM-324-100	Size 1
LM-324-150	Size 1.5
LM-324-200	Size 2
LM-324-250	Size 2.5
LM-324-300	Size 3
LM-324-400	Size 4
LM-324-500	Size 5
LM-324-600	Size 6

- Standard shape tube version
- Single Use—Disposable, Sterile
- Clearly marked guidelines for easy insertion, cuff inflation volume, and patient weight on pilot balloon
- Latex Free and MRI Compatible

Flexible Laryngeal Mask

Ambu® AuraFlex



Ambu Auraflex is a disposable, flexible laryngeal mask which is specially designed for ENT, ophthalmic, dental and other head and neck surgeries.

Size	Full Box of 10	Half Box of 5
2	LMF-327-200	LMF-327-200H
2 1/2	LMF-327-250	LMF-327-250H
3	LMF-327-300	LMF-327-300H
4	LMF-327-400	LMF-327-400H
5	LMF-327-500	LMF-327-500H
6	LMF-327-600	LMF-327-600H

2 Anesthesia Gas Machine

Anesthesia Apparatus Checkout Recommendations, 19931

This checkout, or a reasonable equivalent, should be conducted before administration of anesthesia. These recommendations are only valid for an anesthesia system that conforms to current and relevant standards and includes an ascending bellows ventilator and at least the following monitors: capnograph, pulse oximeter, oxygen analyzer, respiratory volume monitor (spirometer) and breathing system pressure monitor with high and low pressure alarms. This is a guideline which users are encouraged to modify to accommodate differences in equipment design and variations in local clinical practice. Such local modifications should have appropriate peer review. Users should refer to the operator's manual for the manufacturer's specific procedures and precautions, especially the manufacturer's low pressure leak test (step #5).

Emergency Ventilation Equipment

*1. **Verify Backup Ventilation Equipment is Available & Functioning**

High Pressure System

*2. **Check Oxygen Cylinder Supply**
   a. Open 02 cylinder and verify at least half full (about 1000 psi).
   b. Close cylinder.

*3. Check Central Pipeline Supplies
   a. Check that hoses are connected and pipeline gauges read about 50 psi.

Low Pressure Systems

*4. **Check Initial Status of Low Pressure System**
   a. Close flow control valves and turn vaporizers off.
   b. Check fill level and tighten vaporizers' filler caps.

*5. **Perform Leak Check of Machine Low Pressure System**
   a. Verify that the machine master switch and flow control valves are OFF.
   b. Attach "Suction Bulb" to common Fresh gas outlet.
   c. Squeeze bulb repeatedly until fully collapsed.
   d. Verify bulb stays fully collapsed for at least 10 seconds.
   e. Open one vaporizer at a time and repeat 'c' and 'd' as above.
   f. Remove suction bulb, and reconnect fresh gas hose.

*6. **Turn On Machine Master Switch and all other necessary electrical equipment.**

*7. **Test Flowmeters**
   a. Adjust flow of all gases through their full range, checking for smooth operation of floats and undamaged flowtubes.
   b. Attempt to create a hypoxic 02/N20 mixture and verify correct changes in flow and/or alarm.

Scavenging System

*8. **Adjust and Check Scavenging System**
   a. Ensure proper connections between the scavenging system and both APL (pop-off) valve and ventilator relief valve.
   b. Adjust waste gas vacuum (if possible).
   c. Fully open APL valve and occlude Y-piece.
   d. With minimum 02 flow, allow scavenger reservoir bag to collapse completely and verify that absorber pressure gauge reads about zero.
   e. With the 02 flush activated allow the scavenger reservoir bag to distend fully, and then verify that absorber pressure gauge reads <10 cm H20.

Breathing System

*9. **Calibrate 02 Monitor**
   a. Ensure monitor reads 21% in room air.
   b. Verify low 02 alarm is enabled and functioning.
   c. Reinstall sensor in circuit and flush breathing system with 02.
   d. Verify that monitor now reads greater than 90%.

10. **Check Initial Status of Breathing System**
    a. Set selector switch to “Bag” mode.
    b. Check that breathing circuit is complete, undamaged and unobstructed.
    c. Verify that C02 absorbent is adequate.
    d. Install breathing circuit accessory equipment (e.g. humidifier, PEEP valve) to be used during the case.

11. **Perform Leak Check of the Breathing System**
    a. Set all gas flows to zero (or minimum).
    b. Close APL (pop-off) valve and occlude Y-piece.
    c. Pressurize breathing system to about 30 cm H20 with 02 flush.
    d. Ensure that pressure remains fixed for at least 10 seconds.
    e. Open APL (Pop-off) valve and ensure that pressure decreases.

Manual and Automatic Ventilation Systems

12. **Test Ventilation Systems and Unidirectional Valves**
    a. Place a second breathing bag on Y-piece.
    b. Set appropriate ventilator parameters for next patient.
    c. Switch to automatic ventilation (Ventilator) mode.
    d. Fill bellows and breathing bag with 02 flush and then turn ventilator ON.
    e. Set 02 flow to minimum, other gas flows to zero.
    f. Verify that during inspiration bellows delivers appropriate tidal volume and that during expiration bellows fills completely.
    g. Set fresh gas flow to about 5 L/min.
    h. Verify that the ventilator bellows and simulated lungs fill and empty appropriately without sustained pressure at end expiration.
    i. Check for proper action of unidirectional valves.
    j. Exercise breathing circuit accessories to ensure proper function.
    k. Turn ventilator OFF and switch to manual ventilation (Bag/APL) mode.
    l. Ventilate manually and assure inflation and deflation of artificial lungs and appropriate feel of system resistance and compliance.
    m. Remove second breathing bag from Y-piece.

Monitors

13. **Check, Calibrate and/or Set Alarm Limits of all Monitors**

Capnometer	Pulse Oximeter
Oxygen Analyzer	Respiratory Volume Monitor (Spirometer)

Pressure Monitor with High and Low Airway Alarms

Final Position

14. **Check Final Status of Machine**
    a. Vaporizers off
    b. AFL valve open
    c. Selector switch to “Bag”
    d. All flowmeters to zero
    e. Patient suction level adequate
    f. Breathing system ready to use

* If an anesthesia provider uses the same machine in successive cases, these steps need not be repeated or may be abbreviated after the initial checkout.

1 http://www.fda.gov/cdrh/humfac/anesckot.html

SHARN Anesthesia selection of oxygen sensors fulfills virtually any customer application. The standard (alkaline-based) sensors meet or exceed OEM specifications for respiratory applications.

Anesthesia

JB-1 Replacement Sensor for **Datex Ohmeda™** 4700 Oxicap, 5250 RGM Modulus & Excel Series, 5120 O2 Monitor, Fabius
12 month warranty.

Long Life!

JB-8 Extra-life Replacement Sensor for **Datex Ohmeda™** Modulus & Excel Series, 5120 O2 Monitor, Fabius 24 month warranty

JB-10 Replacement Sensor for **Datex™ - Ohmeda Aestiva** 7900 series Smartvent and Inovent 12 month warranty

Long Life!

JB-2 Extra-life Replacement Sensor for **Narkomed™** Series 24 mo warranty

JB-11 Dual cathode replacement Sensor for **Narkomed™** Series 12 month warranty

MAX-23 Replacement Sensor for **CSI/Criticare** 100 Series, Poet monitors. 12 month

Respiratory

MAX-3 Replacement for Paragon Platinum SC430 and Penlon Prima SP2.
12 month warranty

MAX-9 Extra-life Replacement Sensor for **Hudson**: 5500, 5590, 5577, 6477
14 month warranty.

JB-12 Replacement Sensor for **Siemens** 900C and 300 series, **Hamilton** Galileo, Raphael, Arabella, **Datascope**
14 month warranty.

MAX-13 Extra-life Sensor for **MSA:** MiniOx: I, II, III, 3000; **Puritan Benett** 7200, 7820; Bird: 6400, 8400, **Datascope** Anestar 5
14 month warranty.

MAX-16 Extra-life Sensor for P-B 840, 860, 740 (24 mos) and **Versamed** i-Vent
18 month warranty.

MAX-17 O2 Sensor for **Hudson, Teledyne** T-7, TED60T, TED191, TED200T7 (phone jack) 12 month warranty.

MAX-18 Replacement Sensor for **Hudson** 5568. 12 month warranty.

MAX-43 Replacement Sensor for **GE (Ohmeda)** Giraffe. PKG of 2
12 month warranty.

Max-250 Series sensors use a patented weak-acid based technology to provide a more stable signal, longer sensor life, and withstand high levels of CO_2, CO and other acidic gases. The Max-250 series sensors are also known for their superior performance in high humidity applications.

MAX-250E Sensor for **MAXTEC** MaxO2/ MaxO2+. 24 month warranty.

MAX-250ESF Replacement Sensor for **MAXTEC**, most models. 24 month warranty.

MAX-13-250 LONG-life O2 Sensor for **MSA: MiniOx**I, II, III, 3000; **Puritan Benett (Mallinckrodt)** 7200, 7820; Bird: 6400, 8400
24 month warranty

3 Bariatric Patients

Bariatric Patients

According to the 2003-2004 National Health and Nutrition Examination Survey, an estimated 66.2% of U.S. adults age 20 and older are now classified as “overweight or obese.” This means there are more than 127 million overweight adults, 66 million obese adults, and 9 million morbidly obese adults in the U.S. Body Mass Index is the commonly accepted formula for determining obesity. To calculate BMI divide weight in pounds by height in inches.

Underweight	<20
Healthy Weight	20 – 24.9
Overweight	25 - 29.9
Obese	30 – 40
Morbidly obese	40+

The Center for Disease Control and Prevention predict that the number of obese adults will more than double in the next five years in the U.S. to reach an estimated 168 million. The U.S. currently has the largest obese population in the world although the numbers of obese are increasing in other industrialized nations as well.

With this increase in obesity, health care providers are more and more frequently faced with planning care for larger, heavier patients. This special population can predispose caregivers to injury. Failure to provide adequate patient activity and mobility leads to issues of patient safety and challenges to nurses.

Obesity affects every organ of the body and is associated with an increased risk for many diseases, including diabetes, sleep apnea, hypertension, coronary heart disease, cardiomyopathy, osteoarthritis, soft tissue infection, some cancers and impaired circulation. Lungs and other organs do not increase in size as the patient becomes obese. Abnormal diaphragm position, upper airway resistance, and increased daily CO2 production exacerbate respiratory load and further increase the work of breathing. This results in decreased vital capacity and tidal volume which compromises tissue oxygenation.

Obesity is strongly correlated with obstructive sleep apnea syndrome, a condition characterized by repetitive partial or complete obstruction of the upper airway that is associated with arterial blood oxygen desaturations and arousals from sleep. A decreased respiratory rate and ultimately periods of apnea occur frequently, with resultant self-limited periods of severe hypoxia.

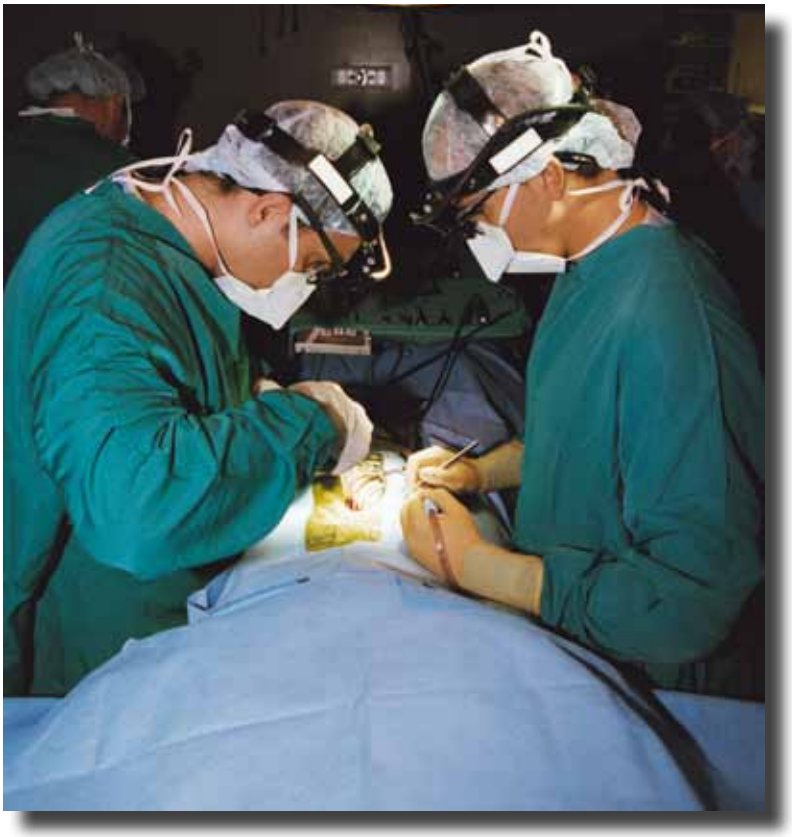
A morbidly obese patient’s heart is frequently stressed by the strain of supplying oxygenated blood to all the tissues. The pathology of cardiovascular disease related to obesity involves an increase in both preload and afterload. Approximately 3 ml of blood volume are needed per 100 g of adipose tissue. As BMI increases so does circulating blood volume. Increased blood volume increases preload, stroke volume, cardiac output and myocardial work. Elevated circulating concentrations of catecholamines, mineralocorticoids, renin and aldosterone serve to increase afterload. Hyperkinesia, myocardial hypertrophy, decreased compliance, diastolic disfunction and eventually ventricular failure ensue.

The diastolic disfunction characteristic of obesity results in poor fluid tolerance. A pulmonary artery catheter may be useful in obese patients who require large volume fluid resuscitation. Noninvasive blood pressure monitoring by cuff sphygmomanometer is often inaccurate due to size discrepancy. Therefore, an in-dwelling arterial catheter should be employed when hemodynamic stability is in question.

Obesity also makes it very difficult to move and position a patient properly.
Patient positioning is a key component of surgical procedures and, if not executed correctly, there can be serious complications for the patient and negative effects to the outcome of the surgery can result. Proper patient positioning can reduce the risk of unwanted conditions such as ulcers, pressure sores, nerve damage, excess bleeding, breathing difficulties and skin breakdown.

Special equipment is necessary for the care of the obese patient. Wheelchairs, beds, and bathroom facilities need heavy duty equipment to accommodate the obese patient.

Pressure-induced rhabdomyolysis is a rare but well-described postoperative complication that results from prolonged, unrelieved pressure to muscle during surgery. Major risks included prolonged operative time and obesity. Prevention of rhabdomyolysis and related complications includes attention to padding and positioning on the operating table, minimization of operative time, and maintenance of a high index of suspicion postoperatively. Patients suspected of having rhabdomyolisis should be monitored in the ICU.



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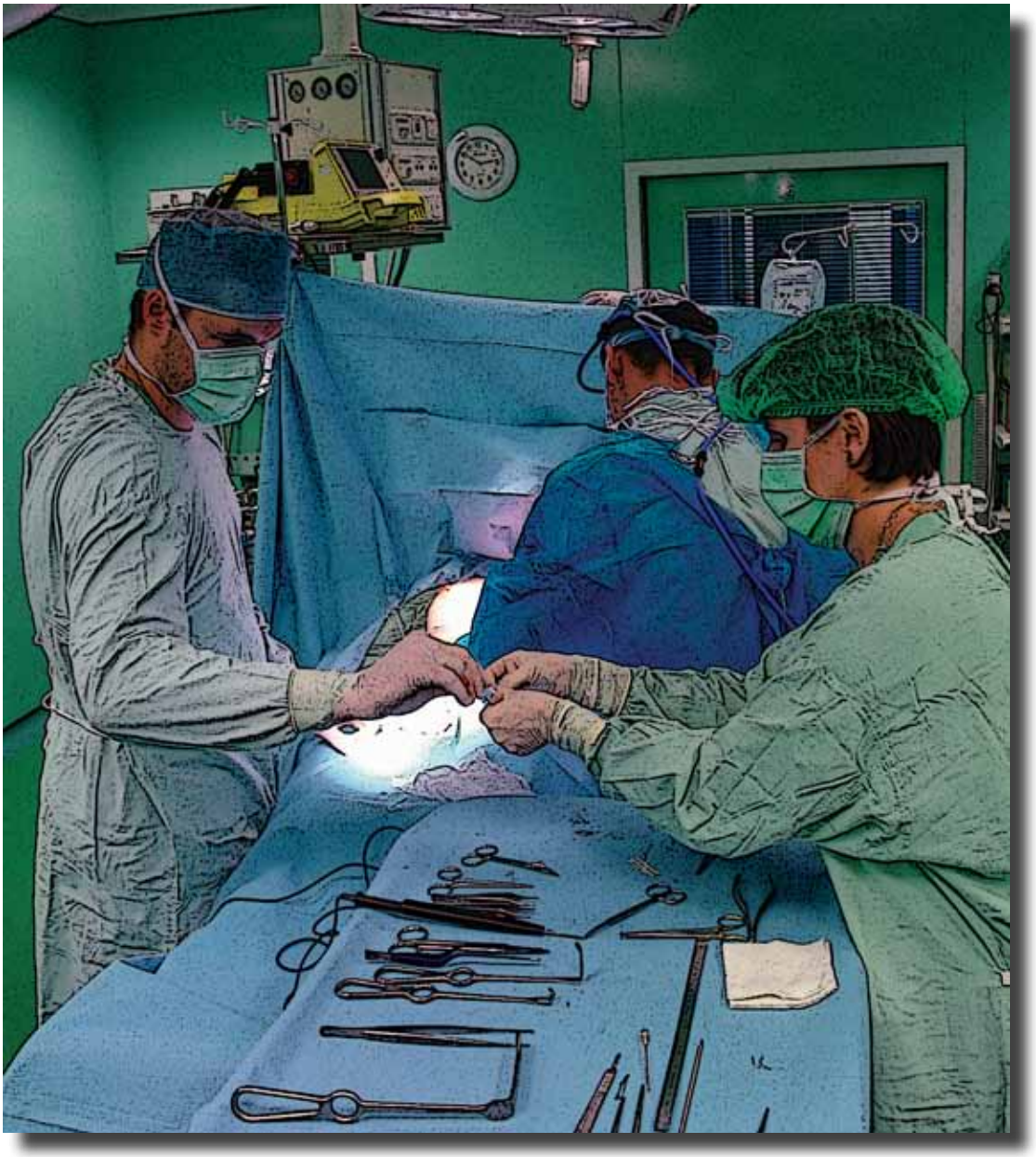

Positioning Products

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Disposable Foam Latex Free

Adult Head Cradle
PPD-40400
8”L x 9”W x 4”H
cut-out 4.375” x 4.75”
box of 16

Slotted Adult Positioner
PPD-30-113
8”L x 8.5”W x 4.5”H
cut-out 6” x 3”
box of 24

Head Rest with ET Slit
PPD-40438
10.75”L x 9.5”W x 6”H
cut-out 6.75’’ x 5”
box of 6

Adult Head Cradle
PPD-30-105
8”L x 9”W x 4”H
cut-out 4.75” x 4.75”
box of 24

Headrest-ET slit & memory foam
PPD-30-106-RL-H
11”L x 9”W x 6”H
cut-out 6.75” x 5”
box of 12

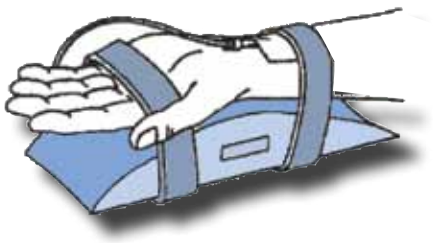
Headrest-ET slit
PPD-30-117-H
10.5”L x 9.5”W x 6”H
cut-out 6.25” x 6”
box of 12

Multi-Ring Head Rest
PPD-30-122
9” - 7.5”-5.5” with 3” center
box of 24

Ulnar Nerve Protector
PPD-30-111
8”L x 9”W x 4”H
box of 36

Armboard Pads
18”L x 9”W x 2”H
PPD-30-107
24box

20”L x 6”W x 2”H
PPD-30-108
24 box r



PPD-175 Art Line Positioner
box of 12

Dale Bendable ArmBoard
PPD-AB650 Adult 9 x 4” 10 bx
PPD-AB651 Child 5 x 3” 10 bx
PPD-AB652 Neo 4 x 1” 10 bx

Positioning Straps
PPD-52001 Arm 1.5”X32”
50/each
PPD-52023 Knee & Body 3”X60”
16/pair

Gel Positioning Products Latex Free

Donut Head Pad:

PPG-H2000	Adult	8.0” diam x 3.0” c x 1.75” h
PPG-H2015	Bariatric	8.0” diam x 3.0” c x 3.0” h
PPG-H2004	Pedi	5.5” diam” x 2.25” c x 1.25” h
PPG-H2005	Neo	3.25” diam” x 1.5” c x .75” h

Horseshoe Head Pad:

PPG-H2007	Adult	8.0” diam x 3.0” c x 1.75” h
PPG-H2012	Bariatric	8.0” diam x 3.0” c x 3.0” h
PPG-H2009	Pedi	5.5” diam” x 2.25” c x 1.25” h
PPG-H2008	Neo	3.25” diam” x 1.5” c x .75” h

Contoured Head Positioner
(use prone or supine)
PPG-H2010-11
11”L x 9”W x 6” H

Richards Style Head Positioner
(use lateral or supine)
PPG-H2021
8” L X 9” W X 3” H

Ophthalmic Head Rest
PPG-2020H
12” L X 10” W X 3.875” H

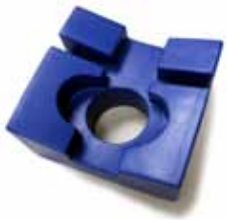
Ulnar Brachial Protector
PPG-5011A
18” L X 13” W X .25” H

Oval Ulnar
PPG-5012
15.75” L X 6” W X .5” H

Elbow pad
PPG-5025
3.25” OD X 1.5” X .75”

Re-Posable Positioning Products Latex Free





Item #	Description	Qty
PPD-53005	Pediatric 5.5 inch diameter ring	24
PPD-53007	7 inch diameter ring	24
PPD-53009	9 inch diameter ring	24
PPD-LC250	Light Cloud™ “doughy” foam”	1
PPD-LC300	Light Cloud™ “doughy” foam”	3
PPD-53030	Slotted Adult Head Positioner	18
PPD-53048	Convoluted Arm Board Pad 20”x8”x2”	18
PPD-53110	Convoluted Ulnar Nerve Protector	18
PPD-53210	Convoluted Foot and Heel Protector	12
PPD-53194	19 inch x 4 inch x 4 inch Bolster	12


The P3 Postioning Pillow Latex Free

The P^3 has proven effective in reducing pressure to the face during procedures requiring the prone position. It provides increased safety against problems such as blindness. The P's open design allows easy access to endotracheal and other tubing used during surgery and in the ICU, as well as a clear view of the patient's face. The open end of the U-shape can be pointed in a left or right direction, for convenient positioning of anesthesia equipment.



