Calibrated vaporizers: Maintaining clinical performance

This column is the fourth in a series of articles designed to help nurse anesthetists understand and manage equipment technology. In this issue the author explains how to maintain vaporizers to minimize the risks of overdose, which may result from high output, or awareness and recall, which low output may cause. Since calibrated vaporizers are used to dispense inhaled anesthetic drugs, both human factors and mechanical problems must be addressed to ensure accuracy and performance during use.

The goal of every equipment maintenance program is to minimize the possibility that a device or component will fail or malfunction. These efforts are undertaken with medical equipment for two important reasons: to extend the life of all devices and maximize the return on the financial investment; and to detect evidence of wear or deterioration long before it causes a patient problem or results in a financial loss. For these reasons, the basic foundations of preventive maintenance and equipment safety apply to mechanical vaporizers in the same way as they do to all other mechanical or pneumatic components of the anesthesia system.

Two decades of argument

For the past twenty years, controversy has surrounded the issue of preventive maintenance for vaporizers, and many arguments have been used to compare the need with the benefits. For example, some experts support the position that a vaporizer needs to be serviced on a regular basis (e.g., every 1-2 years), so that all parts can be inspected, new parts installed where there is any doubt about wear and the calibration verified with a precision refractometer. Others have confused the issue of preventive maintenance with the practice of spot checking a vaporizer's output, a routine that is only one phase of a regular maintenance program. Using a portable gas indicator, an agent analyzer or an agent monitor to follow trends in output have been suggested as sufficient reason to justify operating vaporizers that are clearly performing outside the limits of their specifications. As more departments incorporate continuous gas and agent analysis into routine patient monitoring, some clinicians now believe that preventive maintenance is completely unnecessary.

Sorting out the facts

Preventive maintenance is not the same as a periodic calibration check or the routine use of a gas indicator, an agent analyzer, an agent monitor or a mass spectrometer. Monitors can detect a malfunction but they cannot predict one. Such is the case of a calibration check with a portable gas indicator or a one-time sample measured by an agent monitor. This test can measure the concentration of agent, but it cannot verify that the temperature-compensating system is operating at its mechanical best.

When a temperature-compensating mechanism fails, the resultant increase in output does not cause a gradually changing reading. Instead, the change is usually sudden and develops without subtle indicators. While the agent monitor can demonstrate the sudden overdose and sound an alarm, it cannot protect the patient from exposure to the problem. The speed of overdose may even present so suddenly that the clinical indicators of hypotension and bradycardia occur almost simultaneously with the warning sound of the alarm.

Vaporizers are precision instruments that may not perform as intended whenever they suffer from abuse, misuse or improper maintenance. While every vaporizer operates according to its unique design, all calibrated models are mechanical and prone to the same risks of wear and tear as any other component of the anesthesia machine system. When funnel-filled vaporizers are used instead of key-filled vaporizers, the risks of contamination by dust and particulate matter increase. Dust, when introduced into the vaporizer, contributes to wear on its moving parts. Thymol, normally present in halothane vaporizers, is another example of particulate matter that also adds to the problem of mechanical deterioration. Filling errors must also be considered when evaluating wear and tear on vaporizers. Thymol has historically been found inside enflurane and isoflurane vaporizers and may contribute to deterioration of moving parts in any calibrated vaporizers, regardless of its design, age or manufacturer.

Points of agreement in all aspects of the debate

In ensuring that the clinical performance of a vaporizer will be predictable, all viewpoints have merit, particularly regarding the clinical aspects of vaporizer care. Instead of propagating the debate about which course of action is best, it makes sense...
to identify why both preventive maintenance and field calibration tests are useful procedures.

