The nature of supervision

Key words: Captain of the ship, standard of care, supervision.

In some states, nurse anesthetists must be supervised or directed by a physician. Even in states where there is no statute requiring nurse anesthetists to be supervised, hospitals or other institutions may require it. “Supervision,” despite its frequent appearance remains one of the least understood concepts in nurse anesthetist practice. Its genesis is traced to the historical development of nurse anesthetist practice. A few months ago, yet another court rejected arbitrary constraints concerning supervision and followed the reality of practice in upholding a jury determination that a surgeon was not liable for the improper supervision of a nurse anesthetist.

In recent years, enemies of nurse anesthesia have attempted to increase responsibilities associated with supervision. The dispute about the nature of supervision has nothing to do with patient care. No study has ever shown that anesthesia administered by an anesthesiologist or administered by a nurse anesthetist supervised by an anesthesiologist is any safer or otherwise “better” than anesthesia administered by a nurse anesthetist working alone. Nonetheless, both the American Association of Nurse Anesthetists (AANA) and the American Society of Anesthesiologists (ASA) have much different positions on supervision. The AANA has stated that “Supervision or direction refers to a variety of different practice settings within a continuum. While all satisfy the legal requirement, practice settings take into account the education, experience and capabilities of the nurse anesthetist, the rules and guidelines of the institution in which anesthesia is to be provided, and the needs and desires of the patient, nurse anesthetist, physician, dentist, podiatrist or other health care professional.”

ASA’s position

The ASA’s position is set forth in its “Guidelines for the Ethical Practice of Anesthesiology.” 

Anesthesiologists working with nurse anesthetists are expected by ASA, to carry out the following responsibilities:

a. Preanesthetic evaluation of the patient.

b. Prescription of the anesthesia plan.

c. Personal participation in the most demanding procedures in this plan, especially those of induction and emergence.

d. Following the course of anesthesia administration at frequent intervals.

e. Remaining physically available for the immediate diagnosis and treatment of emergencies.

f. Providing indicated postanesthesia care.

The ASA standards look remarkably like the Tax Equity and Fiscal Responsibility Act (TEFRA) standards which were adopted in 1982 to determine when a CRNA was “medically directed.” Although it may appear that TEFRA supports the ASA position, such a conclusion would be incor-
rect. The TEFRA requirements are for reimbursement purposes only and, even then, only if the anesthesiologist is to be reimbursed at the same rate as if the anesthesiologist had personally performed the procedure. The Health Care Financing Administration (HCFA) will reimburse anesthesia services provided by a nurse anesthetist whether or not the nurse anesthetist is medically directed by an anesthesiologist and whether or not the supervising anesthesiologist performs the TEFRA conditions.

While the words may be the same, there is a vast difference between a level of supervision which entitles an anesthesiologist to be paid as if he or she administered the service himself or herself and a level of supervision needed to satisfy certain state licensing requirements that there be physician involvement when anesthesia is administered. Nonetheless, ASA has attempted to maintain that “ethical anesthesia” requires that an anesthesiologist evaluate the patient, be present for induction, and perform the remainder of the steps outlined above.

**Standards adopted by JCAHO**

The Joint Commission on the Accreditation of Health Care Organizations (JCAHO) has adopted standards for supervising anesthesia care which are quite different from the ASA’s requirements. JCAHO standards require that anesthesia care for each patient is provided directly by a licensed independent practitioner or by an individual who is “directed or supervised” by a licensed independent practitioner. A JCAHO publication explains: “The standards do not require that a supervising, licensed independent practitioner (for example, surgeon or obstetrician) have privileges to administer anesthesia, but the practitioner must be capable of reviewing the results of the preanesthesia evaluation, of determining that the patient is an appropriate candidate to undergo the planned anesthesia (SA.1.5.2), and of determining that the patient can be discharged (SA.1.5.6).”

**Some history**

Nor does history support the ASA’s restrictive position. What was meant by “supervision” when nurse anesthetist statutes were originally enacted? Even in the early days of anesthesia, nurse anesthetists, being bright and capable, rapidly became more adept at anesthesia than the physicians “supervising” them. Consider three nurse anesthetists (these examples are derived from Virginia Thatcher’s book, *History of Anesthesia with Emphasis on the Nurse Specialist*, and the historic notion of supervision. Thatcher found the first group of nurse anesthetists to be Catholic sisters and she reported an interview with a Sister Secundina Mindrup, CRNA, who had developed a timing device for administering a mixture of ether and chloroform depending on how much relaxation was required: “a decade of prayers on her rosary and it was time to give a little more.” Is it likely that the physician “supervising” Sister Secundina would have told her to give anesthesia by timing it with her prayers?

Alice Magaw, the famous nurse anesthetist at the Mayo Clinic, devised her own method of administering open-drop chloroform and ether anesthesia superior to virtually anything that was being used at the time. Physicians came to Mayo to learn her methods. It is obvious that the physicians who admired her work could have added little to her methods or safety through “supervision.” Finally, George Crile, MD, wrote that Agatha Hodgins had learned to skillfully adjust dosages based on her experience and experimentation with anesthetic agents.