Order #	Description	Qty	Size
PP-P3A-1010	Adult	Box of 10	10" W x 12.5" L x 4.5"H
PP-P3P-1020	Pediatric	Case of 20	8" W x 9.25"L x 3.5"H
PP-P3I-1009	Infant	Box of 9	6.75"W x 8"L x 2.75"H

Inflatable Positioner Latex Free

- Infinitely adjustable for positioning and continual pressure relief
- Easy to inflate / deflate and can also be used with tourniquet pump
- Help to reduce ischemia or nerve damage due to compression
- Radiolucent

Order #	Description	Qty
PPE-1505	Shoulder Float	box of 5
PPE-1510	Shoulder Float	box of 10
PPE-1525	Pelvic Tilt	box of 5
PPE-1530	Pelvic Tilt	box of 10
PPE-1605	Delgado Post Cuff	box of 5
PPE-1610	Delgado Post Cuff	box of 10

Peach Clip

Heavy duty clamp is designed to secure drapes to drape stands, IV poles, etc. Can be used for a variety of clamping needs. Washable, does not rust.
Size: 1-7/8" wide x 2-3/4" long

Order #	Description	Qty
PP-JPC-3NS	Heavy duty clamp	8 pkg.
PP-JPC-3NSB	Big Pack	16 pkg.

4 Breathing Circuits

BREATHING CIRCUITS 1

The hospital pipeline is the primary gas source at 50 psi, which is the normal working pressure of most machines. Oxygen is supplied from cylinders at around 2000 psi (regulated to approximately 45 psi after it enters the machine).

Tubing sizes – scavenger 19 or 30mm, ETT or common gas outlet (CGO) 15mm, breathing circuits 22mm.

Oxygen has five "tasks" in the anesthesia gas machine; it powers the

1. Ventilator driving gas
2. Flush valve
3. Oxygen pressure failure alarm
4. Oxygen pressure sensor shut-off valve ("fail-safe")
5. Flowmeters

Delivery System: Breathing Circuits – Circle System

The circle is the most popular breathing system in the U.S. It cleanses carbon dioxide from the patient's exhalations chemically, which allows re-breathing of all other exhaled gases (a unique breathing arrangement in medicine, but used extensively in other environments; i.e., space, submarine).

Circle components:

- Fresh gas inflow source
- Inspiratory and expiratory unidirectional valves
- Inspiratory and expiratory corrugated tubing
- Y connector
- Overflow (called pop-off, adjustable pressure-limiting value, or APL valve)
- Reservoir bag
- Carbon dioxide absorbent canister and granules

Resistance of circle systems is less than 3 cm H2O (less than the resistance imposed by the endotracheal tube). **Dead space** is increased (by all respiratory apparatus). VD/VT = 0.33 normally, 0.46 if intubated, and 0.65 if mask case. **Mechanical dead space** ends at the point where inspired and expired gas streams diverge (the Y-connector).

How is the "best" FGF determined?

The fresh gas flow used determines not just FIO2, but also the speed with which you can change the composition of gases in the breathing circuit.

- 4L/min is common; a legacy from days when a safety margin was needed for flowmeters and vaporizers which were much less accurate.
- A circle at 1-1.5 times VE is essentially a non-rebreather (5-8L/min for an adult). FGF should be this high during pre-oxygenation and induction (allows wash-in) and emergency (washout).
- Low flows (0.5-2L/min total FGF) should beused during maintenance to conserve tracheal heat and humidity, and economize on volatile agents.
  - Don't use less than 1 L/min FGF with sevoflurane for more than 2 MAC-hours. The package insert (revised late 1997) advises against it, as lower flows accelerate Compound A formation.

Circle advantages:

- Constant inspired concentrations
- Conserve respiratory heat and humidity
- Useful for all ages (may use down to 10 kg, about one year of age, or less with a pediatric disposable circuit)
- Useful for closed system or low-flow, low resistance (less than tracheal tube, but more than a NRB circuit)

Circle disadvantages:

- Increased dead space
- Malfunctions of unidirectional valves

What should you do if you lose oxygen pipeline pressure?

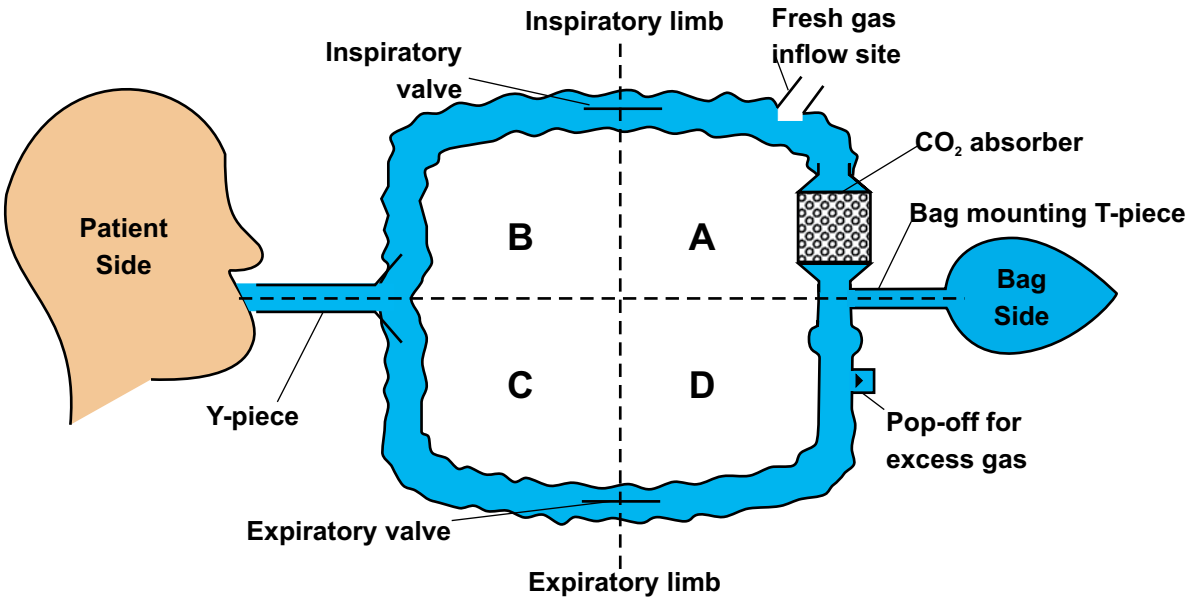
1. Open the emergency oxygen cylinder fully (not just the three or four quick turns used for checking).

2. Disconnect the pipeline connection at the wall.
   - Why? Something is wrong with the oxygen pipeline.
   - What if the supply problem evolves into a non-oxygen gas in the oxygen pipeline? If so, it will flow (pipeline pressure 50 psi) rather than your oxygen cylinder source (down-regulated to 45 psi).

- If you are lucky, the oxygen alarm will sound to warn you of the change (you do set your alarms, don't you?).
- If for some reason the oxygen analyzer does not warn of the crossover, the pulse oximeter will, but only after the oxygen has been washed out by ventilation from the patient's functional residual capacity and vessel-rich group.
  - So disconnect the pipeline connection at the wall if oxygen pipeline pressure is lost. It's also easier to remember one strategy which works for any problem with the pipeline, than to remember that sometimes you must, and sometimes it is optional, to disconnect. And use that oxygen analyzer always!

3. Ventilate by hand rather than with the mechanical ventilator (which uses cylinder oxygen for the driving gas if the pipeline is unavailable.).

1 Michael P. Dosch CRNA MS, University of Detroit Mercy Graduate Program in Nurse Anesthesiology, Pontiac MI, *"The Anesthesia Gas Machine, Vaporizers, Compressed Gases, Safety: Avoiding the Pitfalls,"* May 2000



Anesthesia Breathing Circuits

Choose from a wide variety of adult and pediatric circuits. All are Latex-Free.

Custom kits are available for orders of 5 or more cases at a time. Ask your SHARN representative for more information.

Custom Circuit Kits Available, Ask for a quote!		Size (exp = expandable)	Gas Sample Elbow	Parallel Wye	Gas Sample Line (10', m/m)	Bacterial / Viral Filter	Mask	Latex Free Bag		Qty/ Cs
Adult Dual Limb										
BC-	15207U	40"	✓	✓	✓		M Adlt	3 L		20
BC-	15208U	60"	✓	✓	✓		M Adlt	3 L		20
BC-	601013-1-30	60"	✓	✓		1		3 L		20
BC-	B6C112C0A5	60"	✓	✓	✓	1	M Adlt	3 L		20
BC-	721003-1-30	72"	✓	✓				3 L		20
BC-	72F1013-1-30	72" exp	✓	✓		1		3 L		20
BC-	B7F112C0A5	72" exp	✓	✓	✓	1	M Adlt	3 L		20
BC-	B7F110C005	72" exp	✓	✓			M Adlt	3 L		20
Adult Single Limb										
BC-	N6A112C0A0	60"	✓		✓	1		3 L		15
BC-	N7A112C0A5	72"	✓		✓	1	M Adlt	3 L		20
Pediatric Dual Limb										
BC-	B5C412A0B0	36"	✓	✓	✓	1		1 L		20
BC-	72F1411-1-30	72" exp	✓	✓		1		1 L		20

** Prices subject to change.*

5 Capnography

Making the Case for Capnography

By: Pat Carroll, RN, C, CEN, RRT, MS

Clinicians have a comfort level with pulse oximetry. Remember what saturation is – it tells you what percent of the hemoglobin binding sites are filled. However, pulse oximetry cannot determine which molecules are occupying those binding sites. For example, if you're taking care of a firefighter who's had smoke inhalation, a third of his binding sites may be filled with carbon monoxide, while two-thirds are filled with oxygen. Yet, the pulse oximeter will read 99% because all of the sites are filled with something. Thus, pulse oximetry will not provide useful information about oxygenation in patients with significant carbon monoxide levels in their blood.

Even if you use the most sophisticated pulse oximetry technology to accurately assess oxygenation, you will not be measuring the other half of respiration – which is ventilation. That's where capnography comes in.

Remember that air flow or ventilation depends on three factors: a stimulus from the brain to breathe, a response from the respiratory muscles, and patent airways. When cardiac output is stable, as it is with most non-critically ill patients, capnography readings reflect ventilation.

Capnography measures exhaled carbon dioxide levels. Three things must happen in order for carbon dioxide to be exhaled. First, there must be adequate blood flow to carry CO2 from the tissues to the lungs; second, the gas must diffuse across the alveolar-capillary membrane; and third, the air must then be able to leave the lungs.

The American College of Emergency Physicians, the National Association of EMS Physicians, and the ACLS standards all require measuring exhaled carbon dioxide to assure proper tube placement in intubated patients.

Capnography gives you a more comprehensive picture of your patient's respiratory status – much more than you'll ever get using pulse oximetry alone. The tracings represent each breath a patient exhales. Thus, if apnea occurs, no gas will be exhaled, and the monitor will show a flat line. You'll get a much earlier warning of severe hypoventilation or apnea – in seconds -- than you would ever get with pulse oximetry, which takes minutes to respond.

The beauty of this technology is that it can be used on patients without artificial airways, and it's so simple to use. The patient interface looks like a nasal cannula. All you have to do it place it on the patient's face, attach the tubing, and you're ready to go. You'll get both a digital display of the exhaled carbon dioxide and a waveform display. Don't worry about learning to interpret waveforms – you can start with a few simple principles, and refine your interpretation as you gain experience. If you can read an ECG tracing, you won't have any trouble with capnography.

Since you're monitoring every breath, you'll immediately know if a patient's breathing slows or stops completely. If you're administering oxygen and other medications, you'll have an objective measurement to see if the patient's condition is improving with treatment.

You could use a disposable device that changes color when carbon dioxide is present. But that's only a one-shot assessment. It's safer to monitor exhaled CO2 breath-to-breath so you know the tube stays in the right place. Capnography will instantly identify accidental extubation -- particularly during repositioning and transfers.

In the past ten years, procedural sedation has moved out of the operating room and into both in- and out-patient settings. The challenge with procedural sedation is that it's a balancing act – you want the patient adequately sedated, but not too deep. Since everyone responds to drugs differently, you have to administer a dose, assess the patient and then titrate from there. This type of patient management requires undivided atten-

tion – in fact, the American Nurses Association guidelines state the registered nurse administering drugs and monitoring a sedated patient must have no other responsibilities.

All medications used for procedural sedation have the potential to depress respirations. But it's impossible to assess whether respirations are adequate to remove carbon dioxide by simply looking at a patient. It's even tougher when a patient is positioned for a procedure, covered with drapes, and often in a room that's darkened during the procedure. Without monitoring technology, it's also easy to misinterpret signals from a patient.

For example, a study of patients undergoing endoscopy in a GI lab revealed that restless patients were medicated, assuming they were uncomfortable. But it turned out the restlessness occurred after patients had been apneic, and they moved when they started breathing again! Twenty-one times, patients got more sedation within 2 minutes of being apneic!

This study also compared the sensitivity of capnography and pulse oximetry technology when it came to detecting apnea in sedated patients. Researchers discovered that capnography identified every apnea episode. Pulse oximetry changed enough to alert the clinician 37% of the time in patients who were not receiving oxygen. When patients were getting just a couple of liters of oxygen by a nasal cannula during sedation, apnea was detected by pulse oximetry just 7 percent of the time.

Whether you're sedating patients in an office setting, a diagnostic procedure center, the ED, or in the hospital, your patients will be far safer if you use the best technology – capnography and pulse oximetry together – to monitor vital respiratory functions of both ventilation and oxygenation.

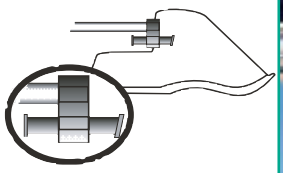
If you are using only pulse oximetry to evaluate your patients' respirations, you are only getting half the picture.

Capnoxygen™ EtCO2/O2 Sampling Mask

The Capnoxygen Mask is a consistent means to monitor breathing of a non-intubated patient, allowing sampling of exhaled carbon dioxide from both the mouth and nose while at the same time administering oxygen. It is made from Clear Medical Grade Resin that is Latex Free. The mask is soft and allows form-fitting comfort for the face. The tubing is non-kinkable (star lumen). The design makes it simple and fast to hook up to oxygen. Can be used in any area equipped for Sidestream Monitoring. (female luer accepts male sample line)

- Post Anesthesia Care Units
- Intensive Care Units
- Cardiac Catheter Labs
- Labor & Delivery Units
- Sleep Apnea Clinics
- Endoscopy Units
- Operating Rooms
- Pain Clinics

Order #	Description	Qty
C02-01	Adult Mask	25 units per case
C02-03	Ophthalmic Mask	25 units per case
C02-04	Pediatric Mask	25 units per case



Hauge & Hauge II™ AIRWAY

Bite Block, Airway, CO2 port and O2 port All In One! (for Moderate Sedation)

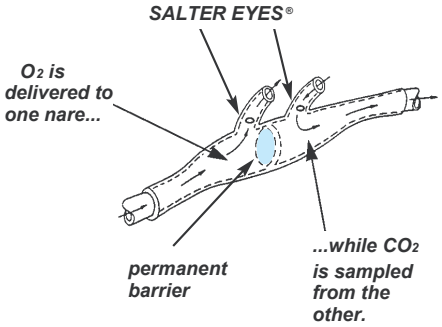
The original Hauge and NEW Hauge II Airways are designed for simplicity and ease of use for most moderate sedation cases. The anatomically correct profile provides an immediate patent airway without stimulating a gag reflex. There is enough width to keep the tongue anterior in the oropharynx to ensure airway patency. The Hauge airways easily accommodate suction catheters and a variety of scopes. Facilitates delivery of high flow O2 orally. Ideal for gastric dilation (ERCP), upper-endoscopies, bronchoscopies and awake intubations.
Kit includes 7' kink-resistant O2 tubing, 7' gas sampling line, 2" female/male adapter, tongue

Latex Free.

Order #	Description
AWH-6587	Hauge original 19mm, medium, kit
AWH-6586	Hauge original 23mm, large, kit
AWH-6595	Hauge II* 25mm, Airway Kit

(*features reduced posterior curvature)

EtCO2 Sampling Nasal Cannulas



Salter Labs Sampling cannula, Divided Cannula & Oral Trac®

The unique divided cannula remains the 'gold standard' among clinicians and is available in a variety of configurations. Latex Free.

Simultaneous O2 delivery with EtCO2 sampling

Adult

COC-4707-25	7' O2 line, 7' CO2 line, male
COC-4707F-25	7' O2 line, 7' CO2 line, female

Pedi

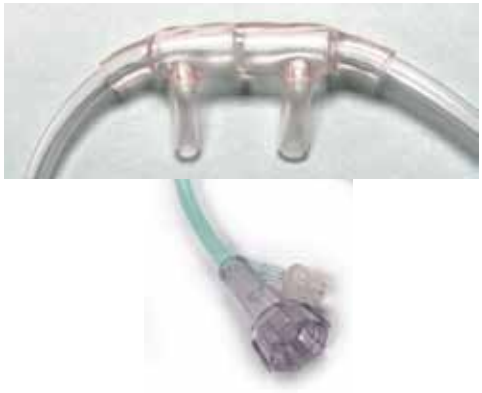
COC-4703-25	7' O2 line, 7' CO2 line, male
COC-4703F-25	7' O2 line, 7' CO2 line, female

OralTrac® with nasal and oral EtCO2 sampling

Adult

COC-4797F-25	7' O2 line, 7' CO2 line, female
COC-4797-25	7' O2 line, 7' CO2 line, male

Also available EtCO2 sampling only



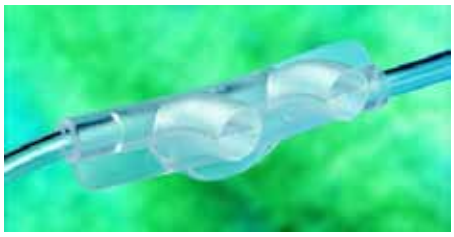
Westmed EtC02/02 Divided Cannulas.

The **Comfort Soft** cannula is lightweight and comfortable and fits all connector Latex Free.

COC-0503	Adult, 7' O2 & CO2 lines, male luer
COC-0504	Adult, 7' O2 & CO2 lines, female luer

Comfort Soft Plus offers a break through material that provides maximum patient comfort and is less likely to slip out of position.

COC-0538	Adult, 10' O2 & CO2 lines, male luer
COC-0539	Adult, 10' O2 & CO2 lines, female luer



Hudson RCI Softech® Bi-Flo® EtCo2 / O2 Cannula

A unique, patented design allows delivery of oxygen to both nasal prongs and sampling of expired gases from both nares simultaneously. Latex Free.