- A regular maintenance program is indicated for any medical device whenever deterioration is possible and there is no means to detect it before the clinical performance of that device changes. Undetected deterioration in a vaporizer may never be significant in a spot check, yet it may cause the device to fail or malfunction.
- A calibration check with a gas analyzer is warranted as a means to verify that the vaporizer is operating within its allowable tolerance, a percentage of the dial setting specified by each manufacturer. A gas analyzer may determine that a vaporizer conforms to its specifications, but it cannot verify that the temperature-compensating system is operating at its best. In addition, an analyzer cannot identify that any part of a vaporizer is marginal and in need of repair. Therefore, to minimize the risk of an inadvertent high output overdose or a low output overdose, a vaporizer that exceeds its allowable specification of tolerance should be returned to its manufacturer for factory-authorized reconditioning.
- Continuous measurement with a mass spectrometer, a Raman scattering gas analyzer or an infrared agent monitor is useful in verifying that the concentration of the agent prescribed is close to the actual concentration delivered. In the case of unusually high or low vaporizer output, and with respect to each instrument’s sampling cycle, continuous monitoring can help detect the onset of a vaporizer failure. But even while closely watching the patient and the monitor, an absolute overdose may still occur. Once an excessively high dose of an agent has been administered, the clinical course of action often leads to resuscitation. At this point the arguments against preventive maintenance have little merit because there are no monitors designed to prevent a failure or substitute for the replacement of a worn part.

Professional choices

Before making decisions about calibration, preventive maintenance, the need for reconditioning and recalibration, or the reliability of readings, it is important to dispel the myth that all vaporizers are inaccurate. The following factors contribute to the reasons why a vaporizer setting is often different from the reading determined by an indicator, an analyzer or a monitor.
- Reading a gas indicator (e.g., a Riken® field refractometer) is different than reading any other type of agent analyzer, agent monitor or gas spectrometer. The Riken® instrument has an optical scale which requires interpretation, subjective judgment and practice before reasonable determinations can be made. Therefore, only persons trained in the technique of reading the optical frame in this instrument and who are skilled in its use should attempt to apply this technique to clinical verification of calibration.
- Each respective gas indicator, agent monitor, gas analyzer or mass spectrometer has an allowable tolerance, which is a range of plus or minus a percentage of the reading displayed. The tolerance of each instrument is product and model specific and must be considered before comparing the reading of one device with the reading of another.
- Every vaporizer setting has an allowable tolerance, which is a range of plus or minus a specified percentage of the dial setting. This tolerance must also be taken into consideration before the vaporizer is declared to be “out of calibration.”
- All vaporizers are calibrated at the factory using a precision refractometer, or equivalent, that measures the percentage of agent at the vaporizer outlet. Agent monitors, gas analyzers and mass spectrometers withdraw a sample of gas from the patient’s airway, downstream of the vaporizer outlet. When the sample sites are different, the readings are expected to be different.
- Changes in the mixture of the carrier gas even alter the percentage of agent delivered to the outlet of the vaporizer. If a vaporizer is calibrated with 100% oxygen, and a clinical sample is measured with a mixture of gases other than pure oxygen, the reading would vary.

Routine maintenance does not guarantee that a problem will not occur, but it is an established method of preventing problems and is used for all other components of the anesthesia machine. The objective of appropriate equipment operation and maintenance is to ensure that medical devices are clinically reliable in their performance and safety. Therefore, before a decision is made to eliminate preventive maintenance for vaporizers or to extend the interval of time beyond that which each manufacturer recommends, it is important to appreciate the risks of a potential malfunction. It is also advisable to remember that vaporizers are rarely implicated in a patient complication, but when they are, the outcome ranges from absolute overdose to recall.

SUGGESTED READING


AUTHOR

Linda M. Huffman, CRNA, BA, is a free-lance anesthetist in Chicago and develops anesthesia and critical care training programs for Healthcare Training Associates, Ltd., Chicago.
Announcing a new emergence in anesthesiology
New for induction and maintenance

DIPRIVAN®
INJECTION
propofol
10 mg/mL

© 1989 ICI Americas Inc.
The first of a new class of IV anesthetic agents for induction and maintenance

DIPRIVAN, an alkylphenol, provides:

**Rapid, predictable onset**
- smooth induction with minimal excitation (one arm-brain circulation)

**Rapid metabolism and extensive distribution**
- total body clearance exceeds estimates of hepatic blood flow
- no active metabolites

**Rapid, clearheaded awakening**
- majority of patients are generally awake, responsive, and oriented within 8 minutes
- low incidence of nausea and vomiting

*As with most anesthetic agents, the clearance rate of DIPRIVAN decreases in elderly patients.