Thus, historically, those who supervised nurse anesthetists acknowledged that nurse anesthetists were more knowledgeable, got better results, and had better techniques than the “supervisors.” It was not necessary that Dr. Crile be able to administer anesthesia to “supervise” Agatha Hodgins, CRNA. Being the bright and dynamic woman that she was, it was obvious that after a relatively short period of time of specialization Agatha Hodgins would clearly know more about anesthesia than Dr. Crile. Yet, under the statutes then being adopted, it was understood that Dr. Crile was “supervising” Agatha Hodgins. ASA’s requirements for medical direction were never what licensing laws contemplated by “supervision.” Physicians provided some medical input but they were not expected to control the anesthetic process.

In contemporary times, the dispute between AANA and ASA has raged for many years. Since the issue involves the meaning of “supervision” in laws and statutes, it can be assumed that the courts would be involved. However, it has been difficult to find cases in which a court reviews these issues. Licensing and regulatory bodies permit healthcare wide latitude. Since the practice of nurse anesthetists working directly with surgeons is so well accepted, regulatory procedures involving supervision of nurse anesthetists rarely come to court. Similarly, issues of supervision seldom arise in malpractice cases. Nurse anesthetists are expected to administer anesthesia with the same quality and results as anesthesiologists. Thus, most anesthesia malpractice cases are decided on the basis of the standard of care rather than the level of supervision. A surgeon’s liability is usually based on
whether the surgeon controlled or had the right to control the procedure which gave rise to the negligence. Cases based on a claim that the surgeon failed to carry out some obligation to supervise are rare. Consequently, it is “news” that the Mississippi Supreme Court recently had an opportunity to discuss supervision in a decision upholding a jury verdict in favor of a surgeon working with a nurse anesthetist.

**Starcher v Byrne**

In *Starcher v Byrne*, 687 So. 2d 737 (Mississippi, 1997), a patient was admitted to a hospital to correct a ventral hernia. Anesthesia was administered by a CRNA employed by an anesthesiologist. As the CRNA began induction, the surgeon received an emergency page. He went into the hallway outside the operating room, but, in compliance with hospital policy, remained within the operating suite to answer the page while the CRNA induced the patient. The nurse anesthetist had trouble inducing the patient. When the surgeon returned, he and the nurse anesthetist determined that the patient was suffering from a bronchospasm. Based on their diagnosis, the operating team conducted emergency treatment. Due to the patient’s condition, her heart rate began to fall rapidly. The surgeon successfully administered cardiopulmonary resuscitation to the patient and she was stabilized. However, as a result of her inability to breathe and the failure of her heart to adequately pump blood to all regions of her body, specifically her brain, for several minutes, the patient suffered brain damage resulting in decreased intellectual and physical capacity. The patient remained comatose for several days following the incident.

The plaintiffs (the patient and her husband) brought suit against the surgeon contending that he was negligent because he was not present in the operating room at the induction of anesthesia by the nurse anesthetist. They contended that the standards of practice for nurse anesthetists required that a CRNA work under the direction of and in the physical presence of a licensed physician. Because the nurse anesthetist’s employer, the anesthesiologist, was not in the operating room or even at the hospital, the plaintiffs claimed that the surgeon was in charge of the operating room. Therefore, his failure to be present at the induction of anesthesia constituted a breach of the standard of care. At trial, the jury returned a verdict in favor of the surgeon. The plaintiffs appealed, claiming that the jury’s verdict was contrary to the weight of the evidence and that the surgeon’s absence from the operating room should mean that he was liable because he failed to properly supervise the nurse anesthetist.

Mississippi does not have a statute on nurse anesthesia practice. The Mississippi Board of Nursing requires that nurse practitioners, which includes nurse anesthetists in Mississippi, practice in a collaborative/consultative relationship with a licensed physician or dentist. Interestingly, the Mississippi Supreme Court never mentioned licensing requirements in its decision. Instead, the case was decided based on practice standards and legal doctrines concerning tort liability. The Supreme Court of Mississippi upheld the jury verdict and dismissed the appeal. Basically, the Supreme Court held that the standard of care did not require the supervising physician to be in the operating room while anesthesia was being induced.

**Judge disagrees with decision**

The decision in the *Starcher* case was not unanimous. One of the judges did not agree with the majority and wrote his own opinion. His dissent is interesting because it gives us a hint of what the arguments were on the other side. Those arguments are quite familiar to nurse anesthetists.