COC-1844	Adult , 7' O2 line, 7' CO2 line, male luer
COC-1845	Adult , 7' O2 line, 7' CO2 line, female luer

MacSafe™ Sampling Cannulas Latex Free.

"Fitsall" connector on the 02 line so it will work even if the "Christmas tree" is missing from 02 flowmeter. It uses both nares and has two ports for delivering 02 as well as two ports for sampling C02.

Order #	Description	Qty
COC-0304	10' 02 line, 7' sampling line, male	25 ea.
COC-0305	10' 02 line, 7' sampling line, female	25 ea.

6 Carbon Dioxide Absorption

CARBON DIOXIDE ABSORPTION

Function – makes re-breathing possible, thus conserving gases and volatile agents, decreasing OR pollution, and avoiding hazards of CO2 re-breathing.

Soda lime-Activator is NaOH or KOH. Silica and kieselguhr added as hardeners.

Indicators for SodasorbTM are colorless when fresh, and purple when exhausted (such as ethyl violet) because of pH changes in the granules.

Soda lime is absolutely incompatible with trichloroethylene (causes production of dichloroacetylene, a cranial neurotoxin and phosgene, a potent pulmonary irritant). Sevoflurane is unstable in soda lime, producing Compound A (lethal at 130-340 ppm, or renal injury at 25-50 ppm in rats; incidence of toxic [hepatic or renal] or lethal effects in millions of humans are comparable to desflurane). Compound A concentrations of 25-50 ppm are easily achievable in normal clinical practice. Sevoflurane is not recommended at total fresh gas flows less than 1 L/min for more than 2 MAC-Hours. Carbon monoxide is produced by (desflurane >= enflurane > isoflurane) >> (halothane = sevoflurane). Worse in dry absorbent, or with baralyme as compared to soda lime. So turn oxygen off at end of case, change absorbent regularly; change if FGF left on over the weekend or overnight, and use low flows.

Amsorb The strong bases (activators NaOH, KOH) have been convincingly implicated in the carbon monoxide problem with the ethyl-methyl ethers, and the generation of Compound A by sevoflurane. Eliminating the activators produces an absorbent, which has equivalent physical characteristics and carbon dioxide absorption efficiency, as compared to soda lime. Amsorb (Armstrong Medical Ltd., Coleraine Northern Ireland) was planned for introduction to the US market in 2000 by Abbott. Read more about Amsorb online, or in Anesthesiology 1999 Nov; 91:1342-8.

Baralyme-activator Ba(OH)2; no hardeners, slightly less efficient. Colorless or pink changing to blue-gray with exhaustion.

Component	Soda Lime	Baralyme	Amsorb
$CA(OH)_2$ %	94	80	83
NaOH %	5	-	-
KOH %	1	6	-
$CACl_2$ % (humectant)	-	-	1
$CaSO_4$ % (hardener)	-	-	1
Polyvinylpyrrolidine % (hardener)	-	-	1
Water Content %	14 – 19	11 – 16 (as octahydrate)	14
$Ba(OH)_2$-8 H_2O %	-	20	-
Size (mesh)	4 – 8	4 – 8	4 – 8
Indicator	Yes	Yes	Yes

To Change Canisters

1. Wear gloves.
2. Loosen clamp.
3. Remove and discard top canister.
4. Promote the bottom canister to the top and put the fresh canister on the bottom.
5. Check for circuit leaks.
6. Always remove wrap before inserting canister.
7. Don't change mid-case; convert to semi-open circuit by increasing FGF to > 5L/min.

Clinical Signs of Exhaustion of Absorber

- Rise (later a fall) in heart rate and blood pressure
- Hyperpnea
- Respiratory acidosis
- Dysrhythmia
- Signs of SNS activation
  - Flushed
  - Cardiac irregularities
  - Sweating
- Increased bleeding at surgical site
- Increased end tidal carbon dioxide
- NOT dark or cherry-red blood!

Caution on Potential Fires with Sevoflurane for Inhalation

FDA Patient Safety News:
Show #23, January 2004

Abbott Laboratories has sent a letter to healthcare professionals about its product Ultane or sevoflurane, a general anesthetic. The letter warns about rare reports of fires or extreme heat in the respiratory circuit of anesthesia machines when this product is used.

Although the exact cause of the fires has not yet been determined, in most cases the CO2 absorbent material used with the Ultane had become desiccated. This may have led to an increased exothermic reaction between the sevoflurane and the absorbent material.

The letter from Abbott provides a number of recommendations to reduce the risk of fires or excessive heat. Let us summarize them.

First, replace the CO2 absorbent if you suspect it's become desiccated because it hasn't been used for a long time.

Turn off the anesthesia machine completely at the end of each clinical use. If the machine is left on, fresh gas continues to flow through it at a low rate, and this may accelerate the drying of the absorbent.

Turn off all vaporizers when not in use.

Before you use a new CO2 absorbent, check the integrity of the packaging.

Periodically monitor the temperature of the CO2 absorbent canisters.

Monitor the correlation between the sevoflurane vaporizer setting and the concentration of the inspired sevoflurane. If you notice an unusually delayed rise or an unexpected decline in the inspired sevoflurane concentration when you compare it to the vaporizer setting, this could indicate that there's excessive heating in the absorbent canister.

And finally, replace CO2 absorbents routinely regardless of what the color indicator shows. The color indicator doesn't necessarily change as a result of dessication.

There's additional important information in Abbott's letter. If you use Ultane, be sure you have a copy. You can get one on our web site, or from Abbott's Medical Information Department, at 1-800-633-9110.

Additional Information:

MedWatch - 2003 Safety Information Alerts
http://www.fda.gov/medwatch/SAFETY/2003/safety03.htm#ultane

CO2 Absorbents

INTERSURGICAL
COMPLETE RESPIRATORY SYSTEMS

Pre-pack Drums 2.2 lb (1kg)

Loose-fill Jerricans 5 liter

IS Can for GE ADU, Avance, Aespire, Aisys

NEW!

Ordering Information:
Pre-pack Drum, 10/ bx
Loose-fill Jerrican, 2/ bx
IS Can for GE, 6/ cs

Intersorb Plus™
Intersorb Plus™ is a conventional soda lime Carbon Dioxide absorbent made of short porous 3mm diameter strands. Contains 3% sodium hyroxide.

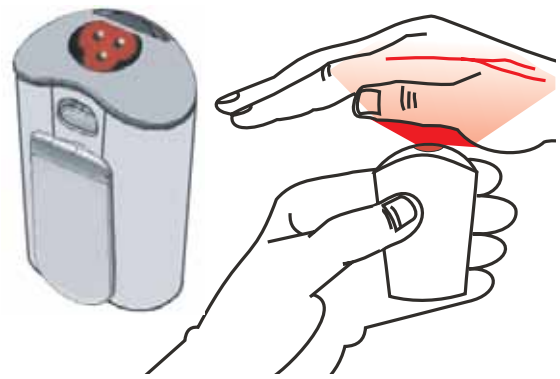
Spherasorb™
Spherasorb™ chemical formulation has been developed specifically to address the use within the medical environment.
- Only 1.5 % Sodium Hydroxide.
- Zeolite to reduce the risk of drying out.
- 3-4mm spheres minimize dust.
- **Lasts 30% longer** than conventional soda lime products. Saves time, saves paperwork & save shipping and waste costs.

Carbolime™ CO2 Absorbents

Granular soda lime absorbent for dependable, efficient CO2 absorbtion. Proportionate mix of calcium hydroxide and a small amount of sodium hydroxide; contains no KOH.

Order #	Description
COA-10005	Carbolime Prepack Canisters 12/case
COA-10006	Carbolime, loose fill bag 12/ case. (1.64L /3lb. each bag)

Vein Locator



The Vein Locator is a portable, battery operated device which uses special lights to trans-illuminate the patient's tissue to highlight veins. Ideal for neonates, pediatric, and frail adult patients, the Vein Locator assists in finding the vein and improves your chance of needing just a single stick. Self-contained, the unit can be cleaned as needed.

Order#	Description	Qty
VL-U	Vein Locator	1 ea.

7 Compressed Gas Cylinder Safety

COMPRESSED GAS CYLINDER SAFETY

Compressed gases present a unique hazard. Depending on the particular gas, there is a potential for simultaneous exposure to both mechanical and chemical hazards.

Gases may be:

- Flammable or combustible
- Explosive
- Corrosive
- Poisonous
- Inert
- Or a combination of hazards

If the gas is flammable, flash points lower than room temperature, compounded by high rates of diffusion, present a danger of fire or explosion. Additional hazards of reactivity and toxicity of the gas, as well as asphyxiation, can be caused by high concentrations of even “harmless” gases, such as nitrogen. Since the gases are contained in heavy, highly pressurized metal containers, the large amount of potential energy resulting from compression of the gas makes the cylinder a potential rocket or fragmentation bomb.

Careful procedures are necessary for handling the various compressed gases, the cylinders containing the compressed gases, regulators or valves used to control gas glow, and the piping used to confine gases during flow.

Identification

Always read the label!! Never rely on the color of the cylinder for identification.

All gas lines leading from a compressed gas supply should be clearly labeled to identify the gas, the laboratory or area served, and the relevant emergency telephone numbers.

The labels should be color coded to distinguish hazardous gases (such as flammable, toxic, or corrosive substances).

Signs should be conspicuously posted in areas where flammable compressed gases are stored, identifying the substances and appropriate precautions (e.g., HYDROGEN – FLAMMABLE GAS – NO SMOKING – NO OPEN FLAMES).

Handling and Use

Gas cylinders must be secured at all times to prevent tipping.

If a leaking cylinder is discovered, move it to a safe place (if it is safe to do so) and inform Environmental Health Services.

Cylinders should be placed with the valve accessible at all times. The main cylinder valve should be closed as soon as it is no longer necessary that it be open (i.e., it should never be left open when the equipment is unattended or not operating).

Cylinders are equipped with either a hand wheel or stem valve. For cylinders equipped with a stem valve, the valve spindle key should remain on the stem while the cylinder is in service. Only wrenches or tools provided by the cylinder supplier should be used to open or close a valve. At no time should pliers be used to open a cylinder valve.

Cylinder valves should be opened slowly. Main cylinder vales should never be opened all the way.

When opening the valve on a cylinder containing an irritating or toxic gas, the user should position the cylinder with the valve pointing away from them and warn those working nearby.

Cylinders containing acetylene should never be stored on their side.

An open flame shall never be used to detect leaks of flammable gases.

Oxygen cylinders, full or empty, shall not be stored in the same vicinity as flammable gases. The proper storage for oxygen cylinders requires that a minimum of 50 feet be maintained between flammable gas cylinders and oxygen cylinders or the storage areas be separated.

Regulators are gas specific and not necessary interchangeable! Always make sure that the regulator and valve fittings are compatible.

After the regulator is attached, the cylinder valve should be opened just enough to indicate pressure on the regulator gauge (no more than one full turn) and all the connections checked with a soap solution for leaks. ***Never use oil or grease on the regulator of a cylinder valve.***

When the cylinder needs to be removed or is empty, all valves shall be closed, the system bled, and the regulator removed. The valve cap shall be replaced, the cylinder clearly marked as "empty," and returned to a storage area for pickup by the supplier.

Empty and full cylinders should be stored in separate areas.

Always use safety glasses (preferably with a face shield) when handling and using compressed gases, especially when connecting and disconnecting compressed gas regulators and lines.

Capacity of Cylinders

Gas	Color US (international)	Service Pressure psi	Capacity L	Pin Position
Oxygen	Green (white)	1900	660	2 – 5
Nitrous Oxide	Blue (blue)	745	1590	3 – 5
Air	Yellow (black & white)	1900	625	1 - 5

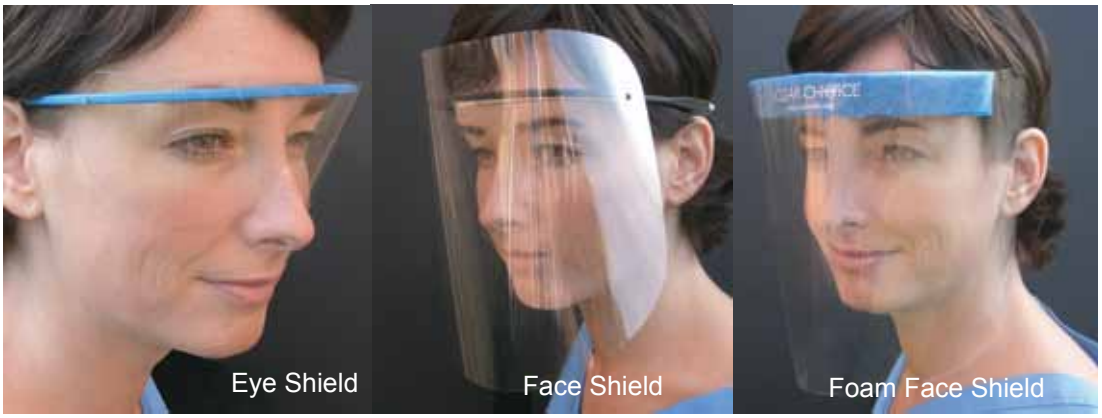
To install:

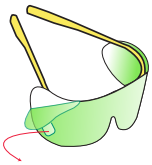
1. Check and remove labels.
2. Hold valve away from face and "crack" valve.
3. Place in hanger yoke.
4. Observe for appropriate pressure and lack of audible leak.

- Leave cylinders on machine closed.
- Don't leave empty cylinder on machine.

Eye & Face Shields

Lightweight and comfortable, the frames are reusable and come in mixed bright colors.
The lenses are disposable - simply pull off a dirty lens and replace it with a new one. Eye & Face Shields fit over eyeglasses comfortably.
Latex Free





Also available with green protective film. Just ask your sales rep. for details.

Eye Shield Folding Frame

Product #	Description	Qty per pkg.
SN1025	Eye Shield Professional Pack (10 frames/25 lenses)	10/25
SDN100	Eye Shield Lenses - Dispenser Pack	100
SF100	Eye Shield Frames - Assorted Colors	100
SLFN100	Eye Shield - Assorted Colors (100 frames/100 lenses)	100/100
SBF100	Eye Shield Folding Frames	100
SBFN1025	Eye Shield Pro Pack (10 folding frames/25 lenses)	10/25
SF1010	Face Shield Professional Pack (10 frames, 10 shields)	10/10
SFS4510	Face Shield lenses	100
SF4510MC	Face Shield Frames	100
SFF3510	Foam Face Shield	40

Splash Shield

Face Protection System with maximum face protection.

- **Anti-fog**
- **Optically Clear**
- **Lightweight for comfort with new SOFT STRAP**
- **Latex Free**
- **13 inch impenetrable foam barrier for wide coverage.**
- **Disposable**
- **Cost efficient**

Full Face Splash Shield

Short Face Splash Shield


Mask with Eye Shield

Order #	Description	Qty
FS4505	Full Face Splash Shield	24/box
FS4511	Short Face Splash Shield	24/box
KV-2505 BA	Mask with Eye Shield (tie)	100/case

8 Conversion Charts

Conversion Charts

mm	inch	french
1.0	0.039	3
1.35	0.053	4
1.67	0.066	5
2.0	0.079	6
2.3	0.092	7
2.7	0.105	8
3.0	0.118	9
3.3	0.131	10
3.7	0.144	11
4.0	0.158	12
4.3	0.17	13
4.7	0.184	14
5.0	0.197	15
5.3	0.21	16
5.7	0.223	17
6.0	0.236	19
6.3	0.249	20
6.7	0.263	21
7.3	0.288	22
8.0	0.315	24
8.7	0.341	26
9.3	0.367	28
10.0	0.393	30
10.7	0.419	32
11.3	0.445	34

lbs	Kg	Estimated Pediatric Weights
30	13.6	**Neonate**
40	18.2	6.6 - 7.7 lbs. = 3 - 3.5 Kg
50	22.7	
60	27.3	**6 months = 2x birth weight**
70	31.8	13.2 - 15.4 lbs. = 6 - 7 Kg
80	36.4	
90	40.9	
100	45.5	**1 year = 3x birth weight**
110	50.0	19.8 - 23.1 lbs. = 9 - 10.5 Kg
120	54.5	
130	59.1	**For 1 - 7 years, add 2 kg/year**
140	63.6	
150	68.2	**For 7 - 12 years, add 3 kg/year**
160	72.7	
170	77.3	
180	81.8	
190	86.4	
200	90.9	
210	95.5	**1 Kg = 2.2 lbs.**
220	100.0	
230	104.5	
240	109.1	
250	113.6	
260	118.2	
270	122.7	
280	127.3	
290	131.8	
300	136.4	

Fiber Optic Laryngoscope

SHARN brings you one of the widest ranges of fiber optic laryngoscope blades and handles available today. Check with us for all of your needs. Below are a few examples.

Basic **GreenLine™** blades are made of lightweight stainless steel and feature a replaceable fiber light bundle. Over 80 profiles available. Compatible with all "green" system handles.
5-year unconditional warranty + lifetime warranty against manufacturer defects.

Super-G German profile blades are crafted of 303/304 surgical stainless steel and feature a large, integrated fiber bundle for easier cleaning. Available in MacIntosh and Miller profiles. (Compare to Heine™ or Propper™)
5-year unconditional warranty + lifetime warranty against manufacturer defects.

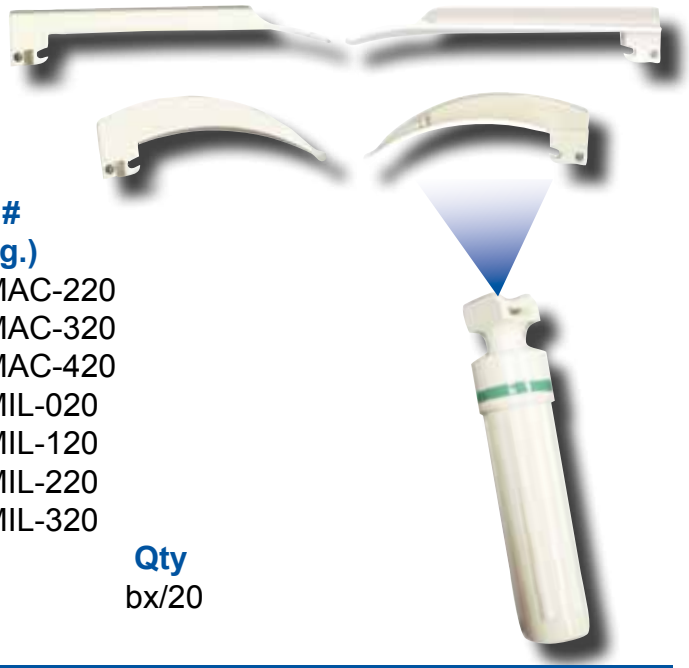
MR

MRI compatable also avialable call for more information!

Disposable Laryngoscope Blades

- Compatible with Green Series reusable handles
- Blades are manufactured of polycarbonate
- Handle features a metal reinforced lock-on assembly

Latex Free



Description	Order # (10/pkg.)	Order # (20/pkg.)
MacIntosh size 2	FDB-MAC-2	FDB-MAC-220
MacIntosh size 3	FDB-MAC-3	FDB-MAC-320
MacIntosh size 4	FDB-MAC-4	FDB-MAC-420
Miller size 0	FDB-MIL-0	FDB-MIL-020
Miller size 1	FDB-MIL-1	FDB-MIL-120
Miller size 2	FDB-MIL-2	FDB-MIL-220
Miller size 3	FDB-MIL-3	FDB-MIL-320

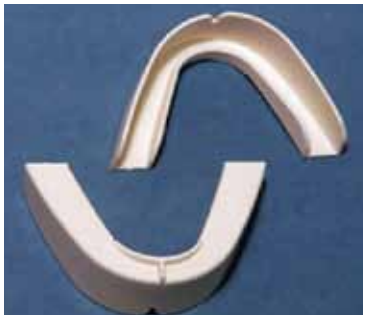
Description	Order #	Qty
Disposable Medium Handle, LED Includes batteries	FDHL-MED20	bx/20

Tooth Protectors

One size.

- Minimize tooth injury • Disposable white plastic • Latex Free

Order #	Description	Qty
TP-1-50	Disposable Tooth Protector	50



Conventional Laryngoscope Blades & Handles

Standard Conventional

- One year unconditional warranty
- Choose chrome plated brass, or waterproof stainless steel handles

- Stainless steel blades
- MacIntosh sizes 0-5
- Miller sizes 00-4
- Over 65 profiles available, including Flex-Tip

All handles are available in Large (D), Medium (C), Penlight (AA) & Stubby (AA)

Call for ordering information: 1-800-325-3671.