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**Mean propofol blood concentration profile after a single bolus dose**

![Graph showing propofol blood concentration profile](image)

**DIPRIVAN clearance**

<table>
<thead>
<tr>
<th></th>
<th>Clearance rate (L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIPRIVAN</td>
<td>1.6–3.4</td>
</tr>
<tr>
<td>thiopental</td>
<td>.11–.30</td>
</tr>
<tr>
<td>methohexital</td>
<td>.70–.84</td>
</tr>
</tbody>
</table>

5-10 times faster than barbiturates

---

Calculations of clearance rates based on 70-kg patient.
—adapted from Way and Trevor, p. 803

—adapted from Cockshott, p. 46

Please see last pages of this advertisement for full prescribing information.
New awakening in anesthesiology...

Alert emergence

Significantly faster recovery profile

Awakening was faster with DIPRIVAN than with thiopental/isoflurane...and DIPRIVAN patients were considered suitable for discharge significantly (P < 0.05) sooner.  

<table>
<thead>
<tr>
<th>Mean postanesthesia recovery times (min)</th>
<th>DIPRIVAN</th>
<th>Thiopental/isoflurane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of anesthesia</td>
<td>85*</td>
<td>57</td>
</tr>
<tr>
<td>Response to commands</td>
<td>3.5*</td>
<td>6.1</td>
</tr>
<tr>
<td>Eyes open spontaneously</td>
<td>4.0*</td>
<td>6.3</td>
</tr>
<tr>
<td>Fully oriented</td>
<td>5.5</td>
<td>9.4</td>
</tr>
<tr>
<td>Able to tolerate fluids</td>
<td>61*</td>
<td>130</td>
</tr>
<tr>
<td>Able to stand unassisted</td>
<td>68</td>
<td>87</td>
</tr>
<tr>
<td>Able to walk unassisted</td>
<td>70</td>
<td>96</td>
</tr>
<tr>
<td>Able to void</td>
<td>102*</td>
<td>173</td>
</tr>
<tr>
<td>“Ready” for home</td>
<td>138*</td>
<td>206</td>
</tr>
</tbody>
</table>

*Statistically significant (P < 0.05).
Measurements taken from time of discontinuation of all maintenance anesthesia.

With less of the nausea and vomiting associated with other anesthetic agents—up to 24 hours postop
Superior recovery

Improved speed and quality of recovery compared with thiopental/isoflurane:
- more rapid time to extubation\(^5\)
- more rapid and clearheaded awakening\(^6\)-\(^8\)
- lower incidence of nausea and vomiting\(^2\),\(^7\)
- patients able to tolerate fluids faster\(^2\),\(^4\)

Earlier discharge from PARR*:
- more efficient utilization of OR/PARR facilities\(^9\)
- increased nursing efficiency\(^9\)
- rapid return to routine self-care activities

As part of a balanced anesthetic technique, DIPRIVAN is a cost-effective alternative to standard induction agents and volatile maintenance agents.

*An adequate period of evaluation of the awakened patient is indicated to ensure satisfactory recovery from general anesthesia.

Please see last pages of this advertisement for full prescribing information.
New control in anesthesiology...

**DIPRIVAN® INJECTION propofol**

Rapid metabolism and extensive distribution facilitate control of anesthetic depth.
Maintenance of anesthesia: easily controlled

No reported awareness during maintenance with DIPRIVAN

Overall quality of maintenance anesthesia superior to thiopental/isoflurane.