The dissenting judge quoted a well-known legal work: “In most states, surgeons may be found liable for the failure to supervise a nurse anesthetist or vicariously liable for a nurse anesthetist’s negligence. 8 Am.Jur. Proof of Facts 2d, Surgeon’s Failure to Exercise Supervision and Control over Anesthetist § 1, 6 (1976). Such liability is usually predicated upon the captain of the ship doctrine . . . That the surgeon is captain of the ship does not expose him to unfettered liability for the acts of all personnel in the operating room. Rather, at least one court has found that the ‘vital test’ is whether the surgeon has the right to control the employee. Harris v Miller, 103 N.C.App. 312, 322, 407 S.E.2d 556, 562 (1991). In . . . this case . . . the issue of whether [the surgeon] had the right to control [the nurse anesthetist] was a proper matter for the jury to consider.”

Unlike the dissenting judge, the majority of the Mississippi Supreme Court was willing to analyze the relationship of the defendants and not rely on labels, as the dissent urged. The statement quoted by the dissent from *Proof of Facts* has caused a number of problems for nurse anesthetists. Someone probably assumed that surgeons “may be found liable for the failure to supervise a nurse anesthetist” because of a number of legal doctrines which once prevailed, such as “captain of the ship.” These doctrines are now outdated and seldom followed. Even when they were followed, the statement gives an inaccurate picture. It is unclear how it came to
be published or who purported to count the cases. There have been any number of decisions in which surgeons were not held liable for the negligence of nurse anesthetists. (In fact, in the Starcher case, there is no suggestion or evidence in the report of the case that the nurse anesthetist was negligent.)

The majority of justices of the Mississippi Supreme Court analyzed the relationship between surgeon and nurse anesthetist and concluded that there was sufficient evidence to uphold the jury's verdict. At trial, testimony had showed that the surgeon had little, if any, say over and was not expected to inject himself into the anesthesia process. There was testimony which the court said the jury could have believed that the surgeon could not tell the nurse anesthetist what to do. Nor could the surgeon expect the nurse anesthetist to obey the surgeon's commands if the nurse anesthetist thought that the surgeon was wrong. Moreover, the court found that it was common practice for a CRNA to perform the anesthesia for surgical procedures, in the absence of an anesthesiologist, so long as a physician was available in case of an emergency.

The plaintiffs had claimed that the standard of practice required that a nurse anesthetist work under the direction of and in the physical presence of a licensed physician. The Mississippi Supreme Court said there were two reasons why the plaintiff's argument must fail. First, the standards of practice apply to CRNAs, not physicians. The plaintiffs failed to present any evidence that the standards apply to physicians. Second, with the exception of the plaintiffs' expert witness, no doctor called by either side stated that a physician must be physically present in the operating room at the induction of anesthesia. Every other doctor called unequivocally stated that the common practice was only that the surgeon be in the operating suite. It was the general consensus of all doctors who testified, except for the plaintiffs' expert, that the operating physician had a tendency to get in the way more than anything else when he or she was in the operating room at the induction of anesthesia. Further, the head of a neighboring hospital testified that it was their hospital policy that the operating physician be within the operating suite, not in the operating room at the induction of anesthesia.

The plaintiffs had made a number of claims concerning “captain of the ship” and “borrowed servants” which the court dismissed because the nurse anesthetist was an employee of the anesthesiologist. What made the case of interest was the court's holding on supervision. The court rejected artificial rules and looked to the reality of practice in its holding: “There was adequate evidence that the CRNA could administer anesthesia where neither a surgeon nor an anesthesiologist is present in the operating room, that Mississippi CRNAs are licensed to do so, and that this was a fairly common practice.”

REFERENCES
Changes in the health care industry have brought many new challenges to CRNAs and we want to make sure you have the right insurance products to meet those challenges. Anesthesia Professional Liability Services, (A+) now has policies for virtually every practice setting including:

- Students
- Hospital-Employed CRNAs
- Physician-Employed CRNAs
- Self-Employed CRNAs
- Part Time CRNAs
- Locum Tenens CRNAs
- CRNA Groups
- MD/CRNA Groups
- Staffing Agencies

A+ will continue to offer Claims-Made coverage through St. Paul. In addition, we will now be offering Occurrence form coverage through TIG Insurance Company (formerly Transamerica Insurance Group) which has a Best’s rating of “A” (Excellent). The Occurrence form coverage through TIG is available exclusively through A+.

A+ has more products and coverages for CRNAs than any other source. Some of the highlights of our new products include:

- Occurrence form coverage for all practice settings
- Discounted rates for Part Time CRNAs
- Discounted rates for Employed CRNAs
- Discounted rates for New Graduates
- Practice Interruption Discount
- Defense Coverage for Disciplinary Actions
- Loss of Earnings Due to Court Appearances

If you have questions about your professional liability coverage, call A+.
Professional liability for CRNAs is our specialty. It’s all we do!

A+ is a wholly-owned subsidiary of the AANA.
When you support A+, you’re also supporting the AANA.