Laryngoscope Lamps

For conventional blades

Order #	Description	Qty
LL-4100-10	Frosted, small	10
LL-4100-25	Frosted, small	25
LL-4100-100	Frosted, small	100
LL-4150-10	Frosted, large	10
LL-4150-25	Frosted, large	25
LL-4150-100	Frosted, large	100

Order #	Description	Qty
LL-4100C-10	Clear, small	10
LL-4100C-25	Clear, small	25
LL-4100C-100	Clear, small	100
LL-4150C-10	Clear, large	10
LL-4150C-25	Clear, large	25
LL-4150C-100	Clear, large	100
	Super Bright	5/pk

Shown Actual Size

9 Drugs Used in Anesthesia

Commonly Used Anesthesia Drug Reference

This guide is intended strictly as a general reference and supply list. Information has been compiled from multiple sources, no endorsement of any pharmaceutical company is intended or implied. Not to be used for patient prescribing.
Special thanks to Anesthesia Labels Company for their help.

Generic Name	Trade Name	Primary Supplier
Anesthestics *(Gases)*		
for general anesthesia, provides analgesia, induces sleep, relaxes muscles and provides pain relief		
N_2O	generic	generic
Desflurane	Suprane®	Baxter
Enflurane	Ethrane®	generic
Fluothane	Halothane®	Halocarbon
Isolflurane	Forane®	generic
Sevoflurane	Ultane®, Sevorane®	Abbott, Abbott

The drugs below are shown with the corresponding ASTM Standard Label color for User-applied labels. ASTM Designation D 4774-94

Malignant Hyperthermia Treatment

MH is a rare, potentially fatal syndrome that may be triggered by anesthetic inhalation agents or succynlchoine. Only one known drug, a concentrated muscle relaxant, will reverse this syndrome.

Dantrolene Sodium	Dantrium I. V.®	Proctor and Gamble

Narcotics:		
provide pain relief		
Alfentanil	Alfenta®	Janssen
Fentanyl	Sublimaze®	Akorn
Hydromorphone	Dilaudid®	Knoll Laboratories
Meperidine	Demerol®	GlaxoSmithKline
morphine	generic	generic
Remifentanil	Ultiva®	Abbott Laboratories
Sufentanil	Sufenta®	Janssen
Narcotic Reversal:		
reverse the effects of narcotics		
levallorphan	generic	generic
Naloxone	Narcan®, generic	DuPont, generic
Induction Agents:		
induce sleep		
** also an anesthetic*		
Etomidate	Amidate®	Abbott Laboratories
Ketamine *	generic	generic
Methohexital	Brevital®	Jones Medical
Propofol *	Diprivan®	Zeneca
Thiopental	Pentothal®	Abbott, generics
Tranquilizers:		
*used to calm patient, ** also induce amnesia*		
Diazepam **	Valium®	Hoffman la Roche Ltd
Midazolam **	Versed®	Hoffman la Roche Ltd
Tranquilizer Reversal:		
reverse the effects of tranquilizers		
Flumazenil	Romazicon®	Hoffman la Roche Ltd

Commonly Used Anesthesia Drug Reference

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Special thanks to Anesthesia Labels Company for their help.

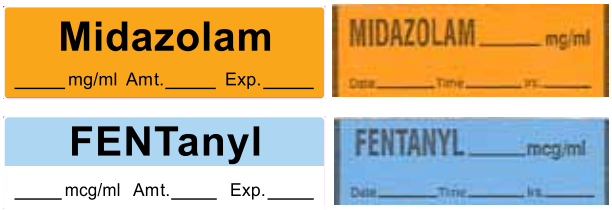
Generic Name	Trade Name	Primary Supplier
Major Tranquilizers:		
**** antiemetics*		
chlorpromazine***	Compazine®	GlaxoSmithKline
Droperidol ***B18	Inapsine®	Akorn
***Anesthestics** (Local):*		
provide pain relief to specific area of the body		
Bupivacaine	Marcaine®	Sanofi Winthrop
lidocaine	Xylocaine®	Astra
Muscle Relaxant - Depolarizing:		
short acting muscle relaxant, usually used for intubation		
succynilocholine	Anectine®	GlaxoSmithKline
	Quelicin®	
Muscle Relaxants - Non Depolarizing:		
used to relax the muscles during surgery, reduces muscle injuries		
Atracurium	Tracrium®	GlaxoSmithKline
Cisatracurium besylate	Nimbex®	GlaxoSmithKline
d-turbocurarine	Curare®	
Mivacurium	Mivacron®	GlaxoSmithKline
Pancuronium	Pavulon®	Organon
Pipercuronium	Arduan®	Organon
Rocuronium Bromide	Zemuron®	Organon
Vecuronium	Norucron®	Organon
Muscle Relaxant Reversal Agents:		
reverses the effects of muscle relaxants		
Edrophonium	Tensilon®, Enlon®, Reversol®	ICN Pharmaceuticals, Ohmeda, Organon
Neostigmine	Prostigmine®	ICN Pharmaceuticals
Pyridostigmine	Regonal®	Organon
Vasopressors:		
stimulates contraction of the arteries, increases blood pressure		
Dopamine	generic	Astra, Elkins-Sinn
Epinephrine	generic	generic
Ephedrine	generic	generic
Phenylephrine	Neo-Synephrine	generic
Hypotensive Agents:		
reduces blood pressure		
Nitroprusside	generic	generic
Nitroglycarine	generic	generic
Phentolamine	generic	generic
Trimethaphan	Arfonad®	Roche
Anticholinergic Agents:		
inhibits parasympathetic nerve activity		
Atropine	generic	generic
Glycopyrrolate	Robinul®	Robbins

Anesthesia Roll Labels

New PharmaTags roll labels are color-coded and pre-printed to help prevent medication mix-ups.

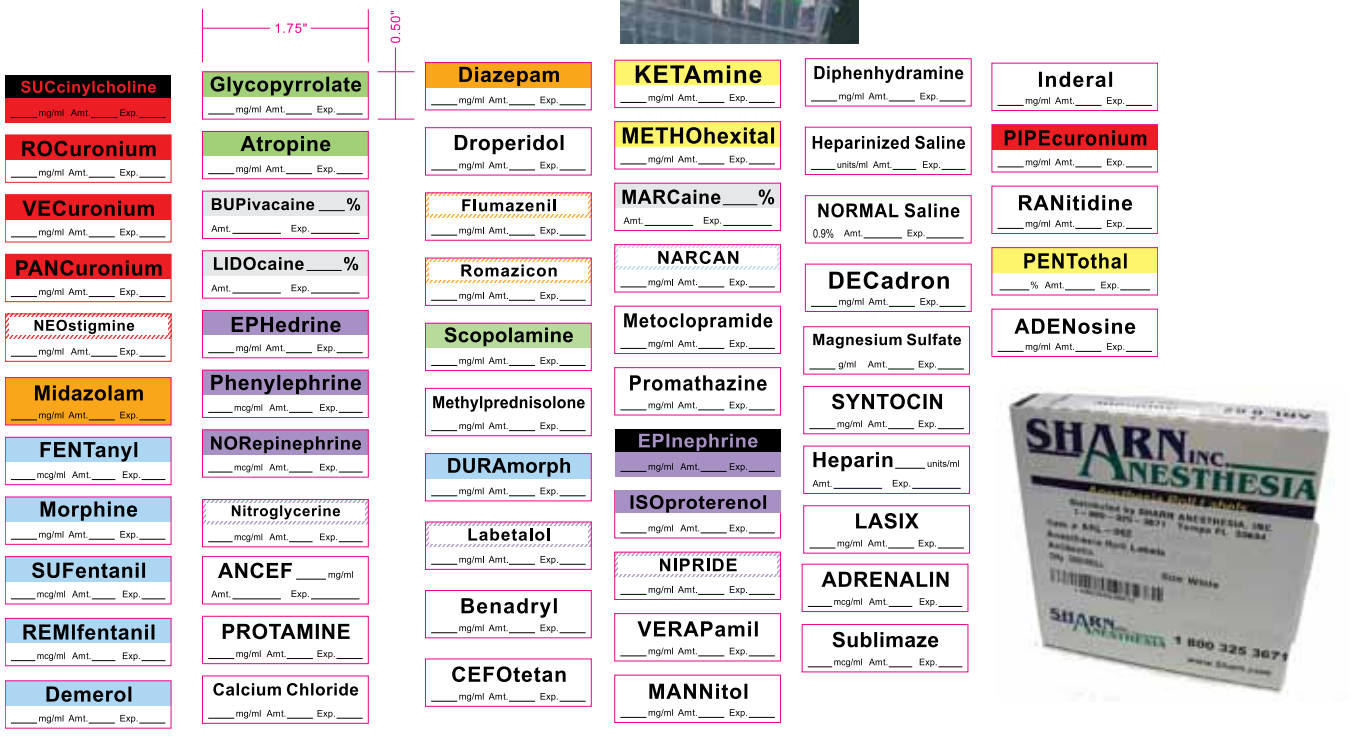
- Bold Print - easy to read
- LARGE Label - provides more writing area
- Strong adhesive - stays on syringe
- Color coded - meets ASTM, JCAHO, FDA and ISMP guidelines
- Easy to use
- Economical - 500 per roll.

Compare! actual size



Order#	Description
ARL-DIS-P10	10-roll acrylic dispenser

* FREE with first order of 10 rolls



10 Eye Protection for Patients

Eye Protection for Patients

Corneal abrasions are the most common ocular complications seen during the perioperative period. At least 3% and perhaps as much as 8% of claims for surgical injuries involve corneal abrasions. This can occur during general anesthesia as well as regional or mac anesthesia cases.

This is a problem that occurs for several reasons. Most commonly it occurs because patients under anesthesia generally do not close their eyes completely. Sixty percent of patients having general anesthesia do not close their eyes naturally. During the procedure the eye and especially the corneal layer dries out as the patient is not blinking to irrigate the eye. Also neuromuscular agents as well as propofol impact eyelid closure.

Without some form of protection it is likely that one of every four patients will suffer corneal abrasion. The tendency as a patient awakes from anesthesia is to rub the eyes. If a patient is wearing a fingertip pulse oximeter clip it is very possible that rubbing with the index finger (normally used for the probe) will scratch the cornea. One solution to this particular issue is to place the clip on the 4th finger which is not typically used to scratch.

Most corneal abrasions are seen in surgeries lasting 100 minutes or more. It is unusual to see this problem in shorter surgeries.

There are several ways to protect the eyes during surgery. The most effective and cost effective is to tape the lids shut immediately after the induction of anesthesia. Many doctors use the common tape so readily available in the OR. Several problems are associated with this practice. Cellophane based tapes can cause a reddening or swelling reaction of the eyelid. They also remove eyelashes when pulled off. It is also a challenge to the anesthesiologist to manage taping the eye with sticky tape while having gloved hands. It becomes a time consuming task not to mention frustrating. Commonly gels or ointments can lead to irritation of the eyes in many patients.

A cost effective and time saving product is now available to protect your patients' eyes during anesthesia. It is the EyeGard™ eye protector. The EyeGard is made of hypoallergenic 3M tape and consists of an oval shaped device with gentle adhesive and a blue tab containing no adhesive for easy placement and removal , even with gloved hands. It takes just seconds to peel the EyeGard off the backing paper and apply, saving valuable OR time. The EyeGard comes in adult and pediatric sizes and is also available in a less sticky gentle version and an extended wear version. They are packaged in boxes of 50 pairs.

Just recently introduced is a laser safe version of the EyeGard, featuring a flexible foil eye cover with paper backing and adhesive edges to completely block the possibility of light entering the eye during laser procedures. This serves two functions: it keeps the eye securely closed and protects from any damage from the laser.

For additional protection against any item which could fall into the eye, consider the Bat Mask. This is an eye protector with comfortable cushioned foam backing with rigid clear plastic protective eye covers. It protects the eyes from blood, fluid and other foreign materials. It is frequently used in conjunction with the EyeGard for additional protection while the EyeGard keeps the eyelids closed. This product is especially helpful when a patient is in a prone position to prevent pressure on the eyes.

EYEGARD™

EyeGard™ is the safe, effective way to protect the eyes during surgery.

Latex Free

Protect your patient's eyes during surgery with EyeGard. No more handling sticky tape with gloved hands. Simply peel an EyeGard off the backing paper and apply to the eye. The tab allows easy removal at the end of the case.

Order#	Description	Qty
S2020	Adult	50 pairs per box
S2020-P	Pediatric	50 pairs per box
S2020-M	Sensitive	50 pairs per box
S2020-E	Extended wear	50 pairs per box
S2020-L	Laser	25 pairs per box

Pediatric size available

Bat Mask

Double Foam for extra protection.

New cushioned backing and easy pull tab!

Protect your patient's eyes during general anesthesia against corneal abrasion, lacerations and scleral hemorrhage with the Bat Mask eye cover. This rigid, clear plastic protective cover is supplied with a non-allergenic self-adhesive foam cushion for fast and accurate application. The Bat Mask protects the eyes from blood, fluid and other foreign materials. **Latex Free**

Order #	Description
BAT1-25	Adult Sterile -25 per box
BAT1-100	Adult Sterile -100 per box
BAT2-25	Double Foam -25 per box
BAT3-25	Pediatric Sterile -25 per box

OPTI-GARD®

OPTI-GARD® Patient Eye Protectors protect your patient's eyes against trauma and unintentional contact. They feature an exclusive "Extra Cushion" layer for additional skin protection. OPTI-GARD is self adhering for fast and accurate placement and is latex-free. Non-sterile, pediatric and laser versions available.

Order #	Description
BAT-D28310	Adult Sterile - 25 per box
BAT-D28200	Pediatric - 25 per box
BAT-D28400	Laser Adult - 10 per box

11 Gas Sampling

Expired Patient Gas Monitoring

The monitoring of the expired gases of a sedated or anesthetized patient is required.

Commonly referred to as “Gas Sampling”, this can actually comprise the monitoring of a number of gases:

End-tidal CO2
Oxygen concentration
Nitrous Oxide
Anesthesia agents concentration
Others, e.g. Nitrogen, helium, argon

Obtaining a gas sample:

To obtain a sample of the gas to be measured and monitored, the patient’s exhaled gas or the gas in the patient’s breathing circuit of an anesthetized patient must be collected.

The methods utilized depend upon the following factors:

Is the patient sedated – using nasal prongs (cannulas) or a face mask, or is the patient intubated?

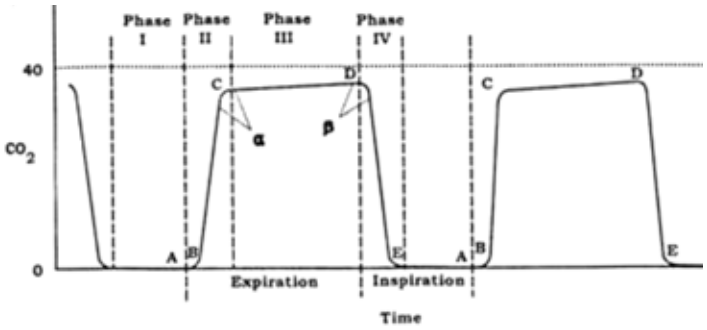
What type of monitor?

A. “Diverting” - commonly referred to as “sidestream” - where a catheter is placed in the breathing circuit and a gas sample is pulled and goes to the monitor for measurement.
B. “Non-diverting” - commonly referred to as “mainstream” - where a sensor is placed in the circuit and analyzes the gas as it pass across the sensor.

The most common type of monitor is sidestream. In this case a connector is placed in the circuit which is connected to a small bore tubing (gas sampling line) that is then connected to the gas inlet of the monitor. A sample of gas from the breathing circuit is continuously collected by the monitor and measured. The results are displayed on the monitor in a graphical waveform plus numerical values of the measured gases.

Monitoring end-tidal CO2 alone with a monitor displaying a wave form can help the clinician to assess the breath rate of the patient and whether there is adequate ventilation provided. For example, hyperventilation, an increase in dead space ventilation, hypoventilation or increase CO2 delivery to the lungs, obstruction of gas flow, etc, may be observed.

Example: the normal range of EtCO2 is 5 to 5.5% or 35 to 40 torr.



For the sedated patient:
The typical gas sampling method is the use of split nasal prongs, (cannulas) which deliver oxygen an sample expired gas.

For the intubated patient with a breathing circuit: there are a number of connectors available.

Gas Sampling Lines –

These small bore tubes have luer fittings which connect to the female luer port on the breathing circuit connector via a male luer lock fitting and the opposite end connecting to the monitor gas inlet. The “monitor” end can be a female luer, male luer, plain or a proprietary connector.

The gas sampling lines are either made of PVC or a co-extruded material – internal layer of polyethylene and outside layer of PVC. These “co-extruded” lines are designed to reduce any absorption of anesthetic agents into the tubing.

Problems:

Water vapor can cause a few problems for ET CO2 monitors.

Water vapor absorbs light similarly to CO2 and can mask the measured CO2 results
Water accumulates in the gas sampling line and “plugs” it so gas is delivered to the monitor
Water enters into the electronics of the monitor and causes problems

Water vapor problems are handled by:

Adding an in-line filter to the gas sampling line
Placing a water trap at the entrance of the gas into the monitor
Adding special tubing, called Nafion[1], which is a permeable membrane material, allowing the water vapor to escape to atmosphere

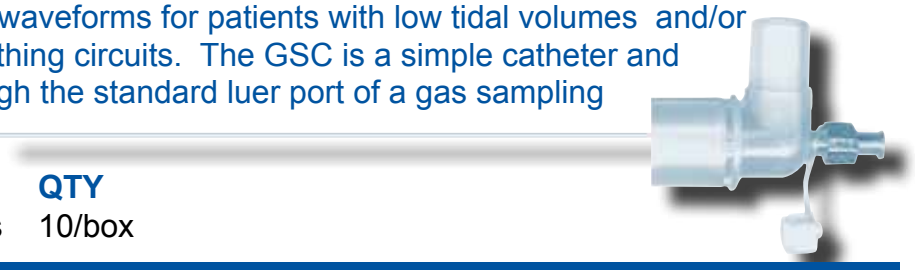
The gas sampling lines are either made of PVC or a co-extruded material – internal layer of polyethylene and outside layer of PVC. These “co-extruded” lines are designed to reduce any absorption of anesthetic agents into the tubing.

(Nafion[1] is a registered trademark of Dupont Chemical CO.)

Reference source:
Understanding Anesthesia Equipment Edition 4, Dorsch and Dorsch, Lippincott Williams & Wilkens.

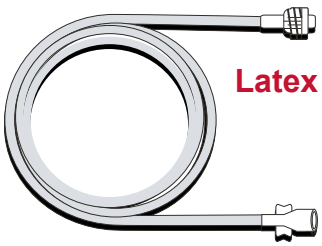
Gas Sampling Catheter

The Gas Sampling Catheter allows sampling within the endotracheal tube, improving the ability to obtain accurate sampling and breath waveforms for patients with low tidal volumes and/or when using high flow anesthesia breathing circuits. The GSC is a simple catheter and luer lock connector that extends through the standard luer port of a gas sampling connector (mask elbow.) **Latex Free**



Order #	Description	QTY
GSC-10	Gas Sampling Catheters	10/box

Gas Sampling Lines



Latex Free

Order #	Description	Qty
GSL-90150-H	PVC, male-male, 10’	50
GSL-90151-H	PVC, male-female, 10’	50
GSL-90100-H	PE/PVC, male-male, 10’	50
GSL-2043-F	PVC, male-male, 10’ with 0.8 micron hydrophobic filter	50

12 Infection Control Procedures for Anesthesia Equipment

Infection Control Procedures for Anesthesia Equipment

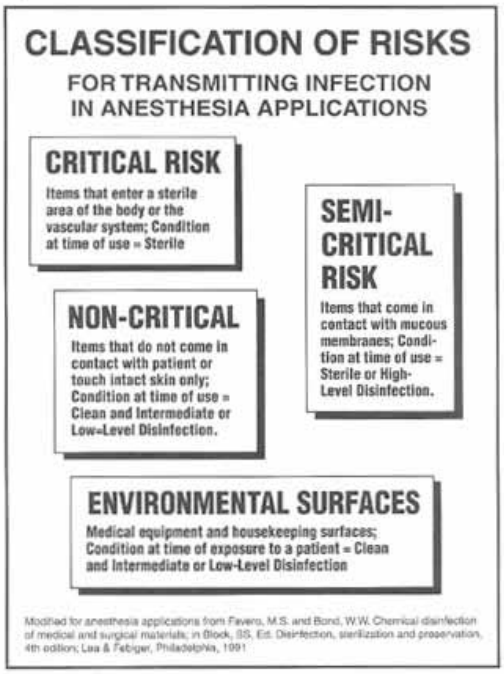
This section provides information necessary to apply appropriate infection control practices to anesthesia machine systems, ancillary instruments, medical devices, accessories, housekeeping procedures, laundry handling, and waste containment and disposal. Effective strategies for infection control programs shall:

1. Minimize the risk of exposure to infection for each patient and provider. Ensure that potentially infectious material on or in anesthesia equipment and components is not transferred from one patient to another, from a clinician to a patient, from a patient to a clinician or any other personnel working in and around an anesthetizing location.
2. Define general conditions that commonly require decontamination. Identify those parts of the anesthesia machine system, ancillary instruments, and components of medical devices that do and do not come in contact with a patient to protect patients and personnel from risks of exposure to infection.
3. Provide appropriate guidance in identifying pathogen-exposed components of the anesthesia machine system, ancillary instruments, and medical devices used during anesthesia procedures.
4. Identify all processes used for decontamination of each component by cleaning, disinfecting, and sterilizing, as recommended by the manufacturer of each respective device or product.
5. Emphasize the importance of pre-use inspection and testing of anesthesia equipment following any process of cleaning, decontamination or sterilization that requires any part or component to be disassembled and reassembled prior to its use.
6. Identify housekeeping practices and procedures to ensure that all work surfaces of machines, monitors, carts, and furniture are maintained in a clean and sanitary condition.
7. Identify and explain the importance of procedures used for handling contaminated laundry.
8. Identify those practices and procedures used during the containment and disposal of regulated waste materials.