<table>
<thead>
<tr>
<th>Assessment of maintenance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
</tr>
<tr>
<td>DIPRIVAN (n = 50)</td>
</tr>
<tr>
<td>Thiopental + isoflurane (n = 50)</td>
</tr>
</tbody>
</table>

*Statistically significant differences between all treatment groups (P < 0.05, Mantel-Haenszel Test)—as measured by the percent variation from baseline in hemodynamic parameters.

When used with N₂O/O₂ for maintenance, supplementation with IV analgesic agents is generally required; muscle relaxants may also be required.
New assurance in anesthesiology...

Worldwide experience in over 7,000,000 patients

Hemodynamic and respiratory effects are dose-dependent

- Hemodynamic effects during induction were generally more pronounced than with traditional IV induction agents.

- Blood pressure predictably decreased on induction (sometimes > 30%) but was within acceptable ranges for healthy individuals.*

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1 Induction bolus dose. Patients received either DIPRIVAN 2.5 mg/kg or thiopental 5.0 mg/kg. DIPRIVAN patients were then maintained with repeated injections of 25% of the original induction dose supplemented with 60% to 70% nitrous oxide in oxygen. Thiopental/isoflurane patients were maintained with 0.5% to 2.0% isoflurane supplemented with 60% to 70% nitrous oxide in oxygen.11

* Elderly, debilitated, and/or hypovolemic patients, and those rated ASA III/IV, may have more profound adverse cardiovascular responses.

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(adapted from Weingarten and Youngberg, data on file)
- Increase in heart rate following intubation was less pronounced than after thiopental with isoflurane.\textsuperscript{11,12}

- The cardiovascular effects of DIPRIVAN may be increased in patients who have received sedative or narcotic premedications.\textsuperscript{*}

**In clinical trials including over 1500 DIPRIVAN patients, most adverse events were mild and transient**

- Transient local pain (≥10%) may occur during IV injection; venous sequelae have rarely been reported (<1%).

- Apnea often occurs on induction (43%) and may persist for more than 60 seconds.

- Significant hypotension (5.5%) and bradycardia (2.4%) have been reported\textsuperscript{1}; experience has shown them to be clinically manageable.

- Low overall incidence of nausea (16.7%) and vomiting (9.1%).

\textsuperscript{*} Induction dose requirements may be reduced.

\textsuperscript{1} Sufficient to require intervention.

*Please see last pages of this advertisement for full prescribing information.*
New versatility in anesthesiology...

DIPRIVAN® INJECTION propofol

For a wide variety of procedures...
outpatient and inpatient

- Gynecologic
- Urologic
- Ophthalmic
- Orthopedic
- Dermatologic
- Diagnostic
- ENT
- General surgery

DIPRIVAN should be administered only by persons trained in the administration of general anesthesia. **Facilities for maintenance of a patent airway, artificial ventilation, and oxygen enrichment and circulatory resuscitation must be immediately available.**

DIPRIVAN should be used with caution in elderly, debilitated, and/or hypovolemic patients, and those rated ASA Class III or IV.

DIPRIVAN is not recommended at this time for use in pediatric patients, nursing mothers, patients with increased intracranial pressure or impaired cerebral circulation, and in obstetrics, including cesarean section deliveries.

- DIPRIVAN can be combined with other commonly used agents in anesthesia.

- Also eliminates concerns about operating room/recovery room pollution associated with volatile agents.

Please see last pages of this advertisement for full prescribing information.
For induction and maintenance...

DIPRIVAN®
INJECTION
10 mg/mL

The new IV anesthetic agent with a unique pharmacokinetic profile

- for rapid, predictable onset of anesthesia
- for smooth induction with minimal excitation
- for easily controlled maintenance of anesthesia
- for rapid, clearheaded awakening—with a low incidence of nausea and vomiting

Extensive worldwide experience
in a wide variety of surgical procedures—
outpatient and inpatient

As part of a balanced anesthetic technique, DIPRIVAN is a cost-effective alternative to standard induction agents and volatile maintenance agents.