1-800-343-1368
Anesthesia Professional Liability Services
222 S. Prospect Avenue
Park Ridge, IL 60068
Now Available

Naropin™

(ropivacaine HCl)

safety/control
**Dose tolerability**

- In two clinical pharmacology studies, equal infusion rates of Naropin™ (ropivacaine HCl) and bupivacaine were compared. In one clinical pharmacology study, the mean maximum IV dose of Naropin tolerated was significantly higher than that of bupivacaine (124 ± 38 mg of Naropin vs. 99 ± 30 mg of bupivacaine, \( p < 0.01 \)); in the other clinical pharmacology study, the difference in doses was not statistically significant (115 ± 29 mg of Naropin vs. 103 ± 30 mg of bupivacaine).\(^1\,^2\)

**Less depression of cardiac conductivity than bupivacaine**

- In the same two studies, Naropin caused significantly less depression of cardiac conductivity (less QRS widening) than bupivacaine at the end of IV infusion.\(^1\,^2\)

- Administration of higher than recommended doses of Naropin to achieve greater motor blockade or increased duration of sensory blockade may negate the advantages of Naropin’s favorable cardiovascular depression profile in the event that an inadvertent intravascular injection occurs. Naropin should be administered in incremental doses.

For obstetrical anesthesia, eg, cesarean section, the 5.0 mg/mL (0.5%) Naropin solution in doses up to 150 mg is recommended. As with all local anesthetics, Naropin should be administered in incremental doses.

Reactions to Naropin are characteristic of those associated with other amide-type local anesthetics. Most adverse events reported in clinical trials were mild and transient, and may reflect the surgical procedures, patient characteristics (including disease) and/or medications administered. Adverse events reported with an incidence >5% were hypotension, fetal bradycardia, nausea, bradycardia, vomiting, paresthesia, and back pain.

Solutions of Naropin should not be used for the production of obstetrical paracervical block anesthesia, retrobulbar block or spinal anesthesia (subarachnoid block) due to insufficient data to support such use. Intravenous regional anesthesia (Bier block) should not be performed due to lack of clinical experience and the risk of attaining toxic blood levels of Naropin. For further information, please see attached brief summary of prescribing information.

*Not an indicated use of Naropin. Please see a brief summary of prescribing information on the following pages.*


© 1996 Astra USA, Inc. PM7787
Limited motor blockade with 2.0 mg/mL (0.2%)³

Fewer instrumental deliveries with Naropin than bupivacaine

- In a prospective meta-analysis of six double-blind studies, there were significantly fewer instrumental deliveries in mothers receiving Naropin as compared with bupivacaine ($p = 0.004$).⁵

Reliable management of acute pain

- Analgesia during labor was judged as "good" or "excellent" by 87% of patients with 2.0 mg/mL (0.2%) at 6 to 10 mL/h.³

Effective surgical anesthesia with Naropin 10.0 mg/mL (1.0%)⁶

- Incidence of complete analgesia and complete muscle relaxation similar to bupivacaine 0.75%.⁶
CONTRAINdications

Naropin is contraindicated in patients with a known hypersensitivity to Naropin or to any local anesthetic agent of the amide type.

WARNINGS

FOR CESEAREAN SECTION, THE 5 MG/DL (0.5%) NAROPIN SOLUTION IN DOSES UP TO 150 MG IS
RECOMMENDED. HIGHER DOSAGES SHOULD BE ADMINISTERED IN INCREMENTS.

Doses of local anesthetics should be titrated to the patient's needs. The block should be
observed for local anesthetic toxicity and other signs of reaction. The dose should be
increased gradually until the desired effect is achieved. Excessive dosing may result in
severe adverse reactions. The maximum recommended dose is

Concurrent administration of other local anesthetics should be avoided.

Intravascular injection is still possible even if results of the test dose are negative.

Naropin should be used in patients undergoing other local anesthetics or agents
structurally related to amide-type local anesthetics, since the toxic effects of these drugs are
additive.

PRECAUTIONS

General

The safe and effective use of local anesthetics depends on proper dosage, correct technique,
adequate precautions and readiness for emergencies.

Resuscitative equipment, oxygen and other resuscitative drugs should be available for immediate
use (see WARNINGS and ADVERSE REACTIONS). The lowest dosage that results in effective
anesthesia should be used to avoid high plasma levels and serious adverse effects. Injections
should be made slowly and incrementally, with frequent aspirations before and during the injection
to avoid intravascular injection. When the needle is withdrawn after injection, aspiration should
be performed to ensure against an intravascular or subarachnoid injection. However, a negative
aspiration does not ensure against an intravascular or subarachnoid injection.

A well established history of an adverse reaction to any local anesthetic agent of the amide type
may preclude its safe use in that patient. In such cases, an alternative form of anesthesia should be
considered. The use of local anesthetics in patients with impaired circulatory and respiratory
functions (e.g., congestive heart failure, asthma, emphysema) is contraindicated.

Local anesthetics are contraindicated in patients who have received MAO inhibitors (except
triptans) within a period of 2 weeks.