A Classification System: Risks of Transmitting Infection

In 1972, Dr. E. H. Spaulding identified a classification scheme for use when assigning disinfection and sterilization procedures to certain items. His plan divided equipment, instruments, and other device-related surfaces into categories based on the degree of risk of infection involved in their use.1,5 This logical approach was refined in 19916 and is modified here to meet the specific needs of anesthesia practice. Illustrated in **Figure 2,** this system includes four general risk categories:

Figure 2

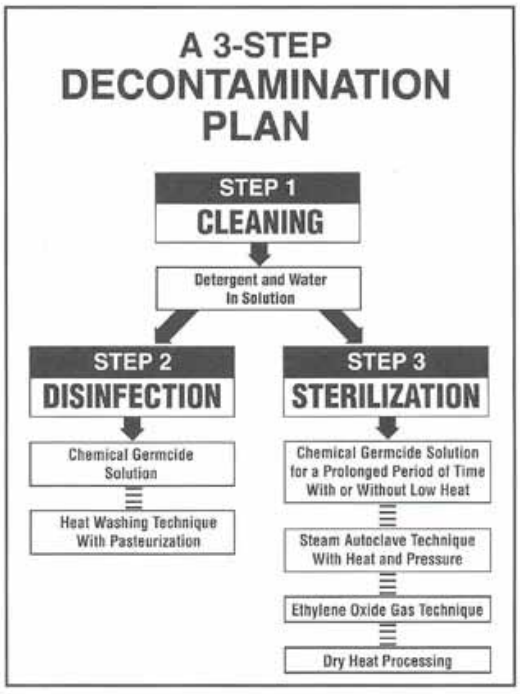


1. Critical Risks: Items that enter a sterile area of the body or the vascular system must be sterile at the time of use. Examples of critical devices include, but are not limited to, needles, catheters, tubing, stopcocks, and any product used to gain access to the vascular system. Products and devices used in the performance of regional anesthesia techniques are also classified as critical risk items.
2. Semicritical Risks: Items that come in contact with mucous membranes should be sterile or treated to produce a state of high- level disinfection. Examples include laryngoscope blades; fiberoptic laryngoscope systems; Magill forceps and stylets; and reusable temperature probes, esophageal catheters, breathing circuits, and masks.
3. Noncritical Risks: Items that do not make contact with the patient and items that touch intact skin should be processed to establish an intermediate or low-level of disinfection. Examples in this category are blood pressure cuffs, skin temperature probes, ECG cables and electrodes, and pulse oximeter sensors.
4. Environmental Surfaces: Environmental surfaces include medical equipment surfaces, such as knobs, handles, and carts, and housekeeping surfaces, such as floors, walls, and table tops. Cleaning with warm water and detergent or using an intermediate or low-level disinfectant will achieve a safe level of decontamination for items listed in this category. Items may either be decontaminated by cleaning, disinfection or sterilization.
   As shown in **Figure 3**, there are three steps in a decontamination plan: Step 1 applies to items requiring decontamination with detergent and water only. Step 2 involves going through Step 1 and then a disinfection process. Step 3 involves going through Step 1 and then an additional sterilization process.

Exterior surfaces of anesthesia equipment, monitors, carts, and tables should be cleaned after each patient procedure and require terminal disinfection at the end of the day or when they are visibly contaminated with blood or body fluids.

Before selecting the decontamination process to be used, care must be given to follow the manufacturer's recommendation on the proper method of cleaning, disinfection, and sterilization appropriate for the instrument, device, or surface to be reprocessed.

Figure 3



Fiber Optic Laryngoscope

SHARN brings you one of the widest ranges of fiber optic laryngoscope blades and handles available today. Check with us for all of your needs. Below are a few examples.

Basic **GreenLine™** blades are made of lightweight stainless steel and feature a replaceable fiber light bundle. Over 55 profiles available. Compatible with all “green” system handles.
5-year unconditional warranty + lifetime warranty against manufacturer defects.

Super-G German profile blades are crafted of 303/304 surgical stainless steel and feature a large, integrated fiber bundle for easier cleaning. Available in MacIntosh and Miller profiles. (Compare to Heine™ or Propper™)
5-year unconditional warranty + lifetime warranty against manufacturer defects.

Fiber Optic Laryngoscope Handles

Choose from traditional battery handles or rechargeable handles with halogen lighting or energy-saving LED illumination. We have a lot to offer!

GreenLine battery operated handles come in 6 sizes ranging from extra-large to micro-mini to accommodate virtually all providers in all situations. Stainless steel and economical chrome plated finishes available. Compatible with all “green” system blades.
5-year unconditional warranty + lifetime warranty against manufacturer defects.

TruLED™ Rechargeable Handle

- LED Light emits brilliant bluish/ white light
- Unique ergonomic design
- Removable battery & lamp
- Rechargeable lithium battery
- 10 hours of usage between charges
- Charger does not interfere with other devices in proximity

Order #	Description
FHL-MED-C	TruLED rechargeable Handle
FHL-55510	Replacement TruLED battery cartridge
FHL-55530	Replacement TruLED power supply

13 Lab Values

NORMAL LAB VALUES

Complete Blood Count (CBC) with Differential

White Blood Cell Count (WBC)

Adult / Child > 2 years	5000 - 10,000/mm **or** 5 -10 x 10/L (SI units)
Child < 2 years	6200 - 17,000/mm
Newborn	9000 - 30,000/mm
Critical Values	WBCs < 2500 or > 30,000/mm
Differential Count	
Neutrophils	55% to 70%
Lymphocytes	20% to 40%
Monocytes	2% to 8%
Eosinophils	1% to 4%
Basophils	0.5% to 1%

Red Blood Cell Count (RBC)

Adult / Elderly – Male	4.7 – 6.1 million/mm
Adult / Elderly – Female	4.2 – 5.4 million/mm
Infant / Child	3.8 – 5.5 million/mm
Newborn	4.8 – 7.1 million/mm

Hemoglobin (Hb, Hgb)

Adult Male	14 – 18 g/dL **or** 8.7 – 11.2 mmol/L (SI units)
Adult Female	12 – 16 g/dL **or** 7.4 – 9.9 mmol/L
Elderly	Values slightly decreased
Child	11 – 16 g/dL
Infant	10 – 15 g/dL
Newborn	14 – 24 g/dL

Hematocrit (Hct)

Adult Male	42 – 52% **or** 0.42 – 0.52 volume fraction (SI units)
Adult Female	37 – 47% **or** 0.37 – 0.47 volume fraction (SI units)
Elderly	Values slightly decreased
Child	31 – 43%
Infant	30 – 40%
Newborn	44 – 64%

Red Blood Cell Indices

Mean Corpuscular Volume (MCV)	
Adult / Elderly / Child	80 – 90 m
Newborn	96 – 108 m
Mean Corpuscular Hemoglobin (MCH)	
Adult / Elderly / Child	27 – 31 pg
Newborn	32 – 34 pg
Mean Corpuscular Hemoglobin Concentration (MCHC)	
Adult / Elderly / Child	32 – 36 g/dL (or 32 – 36%)
Newborn	32 – 33 g/dL (or 32 – 36%)
Red Blood Cell Distribution (RDW)	
Adult	11 – 14.5%

Serum Chemistry

Sodium

Adults / Elderly	136 – 145 mEq/L **or** 136/145 mmol/L (SI Units)
Child	136 – 145 mEq/L
Infant	134 – 150 mEq/L
Newborn	134 – 144 m/Eq/L

Chloride

Adults / Elderly	90 – 110 m/Eq/L **or** 98 – 106 mmol/L (SI Units)
Child	90 – 110 mEq/L
Newborn	96 – 106 mEq/L
Premature Infant	95 – 110 mEq/L
Critical Values	< 80 or > 115 mEq/L

Potassium

Adults / Elderly	3.5 – 5.0 mEq/L **or** 3.5 – 5.0 mmol/L (SI Units)
Child	3.4 – 4.7 mEq/L
Infant	4.1 – 5.3 mEq/L
Newborn	3.9 – 5.9 mEq/L
Critical Values	
Adult	< 2.5 or > 6.5 mEq/L
Newborn	< 2.5 or > 8.0 mEq/L

Magnesium

Adults	1.2 – 2.0 mEq/L
Newborn	1.4 – 2.0 mEq/L
Critical Values	< 0.5 or > 3.0 mEq/L

Phosphorous

Adults	3.0 – 4.5 mg/dL **or** .97 – 1.45 mmol/L (SI Units)
Elderly	Values slightly lower than adult
Child	4.5 – 6.5 mg/dL **or** 1.45 – 2.10 mmol/L (SI Units)
Newborn	4.3 – 9.3 mg/dL **or** 1.4 – 3.0 mmol/L (SI Units)
Critical Values	< 1 mg/dL

Calcium

Adults	Total: 9.0 – 10.5 mg/dL **or** 2.25 – 2.75 mmol/L (SI Units) Ionized: 4.5 – 5.6 mg/dL **or** 1.05-1.30 mmol/L (SI Units)
Elderly	Values slightly lower than adult
Child	Total: 8.8 – 10.8 mg/dL **or** 2.2 – 2.7 mmol/L (SI Units)
Newborn	Total: 9.0 – 10.6 mg/dL **or** 2.30 – 2.65 mmol/L (SI Units)
Umbilical Cord	Total: 9.0 – 11.5 mg/dL **or** 2.25 – 2.88 mmol/L (SI Units)
Critical Values	< 6 mg/dL (may lead to tetany) > 14 mg/dl (may lead to coma)

Glucose

Child > 2 years to Adult	70 – 105 mg/dL **or** 3.9 – 5.8 mmol/L
Child < 2 years	60 – 100 mg/dL **or** 3.3 – 5.5 mmol/L
Infant	40 – 90 mg/dL **or** 2.2 – 5.0 mmol/L
Neonate	30 – 60 mg/dL **or** 1.7 – 3.3 mmol/L
Premature Infant	20 – 60 mg/dL **or** 1.1 – 3.3 mmol/L
Critical Values	
Adult Male	< 50 and > 400 mg/dL
Adult Female	< 40 and > 400 mg/dL
Infant	< 40 mg/dL
Newborn	< 30 and > 300 mg/dL

Albumin

Adults / Elderly	3.5 – 5.0 g/dL **or** 35 – 50 g/L (SI Units)
Child	4.0 – 5.9 g/dL
Infant	4.4 – 5.4 g/dL
Newborn	3.5 – 5.4 g/dL
Premature Infant	3.0 – 4.2 g/dL

Protein

Adults / Elderly	6.4 – 8.3 g/dL **or** 64 – 83 g/L (SI Units)
Child	6.2 – 8.0 g/dL
Infant	6.0 – 6.7 g/dL
Newborn	4.6 – 7.4 g/dL
Premature Infant	4.2 – 7.6 g/dL

Ammonia

Adults	15 – 100 mg/dL **or** 47 – 65 mmol/L (SI Units)
Child	40 – 80 mg/dL
Newborn	90 – 150 mg/dL

Blood Urea Nitrogen

Adults	10 – 20 mg/dL **or** 3.6 – 7.1 mmol/L (SI Units)
Elderly	May be slightly higher than those of adults
Child	5 – 18 mg/dL
Infant	5 – 18 mg/dL
Newborn	3 – 12 mg/dL
Critical Values	> 100 mg /dL (indicates serious renal impairment)

Bilirubin

Adult / Elderly / Child	Total: 0.1 – 1.0 mg/dL **or** 5.1 – 17.0 mmol/L (SI Units) Indirect: 0.2 – 0.8 mg/dL **or** 3.4 – 12.0 mmol/L (SI Units) Direct: 0.1 – 0.3 mg/dL **or** 1.7 – 5.1 mmol/L (SI Units)
Newborn	Total: 1-12 mg/dL **or** 17.1 – 20.5 mmol/L (SI Units)

Uric Acid

Adult Male	2.1 – 8.5 mg/dL **or** 0.15 – 0.48 mmol/L
Adult Female	2.0 – 6.6 mg/dL **or** 0.09 – 0.36 mmol/L
Elderly	Values may be slightly decreased
Child	2.5 – 5.5 mg/dL **or** 0.12 – 0.32 mmol/L
Newborn	2.0 – 6.2 mg/dL
Critical Values	> 12 mg/dL

Alkaline Phosphatase

Adult	30 – 85 lmU/mL **or** 42 – 128 U/L (SI Units)
Elderly	Slightly higher than adults
Child / Adolescent	
< 2 years	85 – 235 ImU/mL
2 – 8 years	65 – 210 ImU/mL
9 – 15 years	60 – 300 ImU /mL
16 – 21 years	30 – 200 ImU/mL

Adult Male	0.6 – 1.2 mg/dL
Adult Female	0.5 – 1.1 mg/dL **or** 44 – 97 mmol/L (SI Units)
Elderly	Decrease in muscle mass may cause decreased values
Adolescent	0.5 – 1.0 mg/dL
Child	0.3 – 0.7 mg/dL
Infant	0.2 – 0.4 mg/dL
Newborn	0.3 – 1.2 mg/dL
Critical Values	> 4 mg/dL (serious renal impairment)

Serum Glutamic Oxaloacetic Transaminase (Aspartate Aminotransferase (AST), (SGOT)

Adults	8 – 20 U/L, 5 – 40 IU/L, **or** 8 – 20 U/L (SI Units) Females tend to have lower values than males
Elderly	Slightly higher values than adults
Child	Values similar to adults
Newborn / Infant	15 – 60 U/L

Serum Glutamic Pyruvic Transaminase (Alanine Aminotransferase (ALT), (SGPT)

Adult / Child	5 – 35 IU/L **or** 8 – 20 U/L (SI Units)
Elderly	May be slightly higher than adults
Infant	May be twice as high as adult

Lactic Acid Dehydorgenase

Adult / Elderly	45 – 90 U/L, 115 – 225 IU/L, **or** 0.4 – 1.7 mmol/L (SI Units)
Isoenzymes in Adult / Elderly Values	
LDH-1	17 – 27%
LDH-2	27 – 37%
LDH-3	18 – 25%
LDH-4	3 – 8%
LDH-5	0 – 5%
Child	60 – 170 U/L
Infant	100 – 250 U/L
Newborn	160 – 450 U/L

Creatinine Phosphokinase

Adult / Elderly – Male	12 – 70 U/mL **or** 55 – 170 U/L (SI Units)
Adult / Elderly – Female	10 – 55 U/mL **or** 30 – 135 U/L (SI Units) Values are higher after exercise
Newborn	68 – 580 U/L (SI Units)
Isoenzymes	
CPK-MM	100%
CPK-MB	0%
CPK-BB	0%

Reusable Mask Harness

The mask harness is constructed of anti-static materials and molded for comfort. Webbed for ventilation, the mask harness is reusable. **Latex Free**

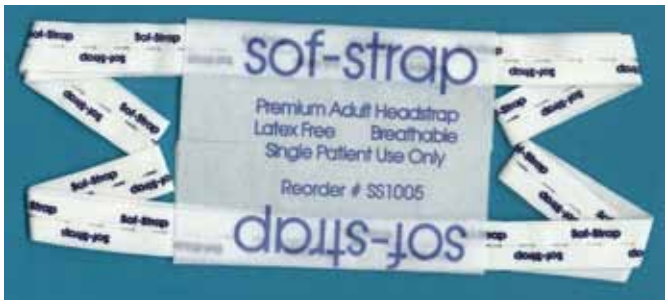
Order #	Description	Qty
MHR-A	Adult mask harness	5
MHR-C	Child mask harness	5
MHR-I	Infant mask harness	5

Silicone Mask Harness

Lightweight mask harness is made of silicone and is autoclavable. Latex-free

Order #	Description	Qty
MHR-35-70-255	Adult, white	pkg of 10
MHR-35-70-155	Child, white	pkg of 10

Sof-Strap Disposable Mask Harness



- 100% **Latex Free**
- Breathable, comfortable and absorbent textile components
- Engineered with controlled elasticity for better fit, better comfort and less chance of pressure-induced trauma
- Better for the clinician - even with wet gloved hands

Order #	Description	Qty
MHD-SS1005	Disposable mask harness	50 case

14 Latex Allergy

LATEX ALLERGY[1]

What is latex?

The term “latex” refers to natural rubber latex, the product manufactured from a milky fluid derived from the rubber tree, Hevea brasiliensis.

What is latex allergy?

Latex allergy is a reaction to certain proteins in latex rubber. The amount of latex exposure needed to produce sensitization or an allergic reaction is unknown. Increasing the exposure to latex proteins increases the risk of developing allergic symptoms. In sensitized persons, symptoms usually begin within minutes of exposure, but they can occur hours later and can be quite varied. Mild reactions to latex involve skin redness, rash, hives, or itching. More severe reactions may involve respiratory symptoms such as runny nose, sneezing, itchy eyes, scratchy throat, and asthma (difficult breathing, coughing spells, and wheezing). Rarely, shock may occur; however, a life-threatening reaction is seldom the first sign of latex allergy.

Who is at risk of developing latex allergy?

Health care workers are at risk of developing latex allergy because they use latex gloves frequently. Workers with less glove use (such as housekeepers, hairdressers, and workers in industries that manufacture latex products) are also at risk.

How is latex allergy treated?

Detecting symptoms early, reducing exposure to latex, and obtaining medical advice are important to prevent long-term health effects. Once a person becomes allergic to latex, special precautions are needed to prevent exposures. Certain medications may reduce the allergy symptoms, but complete latex avoidance, though quite difficult, is the most effective approach.

Are there other types of reactions to latex besides latex allergy?

Yes. The most common reaction to latex products is irritant contact dermatitis – the development of dry, itchy, irritated areas on the skin, usually the hands. This reaction is caused by irritation from wearing gloves and by exposure to the powders added to them. Irritant contact dermatitis is not a true allergy. Allergic contact dermatitis (sometimes called chemical sensitivity dermatitis) results from the chemicals added to latex during harvesting, processing, or manufacturing. These chemicals can cause a skin rash similar to that of poison ivy. Neither irritant contact dermatitis nor chemical sensitivity dermatitis is a true allergy.

How to protect against latest allergy?

Learn to recognize the symptoms of latex allergy: skin rash; hives; flushing; itching; nasal, eye or sinus symptoms; asthma; and (rarely) shock.

What if I think I have latex allergy?

Avoid direct contact with latex gloves and other latex-containing products.

Latex-Free Carts

All hospitals should have available latex-free carts. Develop a list of latex free products to be available for use on patients with latex sensitivity. On the Johns Hopkins web site, you will find a list of specific products, including item numbers and manufacturers that are latex free. Contact the American Latex Allergy Association for more information. Their web site is www.latexallergyresources.org.

What is the well-stocked “latex safe” cart sporting these days?[2]

Everything from tubing and tourniquets to syringes, stethoscopes and stopcocks. At least that’s the recommendation of the Association of Operating Room Nurses (www.aorn.org), Denver, in

its first-ever latex guidelines, Standards, Recommended Practices and Guidelines, 1999.