**INJECTION**

**DIPRIVAN® (propofol) Injection is a sterile, nonpyrogenic emulsion containing 10 mg/mL of propofol suitable for intravenous administration.** Propofol is chemically described as 2,6-Diisopropylphenol and has a molecular weight of 187.2. The empirical structure of the molecule is:

\[
\text{C}_8\text{H}_{17}\text{O}_2
\]

Propofol is very slightly soluble in water and, thus, is formulated in a white, oil-in-water emulsion. The emulsion is sterile in appearance. In addition, the emulsion contains approximately 0.5% lecithin, 0.1% albumin, and 3% polysorbate 80. After a single IV bolus dose, two distribution phases are seen, a rapid phase with a half-life of 1.8 to 8.3 min and a slower phase of 54 to 64 min. These distribution phases are associated with the movement of DIPRIVAN from highly perfused tissues (vessel-rich tissue) to less well-perfused tissues. The terminal elimination half-life of DIPRIVAN ranges from 300 to 700 min. With prolonged administration of DIPRIVAN injection, the terminal elimination half-life may be even longer, and DIPRIVAN has a metabolic clearance that ranges from 1.8 L/min to 3.4 L/min in healthy adult patients. This metabolic clearance exceeds estimates of hepatic blood flow, but the physiologic rate of metabolism is consistent with hepatic metabolism. The steady state distribution volume ranges from 150 to 1000 liters in healthy 70-kg patients. The long term elimination half-life of DIPRIVAN is due to the large steady state distribution volume which is presumed to be due to extensive drug partitioning into tissues.

The termination of anesthetic drug effects of DIPRIVAN after a single IV bolus or a maintenance infusion is due to extensive redistribution from the OIS to other tissues and high metabolic clearance both of which will decrease the concentration of drug in plasma.**

**CLINICAL PHARMACOLOGY:** DIPRIVAN injection is an intravenous hypnotic agent for use in the induction and maintenance of anesthesia. The pharmacokinetic profile of DIPRIVAN injection can be calculated as follows:

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The termination of anesthetic drug effects of DIPRIVAN after a single IV bolus or a maintenance infusion is due to extensive redistribution from the OIS to other tissues and high metabolic clearance both of which will decrease the concentration of drug in plasma.**

**Use in Older Patients:** Propofol bolus concentrations required for induction are generally lower in elderly patients (≥ 65 years of age) compared to younger patients. When given by continuous infusion, elderly patients may require lower infusion rates due to age-related changes in hepatic clearance and plasma volume. The efficacy and safety of DIPRIVAN have not been established in patients ≥ 85 years of age. A pediatric population (18-35 years) patients to avalue one of the dose was recovered In the urine within 24 hours and approximately 90% of the dose was recovered in the urine within 48 hours. Recovery from the effects of DIPRIVAN injection occurs due to metabolism and distribution during the first two-seconds of the decay curve and is not dependent on the terminal elimination half-life. A study in six subjects showed approximately 95% of the dose was recovered in the urine in the first 24 hours and approximately 90% of the dose was recovered in the urine within 24 hours. DIPRIVAN is chiefly metabolized by conjugation in the liver to inactive metabolites which are secreted by the kidney. A glucuronide conjugate metabolite accounted for almost 50% of the administered dose. The exact metabolic fate of DIPRIVAN and the sites of possible "intrastenic" metabolites have not been identified.

**Emulsion Injections:** DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.) DIPRIVAN injection is not recommended for use in nursing mothers because DIPRIVAN injection has been reported to be secreted in human milk and the effects of oral absorption of small amounts of propofol are not known. (See PRECAUTIONS.)
DIPRIMN (propofol) injection

**Indications and Usage:**

- **Anesthesia:** DIPRIMN Injection may be administered by infusion or intermittent injection for maintenance, prior to induction, or during the induction period when an anesthetic agent is required for surgical stimulation or light anesthesia.
- **Sedation/Anxiolysis:** DIPRIMN Injection may be administered by infusion, or intermittent injection to induce sedation/ anxiolysis or to maintain such effects, which may be used to facilitate other diagnostic or therapeutic procedures.
- **Adjunctive Use:** DIPRIMN Injection may be administered by infusion to provide a satisfactory analgesic effect when combined with analgesic agents.