When appropriate, patients should be informed in advance that they may experience temporary loss
of sensation and motor activity in the anesthetized part of the body following administration of local
anesthetic agent of the amide type. Naropin, which is metabolized by this isozyme family may
potentially interact with Naropin. Such interaction may result in a possibility of drugs known to be
metabolized by CYP4A12 via competitive inhibition such as theophylline, imipramine and potent
inhibitors such as fluvastatin and verapamil.

Carcinogenesis, Mutagenesis, Impairment of Fertility

Long-term studies in animals of most local anesthetics, including Naropin, to evaluate the
carcinogenic potential have not been conducted.

Weaker mutagenic activity was seen in the mouse lymphoma test. Mutagenicity was not noted in the
other assays, demonstrating that the weak signs of in vitro activity in the mouse lymphoma test
were not manifested under diverse in vitro conditions.

Studies performed with ropivacaine in rats did not demonstrate an effect on fertility or general
reproductive performance over two generations.

Pregnancy Category B

Teratogenic studies in rats and rabbits did not show evidence of any adverse effects on
organogenesis or early fetal development in rats or rabbits. The doses used were approximately
equal to 5 and 2.5 times, respectively, the maximum recommended human dose (250 mg) based on
body weight. There were no treatment related effects on embryonic and fetal viability or growth in
either species. However, the results of these studies have not been confirmed in other species. There
were no treatment related effects on late fetal development, parturition, lactation, or neonatal viability or
growth of the offspring in two perinatal and postnatal studies in rats, at dose levels equal to 5 and 2.5
times, respectively, the maximum recommended human dose (250 mg) based on body weight. There
were no treatment related effects on late fetal development, parturition, lactation, or neonatal viability or
growth of the offspring in 2 perinatal and postnatal studies in rats, at dose levels equal to 5 and 2.5
times, respectively, the maximum recommended human dose (250 mg) based on body weight. There
were no treatment related effects on late fetal development, parturition, lactation, or neonatal viability or
growth of the offspring in 2 perinatal and postnatal studies in rats, at dose levels equal to 5 and 2.5
times, respectively, the maximum recommended human dose (250 mg) based on body weight. There
were no treatment related effects on late fetal development, parturition, lactation, or neonatal viability or
growth of the offspring in 2 perinatal and postnatal studies in rats, at dose levels equal to 5 and 2.5
times, respectively, the maximum recommended human dose (250 mg) based on body weight. There
were no treatment related effects on late fetal development, parturition, lactation, or neonatal viability or
growth of the offspring in 2 perinatal and postnatal studies in rats, at dose levels equal to 5 and 2.5
times, respectively, the maximum recommended human dose (250 mg) based on body weight. There
were no treatment related effects on late fetal development, parturition, lactation, or neonatal viability or
growth of the offspring in 2 perinatal and postnatal studies in rats, at dose levels equal to 5 and 2.5
times, respectively, the maximum recommended human dose (250 mg) based on body weight. There
were no treatment related effects on late fetal development, parturition, lactation, or neonatal viability or
growth of the offspring in 2 perinatal and postnatal studies in rats, at dose levels equal to 5 and 2.5
times, respectively, the maximum recommended human dose (250 mg) based on body weight. There
were no treatment related effects on late fetal development, parturition, lactation, or neonatal viability or
growth of the offspring in 2 perinatal and postnatal studies in rats, at dose levels equal to 5 and 2.5
times, respectively, the maximum recommended human dose (250 mg) based on body weight. There
were no treatment related effects on late fetal development, parturition, lactation, or neonatal viability or

For the indication epidural anesthesia for surgery, the 15 most common adverse events were:

- Psychiatric Disorders: convulsion, hypokinesia, hypotonia, ptosis, stupor
- Myo/Endo/Pericardium
- Musculoskeletal System
- General and Other Disorders
- Gastrointestinal System

One patient experienced hypotension, but occurred at an overall rate of less than one percent, and were considered clinically insignificant.

Adverse Events Reported in ≥1% of Patients Receiving Regional Or Local Anesthesia

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>Naropin N (%)</th>
<th>Bupivacaine N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension</td>
<td>237 (31.9)</td>
<td>225 (28.3)</td>
</tr>
<tr>
<td>Nausea</td>
<td>97 (12.4)</td>
<td>96 (12.0)</td>
</tr>
<tr>
<td>Paresthesia</td>
<td>51 (6.9)</td>
<td>44 (6.0)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>46 (6.0)</td>
<td>48 (6.2)</td>
</tr>
<tr>
<td>Back pain</td>
<td>36 (4.9)</td>
<td>37 (4.7)</td>
</tr>
<tr>
<td>Pain</td>
<td>30 (4.0)</td>
<td>32 (4.2)</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>32 (4.3)</td>
<td>32 (3.8)</td>
</tr>
<tr>
<td>Headache</td>
<td>23 (3.2)</td>
<td>21 (2.6)</td>
</tr>
<tr>
<td>Fever</td>
<td>21 (2.7)</td>
<td>21 (2.6)</td>
</tr>
<tr>
<td>Dizziness</td>
<td>19 (2.6)</td>
<td>16 (2.0)</td>
</tr>
<tr>
<td>Pruritus</td>
<td>16 (2.2)</td>
<td>17 (2.1)</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>10 (1.3)</td>
<td>12 (1.5)</td>
</tr>
<tr>
<td>Headache</td>
<td>8 (1.1)</td>
<td>8 (1.1)</td>
</tr>
</tbody>
</table>