Latex-free cart staples, according to AORN

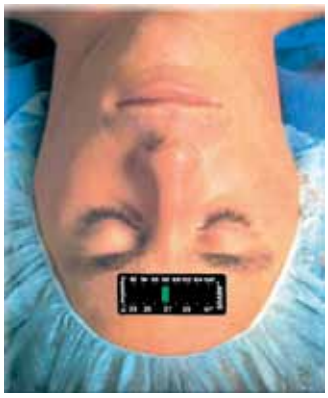
Needles (25 g through 15 g)
Intravenous tubing
Anesthesia breathing bag
Blood tubing
3-way stopcocks
Tourniquet
Dermacil tape (1/2", 1" and 1-1/2")
Feeding tubes (5 fr to 10 fr)
Micropore tape (1/2", 1" and 1-1/2")
Underpads and small chux
Feeding pump bag and tubing
Urinary drainage system
Silastic Foley catheters (3 fr to 18fr)
Blood pressure tubing
Silastic external catheters (pediatric and adult)
Stethoscope
Oxygen cannula, oxygen mask with plastic tie
Exam gloves
Syringes (3cc, 10cc, 20cc, 60cc, tuberculin and insulin)
Sterile gloves
10cc glass ampules of sodium chloride and sterile water
60cc irrigating bulb syringe
Blood pressure cuffs (infant, pediatric, small and large adult and thigh sizes); material to wrap cuffs are not available

ALL SHARN PRODUCTS ARE LATEX FREE

Crystaline® Temperature Strips for anesthesia
DermaTherm® Strips for pain management

1 DHHS (NIOSH) Publication No. 98-113, "*Latex Allergy*, APrevention Guide"
2 Philip A. Perry, Article Display "*A savvy guide to the latex-safe cart*,"
Heath Facilities Management

Temperature Trend Indicators



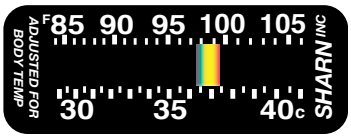
This handy dispenser mounts on the wall or on equipment so it's nearby when you need it.

Call for further description and ordering information.

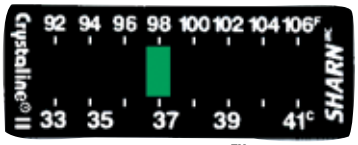
SHARN Forehead Temperature Strips have been used on more than 60 million surgical patients. Easy to use, non- invasive and inexpensive, SHARN temperature strips are a good alternative to electronic probes. Leave them on during your patient's stay in PACU for easy monitoring. These temperature strips are adjusted to display the equivalent of core temperature. Crystaline™ forehead strips are ideal for use with laryngeal mask airways, and mac, or regional anesthesia when you don't have to intubate.

Latex Free & DEHP Free

Order #	Packaged	QTY
Crystaline		
5101C-MLC	Dispenser	100
5101H-MLC	Dispenser	50
Crystaline II		
5101-II	Envelope	100
5101B-II	Bulk	125
5101F-II	Dispenser	125
5101C-II	Dispenser	100
5101H-II	Dispenser	50
Crystaline W		
5105C	Dispenser	100
5105H	Dispenser	50
TempAlert II		
8501-II	Dispenser	100
8501H-II	Dispenser	50

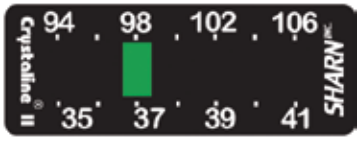


Core Adjusted
84 - 106° F
29 - 41° C



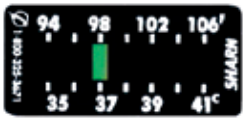
Crystaline™ II

Core Adjusted
92 - 106° F
33 - 41° C



Crystaline™ W

Core Adjusted
94 - 106° F
35 - 41° C



TempAlert™ II

Core Adjusted
94 - 106° F
35 - 41° C

Perfusion Monitors

Useful for many applications, these Sharn temperature strips read and display skin temperature. Use these strips in your Pain Management Department to diagnose RSD, as well as to assess the effectiveness of nerve blocks within minutes by watching for a sympathetic rise in temperature. They are also useful when doing EMGs. **Latex Free & DEHP Free**

Order #	Packaged	Qty	Description
Crystaline ST			
6102	Envelope	100	Strip
6102B	Bulk	125	Strip
6102F	Dispenser	125	Strip
6102C	Dispenser	100	Strip
6102H	Dispenser	50	Strip
DermaTherm			
2105PB	Roll	50	Band
2100PB	Roll	100	Band
2150PB	Roll	250	Band
2200PS	Box	100	Strip

Skin Temp
80 - 100° F
26 - 38° C

Skin Temp
79 - 101° F
26 - 38° C

Skin Temp
80 - 100° F
29 - 36° C

15 Moderate Sedation

Guidelines for Conscious (Moderate) Sedation

Conscious (or moderate) sedation has become an increasingly important subject in recent years. We have seen a vast increase in the number of procedures moving from traditional OR settings to ambulatory surgery centers and office-based practices over the last decade. As this trend continues, physicians and staff who have not administered sedation previously are looking to become informed on safe and efficient use of sedation in their patients.

Based on a review of state guidelines from several states we have prepared the following:

Every patient needs a free flowing intravenous line and supplemental oxygen administered via nasal cannula or face mask.

A health care provider other than the person performing the procedure should monitor the patient at all times. This is non-negotiable. That person should record in the medical record at minimum every five (5) minutes:

Level of consciousness (0 = unconscious, 1 = sedate but responsive, 2 = alert)

Peripheral oxygenation via pulse oximeter and respiratory rate

Heart rate, Heart rhythm, Blood Pressure

Pain score (0= none, 1= tolerable, 2= not tolerated)

This level of monitoring meets JCAHO guidelines. The provider monitoring the patient should be aware of known allergies, medical history, NPO status, and whether the patient may be difficult to intubate. Large men with bull necks and small mouths can be very difficult to ventilate and intubate. Such a person, or those with morbid obesity or other significant airway issues should be evaluated by an anesthesia provider.

Important history includes personal or family history of malignant hyperthermia, cardiac arrest, congestive heart failure, recent MI, stroke or TIA, heart rhythm disturbance, smoking, diabetes, COPD, or recent change in respiratory status. Is there recent onset of URTI or flu? A listing of current medications is important. It is recommended that patients be NPO for eight (8) hours before drug administration.

There should be suction capability and resuscitation equipment immediately available. Do not start until it is available.
All providers should have ACLS certification.
For almost all patients, a combination of two drugs, midazolam (Versed: 1 mg/cc) and fentanyl (Sublimaze: 50 ug/cc) can accomplish the goal of safely getting the patient through the procedure. Patients should be tolerating the procedure, and responsive to a command to open their eyes at all times. This state is called conscious sedation. The risk of administering any intravenous sedative or narcotic drug is loss of consciousness, inability to maintain the
airway or apnea, desaturation and hypoxemia which if unrecognized and treated can proceed all the way to cardiac arrest. It can happen.

Midazolam treats anxiety. It has a specific anxiolytic action. The onset is 60-90 seconds. The duration of action for small doses is 10-15 minutes. Dose range for relatively healthy people is 1-5 mg total over 60 minutes. It is important to wait the 90 seconds to see what the effect of the first dose is before giving a second dose. Additional effects of midazolam are antegrade amnesia, and sedation. By itself, it rarely results in apnea when given in doses of 0.5 to 1 mg at a time. If the patient becomes disoriented- stop. Wait 15 minutes before resuming. Consider trying again later with an anesthesia provider.

Fentanyl treats pain. Onset of action is 90-120 seconds. Duration is also 10-1 minutes. Initial dose is 25-50 ug. Again it is important to wait to evaluate the effect of the first dose before administering a second dose. Dose range is 50-150 ug over 60 minutes. Effects of fentanyl are analgesia

and respiratory depression. There may be a sedative effect, but there is rarely loss of consciousness. The patient may experience pruritus.

Each of these drugs by themselves are fairly predictable. However in combination, especially when administered simultaneously, there may be unpredictable loss of consciousness and or apnea. So do not administer both drugs simultaneously. Wait between doses. Patience is good. For a non-invasive procedure give a milligram of midazolam after monitoring is established, and before positioning the patient. For relatively healthy and robust patients a second milligram can be given safely.

If the patient still seems to be especially anxious, continue with midazolam. Wait between doses. Look for spontaneous eye closure, but with retained responsiveness to verbal commands. The simple phrase “Open your eyes” said gently should be able to establish responsiveness. Avoid the question “Are you OK?” It requires the patient to make an abstract evaluation of the situation. They think you are in charge. Ask what they sense or feel, and whether it is painful, tolerable or any other specific question. Warn them before inserting the examining finger or beginning the procedure. They probably won’t remember anything, but they are supposed to be conscious and should be able to cooperate.

If the patient obviously experiences pain, then add fentanyl. Once you start using the fentanyl do not give any more midalozam unless you can really justify it to yourself. Start with half a cc (25 ug). Wait. Resume the procedure. If not tolerated repeat the dose. Wait. If you need more than 100-150 ug of fentanyl reexamine the situation. Fentanyl as the sole drug works nicely in patients who have previous experience with medical procedures, or otherwise seem to have good coping mechanisms. The dose range can be 150-300 ug over 60 minutes in divided doses. In the event the patient’s respiratory rate slow to 6 breaths per minute, they may still be able to maintain adequate oxygenation. Occasionally you may have to encourage them to breathe. At these doses apnea unresponsive to stimulation is unusual unless there has been prior administration of midazolam. Meperidine (Demerol) in doses of 25-50 mg to a maximum of 200 mg is another good agent used by itself. It increases recovery time.

Another technique involves the use of a constant infusion of propofol. Propofol is a very short acting anesthetic which has been used frequently for GI procedures. Repeated use of this drug has the potential to render the patient unconscious, and thus it has been employed primarily by specilized anesthesia providers. Emergency Department physicians and gastroenterologists with appropriate training have successfully administered propofol for procedures in those arenas. It is used as a constant infusion to avoid fluctuating levels of sedation and responsiveness associated with intermittent bolus administration. Usually a base pre-medication with 1-2 mg of midazolam given IV over 5 minutes is followed by 2-3 ccs of propofol as an IV bolus followed by an infusion of 25-75 ug/kg/min. This regimen rarely results in apnea, but upper airway obstruction is a real possibility if the patient becomes deeply sedated. A jaw thrust usually suffices to relieve the obstruction. Supplemental oxygen administration is obviously crucial, as is constant awareness of the status of the patient.

Regardless of the pharmaceutical regimen, if the patient loses consciousness, but continues to ventilate and maintain oxygenation, then nothing needs to be done other than continued evaluation. Avoid further drug administration. If heavy snoring or desaturation occurs, then a simple jaw thrust is usually adequate. Unresponsiveness with cessation of spontaneous ventilation should be treated with mask ventilation. Hopefully intubation will never be required, but the capacity to do so should always be available. This is why all providers should have ACLS Certification.

You can get a feel for how the patient will respond to the drugs by carefully watching the response to the first dose. Patients taking narcotics or ben-

zodiazepines chronically may require doubling of the corresponding doses. The art of it all involves balancing the dose to the level of stimulation associated with the procedure, with a common sense evaluation of how the patient is responding to the situation. Remember that if higher doses have been necessary to get the patient through the procedure, he may become unconscious or apneic once the stimulation ceases.

It may take 20-50 patients to gain some confidence with the regimen.
Patients should not drive themselves home. If nausea occurs it can be treated with Zofran, 4 mg, though it usually resolves spontaneously within 2-3 hours.

John Hexem MD, PhD
Randy Pigg BSN

Disclaimer

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Posted by Randy Pigg BSN at 6:48 AM
Labels: Moderate SedationGuidelines, Procedural Sedation Guidelines, Sedation Education, Sedation Procedures

NONIN Onyx® Vantage Finger Tip Oximeter

From the leader in fingertip oximetry comes the most accurate device in this category, the new Onyx Vantage. The Onyx is the only finger pulse oximeter with scientifically proven accuracy in the most challenging cases, including patients with low perfusion or dark skin tones.

- Accurate – Scientifically proven in the widest range of patient populations and settings
- Durable – Even against dropping and water spills; expect thousands of uses in the most demanding environments
- Efficient – Up to 6,000 spot checks (36 hours of continual use) on just two AAA batteries
- Safe – **Built in the USA** with **lead-free** and **latex-free** construction
- Versatile – Vantage works on the widest range of patients from pedi to large adult
- Industry leading 4-year warranty

Order #	Description
NO-9590-BL	Onyx Vantage, blue
NO-9590-RD	Onyx Vantage, red
NO-9590-PR	Onyx Vantage, purple
NO-9590-BK	Onyx Vantage, black

Maxtec Finger Tip Oximeters

Adult

Pedi

This innovative technology is an excellent source for the inexpensive, accurate pulse oximeter that you've been looking for.

Product highlights include:

- Convenient, compact & portable
- Bright, 6-way OLED color display
- Displays SpO2, heart rate & waveform
- 30 hrs of use on two AAA-size batteries
- Auto-off function (after 8 seconds of no use)
- Adult Includes blue protective rubber case (shown) and neck lanyard.
- Adjustable 10 level brightness
- 1 year warranty

Order #
FT-C2 adult
FT-C5 pedi

16 Perfusion Monitors

Some Applications for Perfusion Monitors

To help confirm DIAGNOSIS OF RSD and other sympathetically maintained pain disorders. By placing one DermaThermÔ band on the affected site and one on the contralateral site, you will have a fast, accurate indication of any significant temperature differences that may help confirm a diagnosis of RSD. DermaTherm bands have a very light adhesive and would be the least painful to your RSD patients.

For NERVE BLOCK ASSESSMENTS. This is one of the leading applications for DermaTherm. Simply place a DermaTherm monitor at the distal end of the affected extremity. Within minutes you will see a significant change in temperature, indicating a successful block. By leaving the DermaTherm in place, you may continue to assess the progress of the block. Some practitioners have reported that they have noticed a dip in temperature just prior to the return of pain, suggesting the need to re-dose and/or adjust the dosage given.

As an adjunct to BIOFEEDBACK TRAINING. This is an excellent application of DermaTherm, for both you and your patient. As the patient relaxes and vasodilation occurs, a marked increase in skin temperature also occurs. In your office, your patient will read the DermaTherm and learn to associate the change in temperature with their level of comfort. When they leave with the DermaTherm on, they will have a tool to provide quantifiable feedback all day as they practice their therapy. We recommend the bands for all day use for comfort, because the small size makes them inconspicuous and the patient won't feel embarrassed.

With EMG TESTS. It is generally accepted that temperature affects conductivity. A quick, easy, and inexpensive way to determine if an extremity is at a desirable temperature for an EMG test is to place a DermaTherm on the site. You'll be able to read the skin temperature in seconds!

HYDRO-THERAPY/TREATMENT. Whether for wound debridement or muscle therapy, or any of the many other times you choose a hot water therapy for your patients, it is important that the water be at a safe temperature relative to the patient. To quickly determine the patient's skin temperature, simply apply a DermaTherm. You'll know the temperature in seconds and will be able to adjust the water temperature, rather than risking unnecessary injury.

As an adjunct to THERMOGRAPHY. Those wanting to use thermography for patient assessment and diagnosis are often frustrated or thwarted by skeptical insurance companies who are unwilling to reimburse for the costly procedure. An easy, patient-friendly, quick and inexpensive pre-test can be done with DermaTherm. By using pairs of DermaTherm, the temperature of an affected pain site, its contralateral site, and the surrounding areas may be compared. The presence or lack of significant temperature difference may either preclude or justify use of thermography.

INVASCULAR, ORTHOPEDIC or PLASTIC and RECONSTRUCTIVE SURGERY. DermaTherm Perfusion Monitors, especially in the soft band form, provide an easy way to verify restoration of blood flow during and after surgery. Changes will be reflected immediately. Post-operatively you will have a continuous monitor, which will indicate possible clotting or blockage immediately.

For monitoring PHLEBITIS patients. By applying a DermaTherm to the affected limb and checking it periodically, you will know when Heparin treatments begin to be effective because you will see the temperature decrease, even before swelling reduces!

For monitoring AMPUTEE patients. DermaTherm is a fast and easy way to check the circulation of a remaining portion of an amputated limb post-operatively, both in the hospital and in the patient's home. Simply apply DermaTherm post-operatively and record the temperature. Subsequent readings should be thae same or warmer. Lower temperatures could be early indicators of clotting.

To check for DEEP VEIN THROMBOSIS. If you suspect DVT in one of your patients, a comparison on contralateral limbs or even upper and lower portions of a limb with DermaTherm may show a 1° or greater difference and aid in your diagnosis.

If You've Been Looking For A Better Way To Measure Skin Temperature You're Getting Warmer.

A Measurable Improvement In Pain Man-

Introducing 3 perfusion monitors every pain management specialist and patient can warm up to: DermaTherm™, DermaTherm™ Low Range and Crystaline ST™. You simply place the adhesive strip on the skin and its advanced liquid crystal technology gives you a quick, continuous, quantifiable measurement of skin temperature. For patients with RSD or other sympathetically maintained pain syndromes, it aids in diagnosis and helps quickly assess block effectiveness. DermaTherm™ is so simple, inexpensive and reliable it may soon be indispensable in the practice of pain management. It's also ideal in biofeedback, skin and vascular grafting, electromyography or any procedure where accurate information on skin temperature or perfusion is critical. Once you try it, you'll see: Your search for a better way to monitor perfusion ends with DermaTherm™.

DermaTherm™ Low Range Brand
1900PBL

DermaTherm™ Strip
2200PS

DermaTherm™
2100PB

Crystaline ST™
6102

Call 1-800-325-3671
for ordering information.

17 Pipeline/Cylinder Gases

Guidelines for Conscious (Moderate) Sedation

by John Noblitt, MAEd, CBET; and Robert Hijazi, MS, MHA, CBET

The anesthesia machine utilizes pipeline gases as a main source of pressure for operation. These pipeline gases are supplied at 50 psig. A secondary or backup source consists of gas cylinders (oxygen or O2, nitrous oxide or N2O, and air), which are regulated at 45 psig through cylinder pressure regulators. Pipeline pressure is higher than the cylinder pressure (50>45 psig), which is the reason why the anesthesia machine utilizes pipeline gases before cylinder gases. The cylinder gases are used when the pipeline pressure falls below 45 psig. You may also hear the term “drive gas” for the 50 psig pipeline gas source.

The cylinder pressure regulators have two functions: Reduce the cylinder pressure to a constant 45 psig, and close off the cylinder gas supply when pipeline gas supply exceeding 45 psig is present. This prevents usage and depletion of the backup cylinder gases when there is still an adequate pipeline gas supply.

To prevent mixing up the pipeline hoses, the non-interchangeable screw thread—NIST—system is used to prevent piped gases from the wall being accidentally connected to the wrong inlet on the machine. Another system called the pin index safety system, or PISS, is used on size E and smaller cylinders. The pins protruding from the cylinder yoke of a particular gas have a unique configuration that fits into corresponding holes in the cylinder valve. This prevents the misconnection of cylinders to the wrong yokes. So you cannot connect an oxygen cylinder in place of an air cylinder—or worse, connect a nitrous cylinder where air should be.

Safety Features

In today’s health care facility, all gas tanks are color coded, indicating which gas is in the tank. We strongly suggest you know your gas color codes: oxygen—green, nitrous oxide—blue, air—yellow, carbon dioxide—gray, suction—white/purple, nitrogen—black, and helium—brown.

Even though anesthesia machines differ, test questions are usually not manufacturer specific.

One of the safety features you will see on anesthesia machines is called a fail-safe device. This feature will shut off the nitrous oxide supply if there is a loss of oxygen supply pressure. Nitrous oxide is hazardous, and so this feature stops the amount of nitrous oxide delivered when the oxygen supply is disconnected or lost. In other words, if the anesthesia machine was leaking oxygen, then the flow of nitrous oxide would drop automatically to prevent harm to the patient.

Another feature is the hypoxic safeguard feature that links the nitrous oxide flow control valve to the oxygen flow control valve. This feature ensures that the ratio of O2 to N2O flow can never be less than 1:3. The percentage of oxygen within a mixture should always be at least 21%. The anesthesia machine prevents users from delivering a hypoxic mixture (O2 below 21%), which is harmful to the patient. So, the flow of nitrous oxide is automatically lowered when oxygen flow is decreased, but nitrous oxide flow remains unchanged, if oxygen flow is increased. An example would be if there was 9 L/min of nitrous oxide flowing through the system, then oxygen flow would have to be at least 3 L/min. Remember, the 1:3 ratio!

The oxygen flush button is used to flush the system with oxygen. During the inspiratory phase, continuously pressing this button will cause the lungs to overinflate. During expiration, if the oxygen flush button is pressed, the bellow will initially fill rapidly to its maximum capacity. After reaching maximum capacity, in mechanical mode, any pressure in excess of 2 to 4 cm H2O will be vent-

ed through the pressure relief valve. A patient has excess positive pressure accumulation and the bellows won't go down. A probable cause would be failure of the pressure relief valve, which is preventing the gas from exiting. This is confirmed if manual ventilation resolves the problem. If not, then the problem is most likely from the breathing circuit connected to the patient.