**Contraindications:**

- Hypersensitivity to propofol or any of its components.
- Hypertension in patients with a history of intracerebral hemorrhage or other conditions where increased intracranial pressure is a contraindication.
- Known or suspected sensitivity to nitrous oxide, other anesthetic agents, or other agents used in anesthesia.

**Warnings:**

- Cardiac arrhythmias: DIPRIMN Injection may increase the risk of arrhythmias, particularly in patients with pre-existing cardiac conditions.
- Respiratory depression: DIPRIMN Injection may cause respiratory depression, which may require supportive care.
- Hypotension: DIPRIMN Injection may cause or exacerbate hypotension, particularly in patients with pre-existing hypotension.

**Precautions:**

- Close monitoring of vital signs is recommended during and after administration.
- DIPRIMN Injection should be used with caution in patients with a history of Peptic Ulcer Disease, hyperlipidemia, or pre-existing cardiovascular disease.

**Dosage and Administration:**

- **Initial Dose:** The initial dose of DIPRIMN Injection should be individualized based on the patient's condition and response. Generally, 100 mg (100 mL) of DIPRIMN Injection should be administered over 1-2 minutes.
- **Maintenance Dose:** Maintenance doses should be titrated to maintain a satisfactory anesthetic depth. Typically, increments of 25 mg (25 mL) or 50 mg (50 mL) are used, depending on the patient's response.

**Pharmacokinetics:**

- **Onset of Action:** DIPRIMN Injection is rapidly absorbed, with an onset of action within 1-2 minutes.
- **Duration of Action:** The duration of action is typically 5-10 minutes, depending on the dose and patient response.

**Adverse Reactions:**

- The most common adverse reactions include respiratory depression, hypotension, and bradycardia. Other less common reactions may include allergic reactions, paradoxical reactions, and cardiac arrhythmias.

**Overdosage:**

- Overdosage can result in respiratory depression, hypotension, and cardiac arrhythmias. Immediate supportive care, including ventilation and oxygen therapy, should be provided.

**Supplied Forms:**

- DIPRIMN Injection is available in a ready-to-use 20-ml ampule containing 10 mg/mL of propofol.

**Storage:**

- Store below 22°C (72°F). Do not store below 4°C (40°F). Refrigeration is not recommended.

**References:**

- Jay D. Robinson, CPC, Medical Services Consultant, DUNHILLF CHARLOTTE, INC. 
- Jackson Memorial Hospital at University of Miami/Jackson Medical Center is opening a new decentralized maternity center.
- The CRNA Supervisor will have operational management and supervisory responsibilities for The Center. Salary contingent on experience. Qualified candidates will have OB experience.
- Staff CRNA positions are also available on the main complex as well as for our Maternity Center. Starting salary $55,200, contingent on experience. Shift differentials 20% 3pm-11pm, 25% 11pm-7pm/7pm-7am.

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Jackson Memorial Hospital at University of Miami/Jackson Medical Center is opening a new decentralized maternity center. This 55-bed post-partum maternity facility has 2 delivery/operating rooms and will be staffed with nurse anesthetists. The CRNA Supervisor will have operational management and supervisory responsibilities for The Center. Salary contingent on experience. Qualified candidates will have OB experience.

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North Carolina Baptist Hospital

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At United Anesthesia Associates, our primary concern is medical well-being. The responsibility is ours and that's why United CRNAs are the best in the country.

We're tough. It's expected.

Our CRNAs are confident in their skills, responsible, reliable, and have a strong desire to succeed.

If you are interested in perks, exotic travel, choice pay, and cash bonuses—call any placement company. But if you want all of this plus the recognition of being associated with the most highly regarded agency, unequaled in its service to the industry, then choose United Anesthesia Associates.

We will help you get to where you want to be and not a moment too soon.

That's the truth.

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