Online Medical Information - injection site pain Cardiovascular System - vasovagal reaction, syncope, postural hypotension, non-specific ECG abnormalities Female Reproductive - poor progression of labor, uterine atony Gastrointestinal System - fecal incontinence, tenesmus General and Other Disorders - hypothermia, malaise, asthma, accident and/or injury Hearing and Vestibular - tinnitus, hearing abnormalities Heart Rate and Rhythm - nonspecific arrhythmias, atrial fibrillation Liver and Biliary System - jaundice Metabolic Disorders - hypokalemia, hypomagnesemia Musculoskeletal System - myalgia, cramps Myelo/Encephal/Pendiment - ST segment changes, myocardial infarction Nervous System - tremor, Horner's syndrome, paresthesia, dyskinesia, neuropathy, vertigo, convulsion, hypokinesia, hypotonia, ptosis, stupor Psychiatric Disorders - agitation, confusion, somnolence, nervousness, amnesia, hallucination, emotional lability, insomnia, nightmares Respiratory System - dyspnea, bronchospasms, coughing Skin Disorders - rash, urticaria Urinary System Disorders - urinary incontinence, genitourinary tract infection, necrotizing disorder Vascular - deep vein thrombosis, phlebitis, pulmonary embolism Vision - vision abnormalities

The following list includes all adverse and intercurrent events which were recorded in more than one patient, but occurred at an overall rate of less than one percent, and were considered clinically relevant.

Application Site Reactions - injection site pain Cardiovascular System - vasovagal reaction, syncope, postural hypotension, non-specific ECG abnormalities Female Reproductive - poor progression of labor, uterine atony Gastrointestinal System - fecal incontinence, tenesmus General and Other Disorders - hypothermia, malaise, asthma, accident and/or injury Hearing and Vestibular - tinnitus, hearing abnormalities Heart Rate and Rhythm - nonspecific arrhythmias, atrial fibrillation Liver and Biliary System - jaundice Metabolic Disorders - hypokalemia, hypomagnesemia Musculoskeletal System - myalgia, cramps Myelo/Encephal/Pendiment - ST segment changes, myocardial infarction Nervous System - tremor, Horner's syndrome, paresthesia, dyskinesia, neuropathy, vertigo, convulsion, hypokinesia, hypotonia, ptosis, stupor Psychiatric Disorders - agitation, confusion, somnolence, nervousness, amnesia, hallucination, emotional lability, insomnia, nightmares Respiratory System - dyspnea, bronchospasms, coughing Skin Disorders - rash, urticaria Urinary System Disorders - urinary incontinence, genitourinary tract infection, necrotizing disorder Vascular - deep vein thrombosis, phlebitis, pulmonary embolism Vision - vision abnormalities

The most commonly encountered acute adverse experiences that demand immediate countermeasures are related to the central nervous system and the cardiovascular system. These adverse experiences are generally dose-related and due to high plasma levels which may result from overdosage, rapid absorption from the injection site, diminished tolerance or from unintentional intravascular injection of the local anesthetic solution. In addition to systemic dose-related untoward effects, accidental subcutaneous injection of drug during the intended performance of lumbar epidural block or nerve blocks near the vertebral column (especially in the head and neck region) may result in underventilation or apnea ("Total or High Spinal"). Also, hypotension due to loss of sympathetic tone and resultant cardiac parasympathetic or underventilation due to cephalad extension of the motor level of anesthesia may occur. This may lead to secondary cardiac arrest if untreated. Factors influencing plasma protein binding, such as acidoisis, systemic diseases that alter protein production or competition with other drugs for protein binding sites, may diminish individual tolerance.

Central Nervous System Reactions

The most commonly encountered acute adverse experiences that demand immediate countermeasures are related to the central nervous system and the cardiovascular system. These adverse experiences are generally dose-related and due to high plasma levels which may result from overdosage, rapid absorption from the injection site, diminished tolerance or from unintentional intravascular injection of the local anesthetic solution. In addition to systemic dose-related untoward effects, accidental subcutaneous injection of drug during the intended performance of lumbar epidural block or nerve blocks near the vertebral column (especially in the head and neck region) may result in underventilation or apnea ("Total or High Spinal"). Also, hypotension due to loss of sympathetic tone and resultant cardiac parasympathetic or underventilation due to cephalad extension of the motor level of anesthesia may occur. This may lead to secondary cardiac arrest if untreated. Factors influencing plasma protein binding, such as acidoisis, systemic diseases that alter protein production or competition with other drugs for protein binding sites, may diminish individual tolerance.