Device Functions

The manual ventilation mode or bag mode is when the user manually bags the patient to ensure proper respiration. This mode consists of an adjustable pressure limiting (APL) valve that helps control excess pressure buildup and prevents harm to the patient's lungs. Remember that APL is only used during manual ventilation. As its name indicates, the APL valve limits the amount of pressure buildup that can occur during manual ventilation. The APL valve can be adjusted to regulate different pressures. The pressure inside the breathing circuit must generate a force that exceeds the spring compression force for the APL valve to open. As pressure continues to build from the combination of fresh gas flow and manual compression of the breathing bag, the opening pressure of the APL valve will be exceeded and excess gas will be vented to the scavenging system.

The scavenging system functions as a way to remove waste anesthetic gases, or WAGs, to minimize staff exposure to harmful anesthetic gases. Expiration and anesthetic gases are suctioned out of the unit via a suction line connected to a scavenging system. You may have noticed that the scavenger system is located in the bottom of the anesthesia machine since anesthetic gases are heavier than air, which makes it easier to suction out. Also, remember that anesthetic gases used today are nonflammable and each anesthetic agent has a specific vaporizer that it is used in and, like gas tanks, are color-coded.

The anesthesia machine has one inspiratory and one expiratory unidirectional flow valve. The inspiratory valve makes sure that there is no backflow through the inspiratory limb during expiration. The expiratory valve prevents the backflow through the expiratory limb during inspiration. There is a Y-piece that extends from the circuit to the patient. This part of the breathing circuit contains dead space. Flow valves help to minimize the dead space in the Y connector by ensuring that there is no backflow of gases.

When looking at an anesthesia machine, you will notice there is an absorber canister with small white granules. These granules are soda lime crystals. The function of soda lime is to absorb carbon dioxide from the exhaled gas before the patient breathes it back again. Soda lime crystals change color over time, from white to blue/purple, due to pH changes in the granules. Remember that CO2 is an acid, and that makes the pH decrease, thus contributing to the color-changing process of soda lime. You may hear these canisters referred to as scrubbers as they scrub the CO2 out of the exhaled patient gas. This works much like an oxygen concentrator that has a sieve bed that oxygen flows through while the sieve bed scrubs off all the gasses except oxygen, which generates oxygen levels above 21%—which is room air.

The most common problems associated with anesthesia machines are leaks. A leak may exist in the manual or mechanical modes of the unit, or possibly both. The first step before using an anesthesia machine is to perform a leak test. This will help reduce problems during cases and ensure proper function of the unit.

If a leak is prominent in both modes, then you would want to look at components that are common between these two. For instance, always check to see the soda lime canister is securely closed. Service requests have been made many times because canisters were opened to drain water out, and were not closed properly, leading to a gas leak. Another problem would be ensuring that the oxygen sensor is properly installed. Gases tend to leak out from the sides of the oxygen sensor if not properly installed.

Many problems are not actual faults of the anesthesia machine, but with the ancillary equipment, such as tubing etc. There are also instances where the patient might be the problem. An

example would be having a leak in the endotracheal tube cuff connected to the patient. If asked about anesthesia service questions or servicing anesthesia units, always work your way from the gases coming from the wall or cylinders to the patient. If you have a problem, for instance, with suction, the first thing you do is check to make sure the pipeline suction hose is connected, and then check the tubing. Employing a logical approach and the “keep it simple” method will serve you well in repairing anesthesia equipment.

John Noblitt, MAEd, CBET, is the BMET program director at Caldwell Community College and Technical Institute, Hudson, NC; and Robert Hijazi, MS, MHA, CBET, is a clinical engineer at Palmetto Health Hospital, Columbia, SC

18 Pulse Oximetry

Pulse oximetry is a continuous, non-invasive means to monitor oxygenation of the patient's tissue level. Because information is rapid and continuous, pulse oximeters provide an early indication of many problems such as inadequate oxygen supply, anesthetic overdose, and signs of hypoxia before they become dangerous. Pulse oximetry protects the patient in high-risk situations and provides the patient a sense of safety about his or her condition.

Pulse oximetry is widely adopted for monitoring under anesthesia. Ever since anesthesia was launched in the mid-1840s, a lot of ground has been made in the field of anesthetic monitoring. The great advancements made in the field of anesthetics and the related monitoring has enabled surgeons to carry out surgeries that were considered to be impossible earlier. For example, endotracheal anesthesia has enabled the conducting of operations in the chest with comparatively less risk. Moreover, the use of equipment for noting the content of exhaled gases, in addition to noting the percentage of oxygen and carbon dioxide in the patients' blood, arterial pressure and the finding of ST segment depression has also contributed in a big way making heart operations more safe.

There are two basic principles that pulse oximetry is based on:

(1) Oxyhemoglobin and deoxyhemoglobin differ in their absorption of red and infrared light (i.e. oxygenated blood is redder).
(2) The volume of arterial blood in the tissue (and therefore light absorption by that blood) changes during the pulsating cycle of each heartbeat.

A pulse oximeter measures the oxygen saturation of arterial hemoglobin (SaO2) by passing red and infrared light through arterial perfused tissue.

There are four basic vital signs- temperature, pulse rate, respiratory rate and blood pressure- which are used as critical indicators of patient status and remain the core of basic objective clinical assessment.

Oxygenation of the blood is an essential component of cardiopulmonary function but is not directly assessed by the standard vital signs. While observing the rate of respiration provides valuable information about general patient condition and difficulty of breathing, it provides only a partial indication of oxygenation of the blood as it passes through the lungs. Similarly, pulse rate and blood pressure monitoring allow estimation of blood flow but give no indications of the amount of oxygen carried in the blood. The addition of blood oxygenation measurement to the standard vital signs significantly expands the value of basic cardiopulmonary assessment. The technology of pulse oximetry allows the measurement of blood oxygen saturation to be made simply and directly. Pulse oximetry may very well be the fifth vital sign.

Various forms of pulse oximeters are in use today. Both disposable and reusable SpO2 sensors are available. Nearly 85% of the sensors used are the finger-clip style. The Y or ear style sensor may be used on infants, burn patients, patients with poor circulation, patients with missing digits, and hand surgery patients where the finger sensor would not work.

Inaccuracies do occur when using pulse oximeters. The most common causes are low patient perfusion at the sensor site and patient motion. Ambient light may interfere with the function of the sensor. Failures may result in false alarms, inaccurate readings and interruptions in continuous pulse oximetry data.

Fluorescent and especially xenon operating room lights may cause false-normal and high readings. By covering the probe with opaque material has been shown to minimize these effects of ambient fluorescent light. Other sources of inaccuracy include the presence of finger nail polish, intravenous dyes, carboxyhemoglobin and methemoglobin.

Conventional pulse oximetry has served clinicians

well in the years since it was commercialized, giving important oxygen status information in the majority of cases. Pulse oximetry has evolved very rapidly over the past four years. There have been promising clinical results from some of the latest generation of devices, achieving low rates of missed events and false alarms, as well as sensitivities of nearly 100% and specificities of greater than 90%, even under the difficult conditions of low perfusion or motion.

Disposable SpO2 Sensors





Adult **Pediatric** **Microfoam** **Infant** **Neonate**

- **Economical**
- **+/- 2% Accuracy same as OEM**
- **4 sizes to cover all patients**
- **3M Microfoam® tape for a comfortable fit and easy re-positioning**

Latex & DEHP Free

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Pediatric 90 cm/35.4"	**MAX-2211-2**	MAX-2251-2	MAX-2231-2	MAX-2241-2
Infant 90 cm/35.4"	**MAX-2211-5**	MAX-2251-5	MAX-2231-5	MAX-2241-5
Neo-Natal 45 cm/17.7"	**MAX-2211-6**	MAX-2251-6		MAX-2241-6

Non-stock items, some may take 2+ weeks for delivery, ask your rep for current stock status!

Reusable SpO_2 Sensors


Comfort-Line Finger-Clip Large


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Soft-tip SpO_2

For Pulse Oximetry

Proven Accuracy: Replacement sensors manufactured to meet or exceed original manufacturer's accuracy level

Reinforced Cable: Durable Kevlar© cable anchored in the clip reduces breaks, kinks and repairs

Articulated Hinge: Accommodates fingers of all sizes comfortably

Silicone Pad: Good contact, easily cleaned, Latex Free

One Year Warranty on finger sensors. Compatible sensors available for most manufacturers. SpO_2 extension and adapter cables available for most models.

Ohmeda™	CSI™	BCI™	Sensormedics™
HP™	Datascope™	SpaceLabs™	Invivo™
Datex™	Novametrix™	Critikon™	Kontron™

19 Surgical Instrument Care

SURGICAL INSTRUMENT CARE[1]

The quality and integrity of surgical instruments have an important impact on the quality of surgical care. Instruments will last much longer if they are cleaned with an appropriate solution immediately after surgery and regularly sharpened, lubricated, and sterilized.

Surgical Residues

Blood, tissue, and surgical residue are the primary cause of pitting, staining, and discoloration of surgical instruments. If left unattended for any extended period, an instrument will become marked and stained, especially if the residues are allowed to dry. The worst-case scenario is when surgical instruments with dried-on debris are autoclaved. The autoclave will literally bake the stains onto the instruments.

Remember: An autoclave does not clean – it will only sterilize dirt. Every instrument must therefore always be cleaned and dried within 15 minutes after use.

Clean Immediately After Surgery

The washing process should begin within 10 minutes after surgery, even if sterilization will take place much later. Washing the instruments within a few minutes of surgery is the best defense against corrosion, pitting, and staining.

It is occasionally impossible to tend to surgical instruments immediately after surgery. In such cases, keep contaminated instruments moist so that blood, tissue, and other residue do not dry on them. The best way to keep instruments moist is to place a wet towel over them.

Sterilize, Sterilize, Sterilize

Sterilize instruments with their jaws open to allow better steam penetration. If a pan or tray is to be used, the perforated varieties enable better steam penetration and promote better drying. It is a good idea to put heavy instruments at the bottom of the autoclave and lighter, more delicate instruments on top.

When sterilizing equipment in paper or plastic pouches, never stack the pouches on top of one another. Standing the pouches up in a spiral metal letter holder will permit proper steam flow.

Clean Autoclaves Regularly

Taking proper care of the autoclave will not only optimize performance, it will also extend the life of the surgical instruments that are sterilized in the autoclave. The first thing to keep in mind is to use only distilled water in the autoclave's reservoir. Tap water will cause mineral deposits that will stain the instruments and buaild up in the autoclave. Second, it is important to clean the autoclave's filter regularly, using the manufacturer's recommendations as a minimum guideline. The inside of the autoclave chamber should be cleaned once a week to prevent the buildup of scale and allow the sterilizer to operate aefficiently.

Cleaning and Sterilization [2]

Cleaning equipment means removal of foreign matter without special attempts to kill microorganisms. Equipment should be pre-rinsed as soon as possible after use to prevent drying of organic material; then soaked, removal of soil, rinsing and drying.

Sterilization

Moist Heat Methods

- Pasteurization (less than 100°C) disinfects but doesn't sterilize (destroys many but not all organisms).
- Boiling kills all forms of bacteria, most spores, practically all viruses if boiled at least 30 minutes.
- Autoclaving (steam sterilization under pressure) kills all bacteria, spores, and viruses.

Liquid Sterilization

Useful for heat-sensitive equipment, but recontamination possible during drying and re-wrapping. Of several agents (chlorhexidine Hibitaneâ, phenolic compounds, hexachlorophene, ethyl or isopropyl alcohol's), **glutaraldehyde** is the only one effective against both tubercule bacillus and viruses.

The Steris system uses peracetic acid in a low-temperature, 30-minute cycle to sterilize objects such as laryngoscope blades and fiber optic laryngoscopes.

Chemical Gas Sterilization

Ethylene oxide (ETO) is a synthetic gas widely used, especially for heat or moisture-sensitive items like rubber and plastic. Kills bacteria, spores, fungi, and larger viruses. Can be various patient reactions if not aerated (in wrapper) sufficiently after ETO exposure. The gas is also explosive and toxic.

Other Means

Gamma radiation kills all bacteria, spores, and viruses. Used for sterilization of disposable equipment – not practical for everyday needs of hospitals.

Care of Specific Equipment

- **Carts & Gas Machine** – Wipe top, front, sides with detergent/germicide (D/G) daily and place a clean covering on top; clean entire cart inside and out weekly or after contaminated cases.
- Breathing Circuits, ETT, Face Masks, Airways, Resuscitation Bags - Generally single use, or follow department policy and manufacturer's guidelines.
- Absorber, Unidirectional Valves, Relief Valve, Bellows – follow manufacturer's instructions, use disposable components or filters on the circle system for known infected cases.
- **Blades, Magills** – Cleanse, glutaraldehyde (or Steris) sterilization, store clean.
- **Headstraps, BP Cuffs** – Items in contact with intact skin need periodic cleansing, or should be cleansed if soiled.

1 Rick Schultz, BA, "*The Ten Commandments of Surgical Instruments Care"*, Veterinary Technician, November 1998

ABOUT THE AUTHOR

Mr. Schultz is President of Spectrum Surgical Instruments, Inc., in Stow OH., which supplies and maintains surgical instruments for hospitals and private practices.

20 Temperature Monitoring

TEMPERATURE MONITORING[1]

Temperature trends, rather than tenths-of-a-degree readings, are important when used with other vital signs to assess a patient's condition.

What is normal temperature?

In the mid-1800s, researchers agreed that 98.6° Fahrenheit was the average temperature of healthy humans. A 1992 study suggests that the standard should be revised to 98.2°F.

In actuality, everyone's temperature varies by several degrees through the day, with 96-99°F considered the usual range. Body temperature follows a circadian rhythm. Age and gender may affect temperature. Simply digesting a meal raises body temperature by up to one degree. Running a marathon can raise it six degrees.

All of these variations occur daily without the hypothalamus resetting the body's temperature.

Problems in Determining Absolutes in Body Temperatures

As stated above, an individual's body temperature is constantly changing, up to 3°F every 24 hours.

There is no method of measurement or body site offering a specific or absolute temperature, with the possible exception of an indwelling catheter. In several studies, physicians have found that temperature readings can vary widely, depending on the placement of the temperature-measuring device. The temperature in different parts of the esophagus can vary up to almost 6°C. Oral temperature can vary by almost 3°F, depending on where the thermometer is placed in the mouth.

Events in surgery (using cold fluids/gases, opening the body cavity, etc.) will change the body temperature significantly. Furthermore, there are inaccuracies in all forms of temperature monitoring. The leading probe manufacturer, YSI, claims no better accuracy than + 0.2°F in the 400 Series and + 0.4°F in the 700 Series.

The fact that an electronic monitoring device can deliver a digital tenth-of-a-degree readout does not guarantee that the readout accurately reflects core body temperature.

Different Sites during the Same Procedure

Before, during, and after surgery, patient temperatures are often measured using different devices, yielding readings that may not be comparable. It is not unusual for a surgical patient to have three different sites used to monitor his/her temperature. If oral is used in the Pre-Op holding area, esophageal is used in the surgical site, aand axillary is used in the PACU, the "normal" variation from site to site could provide a wide range in temperature measurement.[2]

Continuous Temperature Monitoring

One of the most important benefits of liquid crystal devices, such as the CrystalineÒ Indicator, is that they provide continuous temperature monitoring.

ASA Guidelines for Temperature Monitoring [3]

Temperature is a key vital sign that should be measured routinely in the perioperative period, and except where hypothermia is specifically requirement, every attempt should be made to maintain normothermia.

Forehead skin temperature is an acceptable method, and if this is not available, then axillary temperature is acceptable in most cases. The patient's temperature can give you clues to interpreting other thermal and metabolic changes that are taking place during anesthesia.

Temperature aberrations are remarkably common in the perioperative period, and management begins with accurate body temperature measurement. Anesthesia produces significant changes in body temperature, which can reduce

patients' immunocompetence and predispose them to myocardial ischemia and blood loss, and produce patient discomfort. For these reasons and others, body temperature should be measured during all general anesthetics lasting more than about 20 minutes and during major conduction anesthesia. Monitoring temperature can also provide an early clue to the diagnosis of malignant hyperthermia.

In a recent study in volunteers, Sessler and colleagues found good clinical correlation between core and skin temperature.4 Seven un-anesthetized volunteers participated in this portion of the study. Their legs were cooled sufficiently with forced air and circulating water to maintain arteriovenous shunt vasoconstriction (gradient >0°C) during the protocol. The upper chest, neck, and head were covered with a cardboard and plastic canopy, and air circulated at a typical intraoperative flow rate near 5 cm/s). Air temperature within the canopy was randomly set to 18, 20, 22, 24, and 26°C. Each air temperature was maintained for 30 minutes.

Flows and core and skin temperatures were recorded at 5-minute intervals for 30 minutes at each ambient temperature. All values were averaged first within and then among the volunteers. Changes in core-to-skin temperature differences induced by manipulating ambient temperature were evaluated using linear and second-order regressions.

Skin-surface temperatures were similar when evaluated using thermocouples or (uncorrected) liquid crystals. Consequently, only liquid-crystal cutaneous temperatures were reported.

Inspection of the raw data indicated that manipulation of ambient temperature altered skin-surface temperature within minutes, and that skin temperature subsequently remained constant for the duration of each 30-minute trial.

Major reasons for monitoring intraoperative core temperature include detection of (1) fever (e.g., from mismatched blood transfusions, blood in the fourth cerebral ventricle, allergic reactions, or infection, (2) malignant hyperthermia and hyperthermia from other causes (i.e., excessive patient heating), and (3) inadvertent hypothermia. Hypothermia is by far the most common among these thermal disturbances, and reductions in core temperature of only 2°C are associated with adverse outcomes including prolonged post-anesthetic recovery, increased bleeding and transfusion requirement, ventricular tachycardia and morbid cardiac events, and reduced resistance to surgical wound infections and prolonged hospitalization. Conversely, mild hypothermia may be induced therapeutically because in animals it may protect against cerebral ischemia and malignant hyperthermia.

Estimates of core temperature obtained from the forehead are superior to those from the neck. Forehead temperature is clearly better linked to the thermal core than the neck is.

Usual intraoperative alterations in ambient temperature are unlikely to produce clinically important bias.

Aside from estimating core temperature, there are several other reasons anesthesiologists may wish to measure skin-surface temperatures:

1. Average skin temperature is an important thermal input to the central thermoregulatory system.
2. Local skin temperature can indicate the extent of sympathetic blockade during regional anesthesia.
3. Skin-temperature gradients are a simple method to quantity peripheral thermoregulatory vasoconstriction.
4. Skin temperature monitoring can prevent burns during active external re-warming.

Monitoring for each purpose has a place in clinical practice.

SHARN ANESTHESIA CASH BACK PROGRAM

SHARN, Inc. is the leading supplier of liquid crystal temperature trend indicators in the U.S. Our products have been used in over 35 million surgical procedures across the nation.

Now our preferred customers can save even more by participating in a new program that helps offset the cost of temperature monitoring by providing cash back directly to the Anesthesia Department.

Benefits

- Hospital is reimbursed for their commitment to the program – you determine how you want to receive the cash back.
- Guarantees current price of temperature indicator for the length of the agreement.
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How the program works

1. Commit to purchase our temperature indicators at the same average volume as you have in the past. The number of indicators used each month and the total $ value of the agreement determines the amount of cash back your facility will receive.

2. Program is written for 12 or 24 months -- the longer the commitment, the higher the amount of cash savings.

3. Complete an agreement form.

4. Issue a single blanket purchase order to cover the agreement total, time frame, and guaranteed pricing (blanket PO requirement is negotiable).

5. Fax or mail to SHARN, Inc.

Options for receiving cash savings

- Receive reimbursement at time of signing up for the program.
- Receive reimbursement in two equal installments: First installment payable halfway through the program, with the balance at program end.
- Applied to the cost of the temperature indicator to reduce current hospital pricing.

Save your hospital money on products they already use – sign up today!

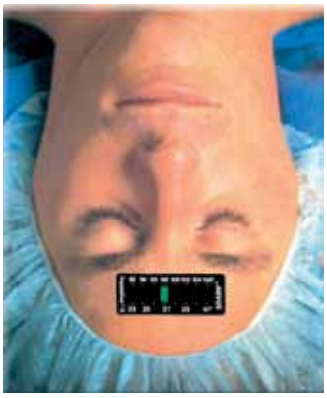
1"*The SHARN Crystaline Indicator and Its Use As A Temperature Trend Indicator for the Surgical Patient,*" October 1992

2 Sladen RN, "*Thermal Regulation in Anesthesia and Surgery,*" Philadelphia PA, JB Lippencott, p.172

3 Linda Pembrook, "*ASA Guidelines for Temperature Monitoring Inadequate, Out of Date,*" Anesthesia News, June 1999, Based on a report at the 52nd annual Postgraduate Assembly of the New York State Society of Anesthesiologists, present by Dr. Henry aProfessor of Anesthesiolorgy, Jefferson Medical College of Thomas Jefferson University, Philadelphia.