Central Nervous System Reactions

These are characterized by excitation and/or depression. Restlessness, anxiety, dizziness, tinnitus, blurred vision or terrors may occur, possibly proceeding to convulsions. However, excitement may be transient or absent, with depression being the first manifestation of an adverse reaction. This may quickly be followed by drowsiness merging into unconsciousness and respiratory arrest. Other central nervous system effects may be nausea, vomiting, chills, and/or constriction of the pupils.

The incidence of convulsions associated with the use of local anesthetics varies with the route of administration and the total dose administered. In a survey of studies of epidural anesthesia, overt toxicity progressing to convulsions occurred in approximately 0.1 percent of local anesthetic administrations.

Cardiovascular System Reactions

High doses or unintentional intravascular injection may lead to high plasma levels and related depression of the myocardium, decreased cardiac output, heart block, hypotension, bradycardia, ventricular arrhythmias, including ventricular tachycardia and ventricular fibrillation, and possibly cardiac arrest. (See WARNINGS, PRECAUTIONS, and OVERDOSAGE sections.)

Allergic Reactions

Allergic-type reactions are rare and may occur as a result of sensitivity to the local anesthetic (see WARNINGS). These reactions are characterized by signs such as urticaria, pruritus, erythema, angioneurotic edema (including laryngeal edema), tachycardia, sneezing, nausea, vomiting, dizziness, syncope, excessive sweating, elevated temperature, and possibly anaphylactoid symptomatology (including severe hypotension). Cross sensitivity among members of the amide-type local anesthetic group has been reported. The usefulness of screening for sensitivity has not been definitively established.
Neurologic Reactions
The incidence of adverse neurologic reactions associated with the use of local anesthetics may be related to the total dose and concentration of local anesthetic administered and are also dependent upon the particular drug used, the route of administration and the physical status of the patient. Many of these observations may be related to local anesthetic techniques, with or without a contribution from the drug itself. During lumbar epidural block, occasional unintentional penetration of the subarachnoid space by the catheter or needle may occur. Subsequent adverse effects may depend partially on the amount of drug administered, the depth of surgical anesthesia and the physical status of the patient, and may be characterized by a loss of consciousness, respiratory depression and paralyzation.

OVERDOSE
Acute emergencies from local anesthetics are generally related to high plasma levels encountered during therapeutic use of local anesthetics or to unintended subarachnoid or intravascular injection of local anesthetic solution. (See ADVERSE REACTIONS, WARNINGS, and PRECAUTIONS.)

Management of Local Anesthetic Emergencies
The practitioner should be familiar with contemporary textbooks that address the management of local anesthetic emergencies. No specific information is available on the treatment of overdosage with Naropin; treatment should be symptomatic and supportive. Therapy with Naropin should be discontinued.

The first consideration in prevention, best accomplished by incremental injection of Naropin, careful and constant monitoring of cardiovascular and respiratory vital signs and the patient’s state of consciousness after each local anesthetic injection and during continuous infusion. At the first sign of respiratory or circulatory depression, administer oxygen directly.

The first step in the management of systemic toxic reactions, as well as underventilation or apnea due to unintentional subarachnoid injection of drug solution, consists of immediate attention to the establishment and maintenance of a patent airway and effective assisted or controlled ventilation. Oxygen administered at 100% concentration is helpful in the management of severe neurologic effects following subarachnoid block administration during epidural anesthesia may include persistent anaphylaxis, paresthesia, weakness, paralysis of the lower extremities and loss of sphincter control. Intravenous drip of physiologic saline should be established, incomplete atropinization, respiratory depression, meningeal irritation, slowing of labor, increased incidence of forceps delivery, or cranial nerve palsies due to traction on nerves from loss of cerebrospinal fluid have been reported. (See DOSAGE AND ADMINISTRATION discussion of lumbar epidural block). A high spinal is characterized by loss of consciousness, respiratory depression and paralyzation.

POSTOPERATIVE PAIN MANAGEMENT

Dosage Recommendations

<table>
<thead>
<tr>
<th>Conc</th>
<th>mg/mL (%)</th>
<th>Volume mL</th>
<th>Dose mg</th>
<th>Smart hr</th>
<th>Duration hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumbar Epidural</td>
<td>5.0 (0.5%)</td>
<td>15-30</td>
<td>75-150</td>
<td>15-30</td>
<td>2-4</td>
</tr>
<tr>
<td>Surgery</td>
<td>7.5 (0.5%)</td>
<td>15-25</td>
<td>113-188</td>
<td>10-20</td>
<td>2</td>
</tr>
<tr>
<td>Lumbar Epidural</td>
<td>5.0 (0.5%)</td>
<td>20-30</td>
<td>100-150</td>
<td>10-25</td>
<td>2-4</td>
</tr>
<tr>
<td>Thoracic Epidural</td>
<td>5.0 (0.5%)</td>
<td>5-15</td>
<td>25-75</td>
<td>10-20</td>
<td>0-10</td>
</tr>
</tbody>
</table>

Lumbar Epidural Administration
To establish block for postoperative pain relief

Major Nerve Block (e.g. median, sural block) | 5.0 (0.5%) | 35-50 | 175-350 | 15-30 | 5-8 |

Field Block (e.g. pin/nerve block administrations) | 5.0 (0.5%) | 1-4 | 5-20 | 0-1 |

LUMBAR EPIDURAL ADMINISTRATION

<table>
<thead>
<tr>
<th>Infusion Rate (mg/h)</th>
<th>Continuous Dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-20</td>
<td>20-40</td>
</tr>
<tr>
<td>10-30</td>
<td>20-60</td>
</tr>
<tr>
<td>10-40</td>
<td>20-80</td>
</tr>
<tr>
<td>10-50</td>
<td>20-100</td>
</tr>
</tbody>
</table>

1 = Not Applicable
2 = Median dose of 21 mg per hour was administered by continuous infusion or by incremental injections (top-up) over a median delivery time of 5.5 hours
3 = Cumulative dose up to 770 mg of Naropin over 24 hours for postoperative pain management have been well tolerated in studies.

The doses in the table are those considered to be necessary to produce a successful block and should be regarded as guidelines for use in adults. Individual variations in onset and duration of effects, as well as the figures reflect the expected average dose range needed. For other local anesthetic techniques standard current textbooks should be consulted.

When prolonged blocks are used, either through continuous infusion or through repeated bolus administration, the risks of reaching a toxic plasma concentration or inducing local neural injury must be considered. Experience to date indicates that a cumulative dose of up to 770 mg Naropin administered over 24 hours is well tolerated in adults when used for postoperative pain management.

For management of postoperative pain, the following technique can be recommended: If regional anesthesia was not used intraoperatively, then an epidural block with Naropin is induced via an epidural catheter. Analgesia is maintained with an infusion of Naropin, 2 mg/mL (0.2%). Clinical studies have demonstrated that infusion rates of 6-10 mg (12-20 mg/h) per hour provide adequate analgesia with only slight and nonprogressive motor block in cases of moderate to severe postoperative pain. If patients require additional pain relief, higher infusion rates of up to 14 mg (28 mg) per hour may be used. With this technique a significant reduction in the need for opioids was demonstrated. Clinical experience supports the use of Naropin epidural infusions for up to 24 hours.

HOW SUPPLIED

Naropin® Astra-E 2% Sterile Single Dose Vials:
- 7.5 mg/mL (2%) | 5 mL NDC 0186-0868-51
- 10.0 mg/mL (2%) | 10 mL NDC 0186-0868-52

Naropin® Sterile Single Dose Vials:
- 2.0 mg/mL (1.0%) | 5 mL NDC 0186-0868-53
- 5.0 mg/mL (1.0%) | 10 mL NDC 0186-0868-54
- 7.5 mg/mL (1.0%) | 15 mL NDC 0186-0868-55
- 10.0 mg/mL (1.0%) | 20 mL NDC 0186-0868-56

Naropin® Single Dose Ampules:
- 2.0 mg/mL (1.0%) | 0.5 mL NDC 0186-0859-59
- 5.0 mg/mL (1.0%) | 1.5 mL NDC 0186-0859-62
- 7.5 mg/mL (1.0%) | 2.5 mL NDC 0186-0859-63
- 10.0 mg/mL (1.0%) | 3.5 mL NDC 0186-0859-64

Naropin® Sterile-Fast® Single Dose Vials:
- 2.0 mg/mL (1.0%) | 20 mL Product Code 0868-59
- 5.0 mg/mL (1.0%) | 50 mL Product Code 0868-63
- 7.5 mg/mL (1.0%) | 75 mL Product Code 0868-64
- 10.0 mg/mL (1.0%) | 100 mL Product Code 0868-65

Naropin® Sterile-Fast® Single Dose Vials:
- 2.0 mg/mL (1.0%) | 20 mL Product Code 0868-59
- 5.0 mg/mL (1.0%) | 50 mL Product Code 0868-63
- 7.5 mg/mL (1.0%) | 75 mL Product Code 0868-64
- 10.0 mg/mL (1.0%) | 100 mL Product Code 0868-65

The solubility of ropivacaine is limited at pH above 6. Thus care must be taken as precipitation may occur if Naropin is mixed with alkaline solutions.

When chemical disinfection of the container surface is desired, either isopropyl alcohol (91%) or ethyl alcohol (96%) is recommended. It is recommended that chemical disinfection be accomplished by wiping the ampule or vial stopper thoroughly with cotton or gauze that has been moistened with the recommended alcohol just prior to use. When a container is required to have a stopper, a sterile, sterile-

The products are intended for single use and are free from preservatives. Any solution remaining from an opened container should be discarded promptly. In addition, continuous infusion bottles should not be left in place for more than 24 hours.