4 Takehiko Ikeda MD, Daniel I. Sessler MD, Danielle Marder BA, Junyu Xiong MD, "*Influence of Thermoregulatory Vasomotion and Ambient Temperature Variation on the Accuracy of Core-temperature Estimates by Cutaneous Liquid-crystal Thermometers,*" Anesthesiology, Vol. 86, No. 3, March 1997, p. 603-612

Temperature Trend Indicators



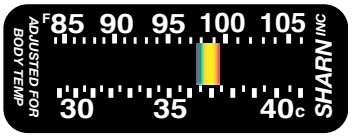
This handy dispenser mounts on the wall or on equipment so it's nearby when you need it.

Call for further description and ordering information.

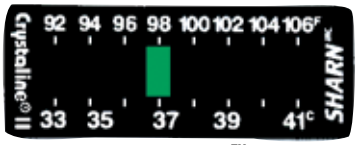
SHARN Forehead Temperature Strips have been used on more than 65 million surgical patients. Easy to use, non- invasive and inexpensive, SHARN temperature strips are a good alternative to electronic probes. Leave them on during your patient's stay in PACU for easy monitoring. These temperature strips are adjusted to display the equivalent of core temperature. Crystaline™ forehead strips are ideal for use with laryngeal mask airways, and mac, or regional anesthesia when you don't have to intubate.

Latex Free & DEHP Free

Order #	Packaged	QTY
Crystaline		
5101C-MLC	Dispenser	100
5101H-MLC	Dispenser	50
Crystaline II		
5101-II	Envelope	100
5101B-II	Bulk	125
5101F-II	Dispenser	125
5101C-II	Dispenser	100
5101H-II	Dispenser	50
Crystaline W		
5105C	Dispenser	100
5105H	Dispenser	50
TempAlert II		
8501-II	Dispenser	100
8501H-II	Dispenser	50

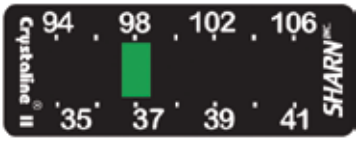


Core Adjusted
84 - 106° F
29 - 41° C



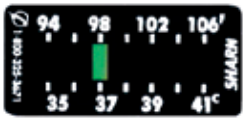
Crystaline™ II

Core Adjusted
92 - 106° F
33 - 41° C



Crystaline™ W

Core Adjusted
94 - 106° F
35 - 41° C



TempAlert™ II

Core Adjusted
94 - 106° F
35 - 41° C

Perfusion Monitors

Useful for many applications, these Sharn temperature strips read and display skin temperature. Use these strips in your Pain Management Department to diagnose RSD, as well as to assess the effectiveness of nerve blocks within minutes by watching for a sympathetic rise in temperature. They are also useful when doing EMGs. **Latex Free & DEHP Free**

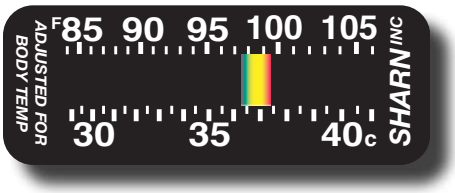
Order #	Packaged	Qty	Description
Crystaline ST			
6102	Envelope	100	Strip
6102B	Bulk	125	Strip
6102F	Dispenser	125	Strip
6102C	Dispenser	100	Strip
6102H	Dispenser	50	Strip
DermaTherm			
2105PB	Roll	50	Band
2100PB	Roll	100	Band
2150PB	Roll	250	Band
2200PS	Box	100	Strip

Skin Temp
80 - 100° F
26 - 38° C

Skin Temp
79 - 101° F
26 - 38° C

Skin Temp
80 - 100° F
29 - 36° C

Crystaline™. The Inexpensive, All-Around, Every Patient Temperature Strip.



From pre-op through recovery and beyond, the Crystaline Temperature Trend Indicator stays with the patient. Temperature monitoring in the holding area has traditionally been done orally or with infrared tympanic thermometers. This can create inconsistencies between readings taken by other electronic methods later in the OR and in recovery. Understanding the peri-operative temperature "trend" is critical to achieving satisfactory patient outcomes. With the Crystaline indicator, temperature readings are consistent and instantly available. Crystaline has been successfully used in over 60 million surgical procedures in the U.S. During recovery, when surgical complications may be manifested, there can be long periods of time when patients are not monitored for temperature. With the Crystaline indicator in place throughout surgery and recovery, there are no interruptions in monitoring, and you can be sure that comparative readings reflect changes in the patient, not in the monitor.

* "Measurement Offset With Liquid Crystal Temperature Indicators," Anesthesiology, V 73, No 3A, Sept. 1990. Tests were conducted by T. S. Shomaker, MD and D. G. Bjorake, MD, Dept. of Anes., University of Florida College of Medicine, Gainesviiie, FL 32610.

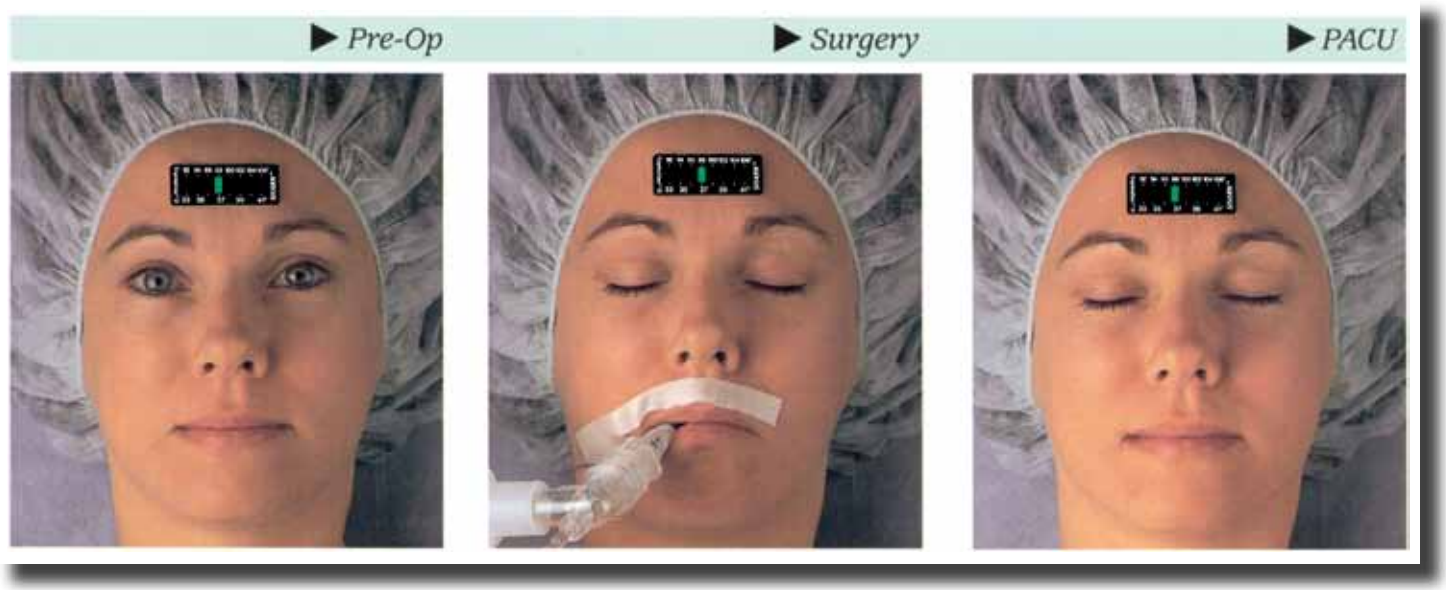
The Reliability of An Electronic Probe Without the Electronics. Or the Probe.

Crystaline measures surface temperatures and gives you a core-adjusted reading on a continuous scale in both Centigrade (28°-42°C) and Fahrenheit (84°-106°F). Not only is Crystaline much less expensive than disposable probes, it also eliminates hidden costs such as maintenance, repairs, acquisition, inventory, dispensing and biohazardous disposal associated with electronic monitoring. As standardization occurs, Crystaline is the ideal choice to replace many of the temperature devices typically stocked in anesthesia.

It Makes Good Sense To Monitor Every Surgical Patient.

The danger of hypothermia, malignant hyperthermia and other life-threatening conditions can be as great for patients undergoing brief surgeries as for those facing longer procedures. Yet many surgeries, especially less-invasive procedures, are performed without temperature monitoring. Because the Crystaline indicator is a non-invasive device, it is ideally suited for use in all surgeries. It gives you the assurance you need, at a cost you can afford.*

If you are using any laryngeal mask airways, Crystaline is the perfect choice for monitoring temperature because it is non-invasive, easy to use and inexpensive.



21 Vaporizers

Operating Principles of Variable Bypass Vaporizers

Total fresh gas flow (FGF) enters and splits into carrier gas (much less than 20%, which becomes enriched – saturated, actually – with vapor) and bypass gas (more than 80%). These two flows rejoin at the vaporizer outlet. The splitting ratio of these two flows depends on the ratio of resistances to the flow, which is controlled by the concentration control dial, and the automatic temperature compensation valve.

How to Fill Vaporizers

For either funnel or keyed filler types, fill the vaporizer only to the top etched line within the sight glass. Do not hold the bottle up on a keyed filler until it stops bubbling (this will overfill the chamber, particularly if the concentration control dial is "on", or if leaks are present). The only current vaporizer which can be filled while it is operating is the Tec 6 (Desflurane).

How Much Liquid Agent Does a Vaporizer Use Per Hour?

Typically, 1 mL of liquid volatile agent yields about 200 mL vapor. This is why tipping is so hazardous – it discharges liquid agent into the control mechanisms or distal to the outlet. And minute amounts of liquid agent discharged distal to the vaporizer outlet result in a large bolus of saturated vapor delivered to the patient instantaneously.

Hazards and Safety Features of Contemporary Vaporizers

Hazards

Incorrect agent

Tipping
- If tipped more than 45° from the vertical, liquid agent can obstruct valves.
- Treatment: Flush for 20-30 minutes at high-flow rates and with high concentration set on dial. Please note that this is the recommended treatment for the Tec 4 vaporizer. The correct approach for other models differs, so their individual operating manuals must be consulted.

Simultaneous inhaled agent administration
- If removing the central vaporizer from a group of three on an Ohmeda machine, move the remaining two so that they are adjacent. On models which were manufactured prior to 1995, removing the center vaporizer of three defeats the interlock and allows the outer two vaporizers to be turned on simultaneously.

Reliance on breath by breath gas analysis rather than preventive maintenance
- Problem: Failure of temperature compensation device may result in a rapid onset, high output failure of the vaporizer.
- Failure of renewable components, such as seals and O-rings, may have the same effect.

Safety Features

Important safety features include:

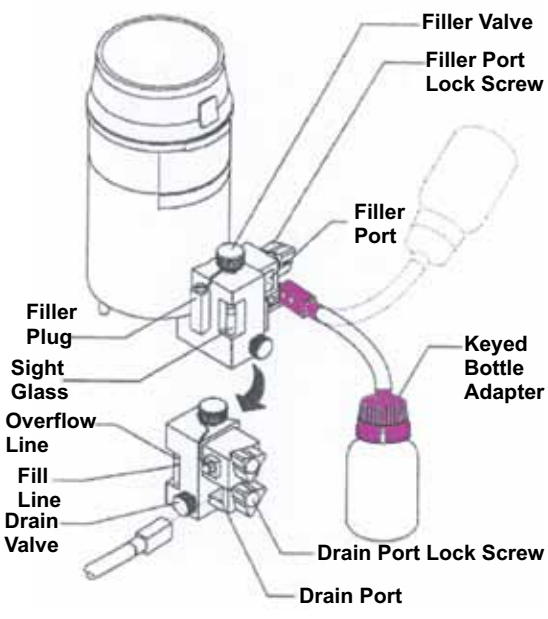
- Keyed fillers
- Low filling port
- Secured vaporizers (less ability to move them about minimizes tipping)
- Interlocks
- Concentration dial increases output in all when rotated counterclockwise (as seen from above)

VAPORIZERS 2

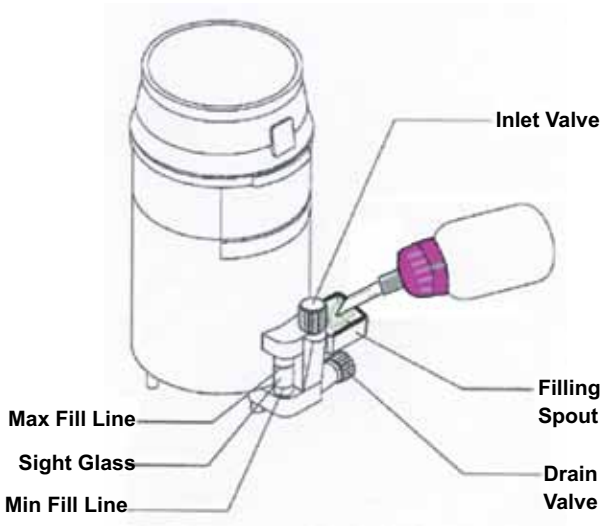
Classification	*Datex -Ohmeda Tec 4, Tec 5, and Aladin (AS/3 ADU); Drager Vapor 19.n*	*Copper Kettle, Vernitrol*	*Datex -Ohmeda Tec 6 (Desflurane)*
Splitting Ratio (carrier gas flow)	Variable -bypass (vaporizer determines carrier gas split)	Measured -flow (oper ator determines carrier gas split)	Dual -circuit (carrier gas is not split)
Method of Vaporization	Flow -over	Bubble -through	Gas/vapor blender (heat produces vapor, which is injected into fresh gas flow)
Temperature Compensation	Automatic temperature comp ensation mechanism	Manual (i.e., by changes in carrier gas flow)	Electrically heated to a constant temperature (39°C thermostatically controlled)
Calibration	Calibrated, agent -specific	None; multiple -agent	Calibrated, agent -specific
Position	Out of circ uit	Out of circuit	Out of circuit
Capacity	Tec 4 – 125 mL Tec 5 – 300 mL Vapor 19.n – 200 mL Aladin – 250 mL	200 -600 mL (no longer manufactured)	390 mL

VAPOFIL

Vapofil



AntiSpil



Vaporizer Filler Adapters

Vapofil™ for key filled vaporizers
Stop fighting with your filler keys. Vapofil is designed with 2 inner tubes, one to let the air escape and the other to let the agent flow into the vaporizer. Vapofil prevents vapor-lock.

Stainless Steel Block!

Vaporizer	Order #
Ultane®/Sevoflurane	8907-S
Forane®/Isoflurane	8907-F

If you prefer a corrugated tube with a stainless block.

Sevoflurane	V0507-S
Forane®	V0507-F

Drager Fill® for newer models of Drager vaporizers

Color	Order #
Ultane®/Sevoflurane	DF-M36120
Forane®/Isoflurane	DF-M36110

AntiSpil™ for funnel-filled vaporizers
Stop wasteful spills by using AntiSpil to fill your funnel-filled vaporizers. The curved tip and flow meter let you pour the agent with less risk of spills.

Vaporizer	Order #
Forane®/Isoflurane	9010-F

22 Ventilator Problems and Hazards

VENTILATOR PROBLEMS & HAZARDS 1

Disconnection

Most common site is Y piece. The most common preventable equipment-related cause of mishaps. Direct your vigilance here by: precordial ALWAYS; if you turn the vent off, keep your finger on the switch, use apnea alarms, and don't silence them.

The biggest problem with ventilators is the failure to initiate ventilation, or resume it after it is paused.
Be extremely careful just after initiating ventilation – or whenever ventilation is interrupted: observe and listen to the chest for a few breathing cycles. Never take for granted that flipping the switches will cause ventilation to occur, or that you will always remember to turn the ventilator back on after an X-ray.

Monitors for Disconnection
Precordial monitor (the most important because its "alarms" can't be inactivated)
Capnography
Other monitors for disconnection
- Ascending bellows
- Observe chest excursion and epigastrium
- Airway Pressure monitors
- Exhaled Volume monitors

Occlusion / Obstruction of Breathing Circuit

Beside inability to ventilate, obstruction may also lead to barotrauma. Obstruction may be related to:

Tracheal tube (kinked, biting down, plugged, or cuff balloon herniation). "All that wheezes is not bronchospasm."
Incorrect insertion of flow-direction-sensitive components (PEEP valves which are added on between the absorber head and corrugated breathing hoses).
Excess inflow to breathing circuit (flushing during ventilator inspiratory cycle)
Bellows leaks
Ventilator relief valve (spill valve) malfunction
APL valve too tight during mask ventilation or not fully open during pre-oxygenation

Misconnection

Much less of a problem, since breathing circuit and scavenger tubing sizes have been standardized.

Failure of Emergency Oxygen Supply

May be due to failure to check cylinder contents, or driving a ventilator with cylinders when the pipeline is unavailable. This leads to their rapid depletion, perhaps in as little as an hour, since you need approximately a VT of driving gas per breath, substantially more if airway resistance (RAW) is increased.

Infection

Clean the bellows after any patient with diseases, which may be spread through airborne droplets, or don't use the mechanical ventilator, or use bacterial filters, or use disposable soda lime assembly, or use a Bain.

AIRWAY MANAGEMENT 2

Equipment and Devices for Aiding in Airway Management

LMAs (Laryngeal Mask Airways)
Devices that are designed to aid in endotracheal tube placement. The LMA consists of a tube connected to an elliptical mask with an inflatable rim, which sits over the larynx. The patient can usually breathe spontaneously using this airway device but, to be safe, some doctors like to put patients on a ventilator while using the LMA. The biggest advantage of the LMA is that it stays outside the larynx, so that you don't need to manipulate the vocal cords, which is the deepest point of airway stimulation.

COPAs (Cuffed Oropharyngeal Airways)
Oral airways with a cuff that produces a seal around the larynx. The COPA works via a different concept than the LMA. You cannot intubate a patient using a COPA; rather it is designed to help the patient breathe spontaneously through it (or in combination with a ventilator). The COPA is positioned against the base of the tongue and is placed in the pharynx, where the inflatable low-pressure cuff helps to block the oropharynx and thereby enables you to ventilate the patient. Like the LMA, the COPA is designed to avoid tracheal and laryngeal stimulation.

Oropharnygeal and Nasopharyngeal Airways
Short plastic devices, which are placed in the oral cavity and the pharynx to help prevent respiratory obstruction, such as when the tongue falls back. The oral airway alone can't help you manage the airway. They are primarily used in conjunction with mask ventilation. The nasopharyngeal airway works the same way, except that it is placed through the nasopharynx.

Combitubes
A combination between tube airways and cuffed devices. It can be blindly placed in the mouth; you don't need a laryngoscope.

Bullard Laryngoscopes
Rigid instruments that function as sort of an indirect fiberoptic laryngoscope. They have a unique blade (the "Bullard blade") attachment that is designed to make the exposure of the vocal cords better. The blade portion is designed to match the body's anatomical airway. This feature negates the need to manipulate the patient's head and neck to visualize the larynx. The Bullard scopes are primarily used as an option for difficult airway cases, particularly in patients with cervical-spine pathology. The reason that they are not used more often is that they require much more setup to use than a typical laryngoscope.

Protocol for Mechanical Ventilator Failure

1. If the ventilator fails, manually ventilate with the circle system.
2. If #1 is not possible, then bag with oxygen (if a portable cylinder is available) or room air.
3. If #2 is not possible, then try to pass suction catheter through the tracheal tube.
4. If #3 is not possible, then visualize the hypopharynx and cords, or re-intubate (?).

Don't delay re-establishing ventilation to diagnose a problem. Proceed expeditiously from one approach to another.

Parker Laryngeal Mask Device

Disposable Silicone Laryngeal Masks

Finally a disposable that feels like a reusable!

The smooth contouring of our 100% medical grade silicone device enables easy insertion, is gentle to the airway, and is designed to produce an effective seal.

The unique color-coded and printed pilot balloon allows for fast and correct size identification.

The clear 15mm connector allows a potential blockage to be seen.

Latex-free & DEHP free

Silicone Disposable

Order #	Size
LP-HPLMD-10	Size 1.0
LP-HPLMD-15	Size 1.5
LP-HPLMD-20	Size 2.0
LP-HPLMD-25	Size 2.5
LP-HPLMD-30	Size 3.0
LP-HPLMD-40	Size 4.0
LP-HPLMD-50	Size 5.0

Silicone Disposable Reinforced

Order #	Size
LP-HPLMDR-10	Size 1.0
LP-HPLMDR-15	Size 1.5
LP-HPLMDR-20	Size 2.0
LP-HPLMDR-25	Size 2.5
LP-HPLMDR-30	Size 3.0
LP-HPLMDR-40	Size 4.0
LP-HPLMDR-50	Size 5.0